

BASIC ASSESSMENT REPORT FOR THE PROPOSED MAKHOKHOBA ROAD, MKHAMBATHINI LOCAL MUNICIPALITY, KWAZULU-NATAL

DC22/0018/2021

KZN/EIA/0001622/2021



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August 2021

 <p>P.O. Box 52143 Berea Road Durban - 4007</p> <p>Cell: 082 788 0484 Email: saan@sesehq.co.za</p>	<p>THE PROPOSED MAKHOKHOBA ROAD, CAMPERDOWN, KWAZULU-NATAL</p>
<p>Date:</p>	
<p>Report Status:</p>	<p>DRAFT BAR</p>
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KEY DETAILS

Name and Contact Details of the EAP

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<p>Qualifications of EAP representative</p>	<p>BSocSci (Honours) Geography and Environmental Management (8 years experience)</p>

Name and Contact Details of the Applicant

<p>Name of Applicant</p>	<p>Mkhambathini local Municipality</p>
<p>Physical Address</p>	<p>Private Bag X04, Camperdown</p>
<p>Postal Code</p>	<p>3720</p>
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Table of Contents

SECTION 1: INTRODUCTION	1
SECTION 2: DETAILS OF THE EAP AND APPLICANT	1
2.1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	1
Table 1: Name and Contact Details of EAP	1
2.1 DETAILS OF APPLICANT	2
SECTION 3: LOCATION OF THE ACTIVITY	2
3.1 LOCATION	2
3.2 PROPERTY DETAILS	3
Table 4: Property Details	3
3.3 COORDINATES	3
SECTION 4: ACTIVITY DESCRIPTION	3
4.1 Project description	3
4.2 Phases of Development	7
4.2.1 The Planning and Design Phase	7
4.1.2 The Construction Phase	8
4.2.3 The Post Construction and Rehabilitation Phase	8
4.2.4 The Operation and Maintenance Phase	8
SECTION 5: APPLICABLE LEGISLATION	8
5.1 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014	8
5.3 FURTHER RELEVANT LEGISLATION, POLICIES AND GUIDELINES	13
5.3.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996	13
5.3.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998	13
5.3.3 MKHAMBATHINI MUNICIPALITY SPATIAL DEVELOPMENT FRAMEWORK	14
5.5.4 INTEGRATED DEVELOPMENT PLAN	14
5.3.5 OTHER APPLICABLE LEGISLATION	15
SECTION 6: DEVELOPMENT MOTIVATION	15
6.1 NEED AND DESIRABILITY	15
6.2 MOTIVATION FOR THE DEVELOPMENT OF MAKHOKHOBA BRIDGE ..	16
SECTION 7: ALTERNATIVES CONSIDERED	17
7.1 PREFERRED AND ALTERNATIVE SITE ALTERNATIVE	17
7.2 PREFERRED LAYOUT ALTERNATIVE	18
7.2.1 Preferred Layout Alternative: Layout Alternative 1	18
7.2.2 Recommended/Selected/Preferred Layout Alternative	18
7.3 PREFERRED TECHNOLOGY ALTERNATIVE	18

7.4 NO-GO ALTERNATIVE	18
SECTION 8: PUBLIC PARTICIPATION.....	19
8.1 Placement of site notices	19
8.2 Newspaper advert	21
8.3 Community Meeting with ward councillor:	21
8.4 Circulation of BID (background information document), Draft BAR.....	22
8.5 IAPS and Authorities Consulted	22
8.6 Comments from IAPs on BID.....	22
SECTION 9: DESCRIPTION OF THE AFFECTED ENVIRONMENT AND SUMMARY OF SPECIALIST STUDIES	22
9.1 TOPOGRAPHY	22
9.2 VEGETATION AND BIODIVERSITY	23
9.2 WETLAND ENVIRONMENT	23
9.4 GEOLOGY AND SOILS.....	24
Rock Head.....	25
9.5 HERITAGE AND CULTURAL.....	25
9.6 SOCIO-ECONOMIC PROFILE.....	25
9.7 CURRENT LAND-USES, ACCESS, SERVICES AND IMPACTS.....	26
9.8 SPECIALIST STUDIES IDENTIFIED IN THE DEA SCREENING TOOL WHICH WERE NOT COMMISSIONED:.....	27
SECTION 10. IMPACT ASSESSMENT	28
10.2 CONSTRUCTION AND POST CONSTRUCTION / OPERATIONAL PHASE IMPACTS	29
Impacts on watercourse/aquatic environment (-)	33
Shading (0).....	34
Fish migration (0).....	34
SECTION 11: ENVIRONMENTAL IMPACT STATEMENT.....	36
SECTION 12: RECOMMENDATIONS OF THE EAP	37

LIST OF TABLES:

Table 1: Name and contact details of EAP.....	1
Table 2: Expertise of EAP who prepared the report.....	1
Table 3: Name and Contact Details of the Applicant.....	2
Table 4: Property details.....	5
Table 5: Coordinates.....	5
Table 6: Other applicable legislation.....	10
Table 7: Potential Impacts and Mitigations.....	25
Table 8: Impacts rating.....	31

List of Figures:

Figure 1: Locality.....2
Figure 2: Image of proposed crossing point.....22

ANNEXURES

ANNEXURE A: MAPS

ANNEXURE B: SITE PHOTOGRAPHS

ANNEXURE C: DRAWINGS & LAYOUTS

ANNEXURE D: SPECIALISTS REPORTS

ANNEXURE D1: TERRESTRIAL VEGETATION ASSESSMENT REPORT

ANNEXURE D2: WETLAND FUNCTIONALITY & IMPACT ASSESSMENT REPORT

ANNEXURE D3: GEOTECHNICAL REPORT

ANNEXURE D4: PALAEOLOGICAL IMPACT ASSESSMENT

ANNEXURE E: ENVIRONMENTAL MANAGEMENT PROGRAM REPORT

ANNEXURE F: DEA SCREENING REPORT AND COMMENTARY REPORT

ANNEXURE G: CV OF EAP

ANNEXURE H: ADDITIONAL INFORMATION

ANNEXURE H1: ENGINEERING DESIGN REPORT AND CONSTRUCTION METHOD STATEMENT

ANNEXURE H2: EIA APPLICATION FORM AND EDTEA MEETING MINUTES

ANNEXURE I: PROOF OF PUBLIC PARTICIPATION, IAP REGISTER, COPIES OF COMMENTS,

SECTION 1: INTRODUCTION

SA Sheq Consultants have been appointed by Mzolo Consulting Engineers, on behalf of the Mkhambathini Local Municipality, to undertake the Basic Assessment process for the proposed construction of Makhokhoba Road, located in Cosmoore, ward 3 under Mkhambathini local municipality, KwaZulu-Natal.

As per GNR 982 of the Environmental Impact Assessment (EIA) Regulations (2014, as amended), a Basic Assessment (BA) process must be undertaken in such a manner that the environmental outcomes, impacts and residual risks of the proposed Listed Activities being applied for are noted in the BA report and assessed accordingly by the Environmental Assessment Practitioner (EAP). **In this regard, the requirements of the BA process are noted in the EIA Regulations, 2014 (as amended), Listing Notice 1 and Listing Notice 3. The project is also subject to a water use licence application from the Department of Water and Sanitation and thus comments pertaining to the licence application are also required.**

SECTION 2: DETAILS OF THE EAP AND APPLICANT

2.1 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

SA Sheq Consultants has been appointed by Mkhambathini Local Municipality as the professional team to undertake the Basic Assessment process for the proposed Makhokhoba Road in Cosmoore within Mkhambathini Municipality, KwaZulu-Natal.

The following table (**Table 2**) contains details of the qualified EAPs from SA Sheq Consultants involved in undertaking the BA process. The Curriculum Vitae (CV) of the relevant EAPs is attached as Appendix H of this report.

Table 1: Name and Contact Details of EAP

Name of EAP	SA Sheq Consultants
Physical Address	P.O.Box 52143 Berea Road Durban
Postal Code	4007
EAP Representative Contact	Vukani Ngwabi
Telephone	073 3685 731
Email	vukanih@yahoo.com

Table 2: Names and Expertise of the EAP who prepared this Report

EAP	Qualifications	Experience (Yrs.)
Mr Vukani Ngwabi	-BSocSci (Honours) Geography and Environmental Management	8

The Curriculum Vitae (CV) of the relevant EAP is attached as Appendix H of this report. The signed Declaration by the EAP is attached in Appendix H.

2.1 DETAILS OF APPLICANT

Table 3: Name and Contact Details of the Applicant

Name of Applicant	Mkhambathini Municipality
Physical Address	Private Bag x 503 Ndwedwe
Postal Code	4000
Contact	Mr Sipho Zulu
Telephone	032 785 9300
Fax	-
Email	pmu@mkhambathini.gov.za

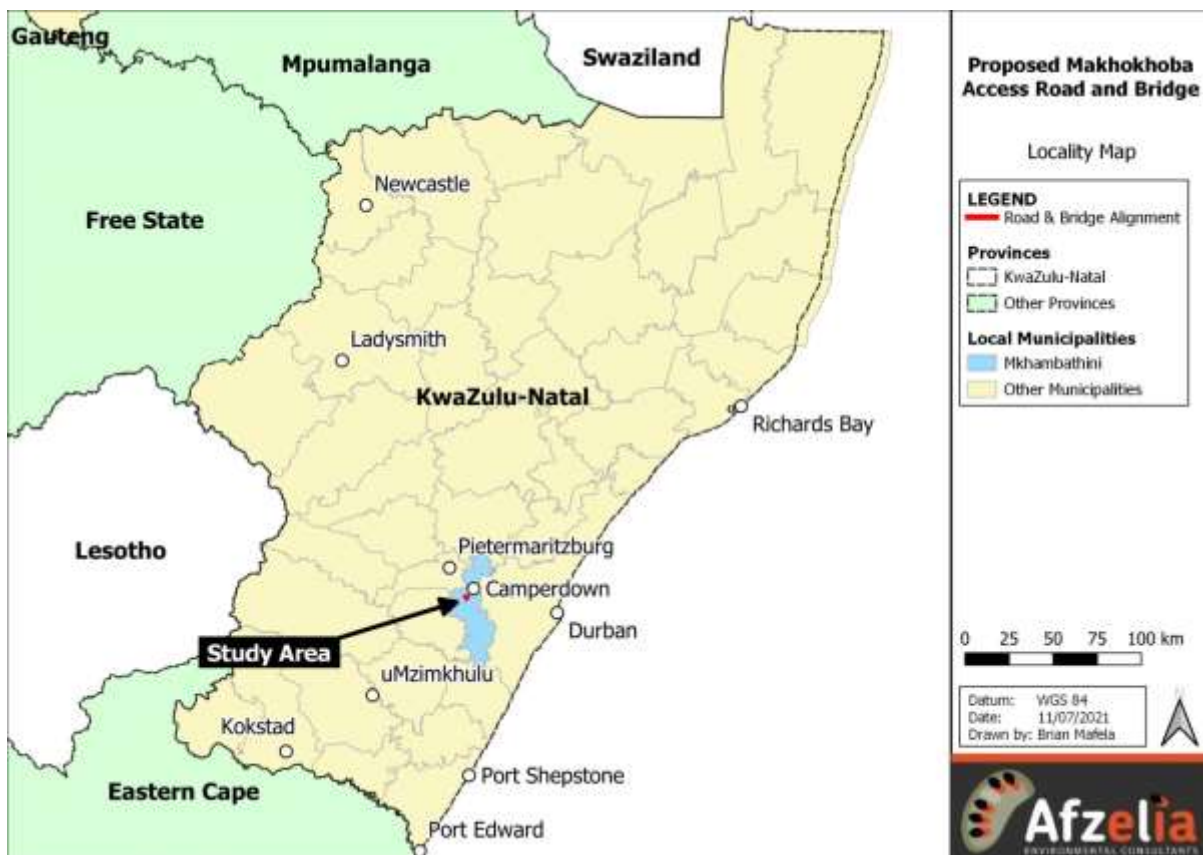
SECTION 3: LOCATION OF THE ACTIVITY

3.1 LOCATION

The proposed road is located in Cosmoore, Ward 3 which falls under the Mkhambathini Local Municipality. It is situated approximately 9 km from the town of Camperdown and the N3 highway.

The proposed site is currently used as an informal access and it will be connecting to P502. Refer to appendix A for layout and locality plans.

Figure 1: Locality (refer to appendix A for maps)



3.2 PROPERTY DETAILS

The property details (physical addresses, cadastral details and farm names), as well as the 21-digit Surveyor-General codes for the properties are listed in the table below:

Table 4: Property Details

Farm Name	21-digit Surveyor-General
COSMOORE Portion 0 of ERF 18684	N0FT00000000090200014

3.3 COORDINATES

Coordinates of centre points of the project locations are found in **Table 8** below:

Table 5: Coordinates

Start point

Latitude /Longitude	Degrees	Minutes	Seconds
South	29°	46'	23.92
East	30°	29'	49.05

Bridge position

Latitude /Longitude	Degrees	Minutes	Seconds
South	29°	46'	23.22
East	30°	29'	48.17

End point

Latitude /Longitude	Degrees	Minutes	Seconds
South	29°	46'	46"
East	30°	29'	40.43"

SECTION 4: ACTIVITY DESCRIPTION

This bridge construction project will involve the activities of removing material (more than 10 cubic meters) from a watercourse and infilling material into a watercourse; as well as erecting a structure within a watercourse. The activity also involves development of a structure of more than 100 square meters within a watercourse or within 32m of a watercourse. The development occurs within a watercourse where the area is Sensitive as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority and channels exceeds 10 square metres in size, the clearance will be more than 300 square meters of indigenous vegetation.

4.1 Project description

The proposed access road will connect with the P502 (Ingomankulu) road, an existing tarred road which feeds off the R603 road. The proposed access road will be 5.5m wide and 0.44km in total length. Additionally, the Makhokhoba access road construction will include the construction of a bridge which will cross an unnamed watercourse. The bridge crossing will be 10.5m in height and 100m in length.

STRUCTURAL SCHEME

The structure consists of 9.45 wide x 60.0 m long continuously supported solid slab decks, supported on wall type piers and closed face abutments, which are all founded on Strip footing.. The deck has a width of 6.07 m between the pedestrian guard blocks.

The proposed new structure is to accommodate two-way traffic, with 2.5 m traffic lane and a 0.45 m shoulder in both direction including on the eastern or downstream side of the bridge with an 850 mm high protective crash barrier between the lane and the walkway on a deck width of 2.03 m between end guard blocks. The piers for the deck option are positioned at 12.0 m apart. The bridge alignment is offset at 1.08m from the bridge alignment pivoted at the roadway.

The bridge piers and the north and south embankment abutments are to be founded on dolerite (based on site assessment by engineer). The north embankment abutment has the 2.0 m founding level relative to the natural ground level (1.8 m) and being at close proximity to the bridge abutment, undermining of the existing roadway is likely during construction of the new abutment. As recommended in the SANRAL drainage manual report, we have designed the eastern north abutment counterfort wall to be constructed from the top down using ground anchors as an alternative temporary works design forming the design basis against which the contractor's temporary works can be assessed and to prevent claims. Once the counterfort wall is in place, the remaining abutment and counterfort walls can be constructed on the upstream side of the anchored counterfort wall which protects the existing roadway and abutment from being exposed and from being undermined.

GENERALS

TMH7 (as amended 1988) NA type loading will be used in the bridge design. Class 1 will be used for the solid slab elements for those load combinations containing live load (NA, NB36 or NC loading). For the combination containing full live load (NA,NB36 & NC loading).

DECK

The proposed new deck will be 6.07 m wide between the guard blocks concrete traffic barriers. The deck has a crossfall of 3,0 % on either side of the roadway centreline. For the deck option, there are to be five deck spans of 12.0m length each between 4.0 proposed piers and the 4.0 abutments. The deck option comprises a 0.85m thick reinforced solid concrete deck slab.

DECK & ABUTMENT JOINT

The deck will be cast monolithically with the abutments and pier will have movement joints to simulate simple supported design conditions.

PIERS

The piers will have an overall average height of 10.0 m above the top of the pier base. The pier base is 2.5m wide and 0.85 m deep on average for the deck. The pier stems for the deck option are rounded wall type piers 8.25m long x 0.75m thick. The piers will be supported on strip footings recessed by 0.75 m into the founding bedrock for beam deck.

ABUTMENTS

The abutments will be full face type abutments with wingwalls and in some cases a earwing wall preventing scour around the abutment sides

FOUNDATION

The General Description of Founding Material: There is rock on the North side of the river consist almost entirely of hard, slightly weathered to weathered sandstone (by visual inspection). All assumptions to be confirmed by the Geotechnical Engineer. The type of footing used will be Strip footing in the riverbed with provisional dowel bars at design spacing into river hard rock.

Geometry

The proposed route will be designed for a design speed of 40km/h. In order to remain within the minimum and maximum grade requirements a considerable volume of earthworks will be required.

HYDRAULIC DESIGN

The river bridge is located such that upstream section of the structure is orientated at an angle relative to the river flow direction for hydraulic design purposes. The road requires a NO crossfall towards the upstream position. The new fill depth will be reduced near the upstream side of the deck. In view of this, an in-depth hydraulic modelling study of the river was carried out to determine what impact a lower depth of fill might have for various flood events. The US Army Corps of Engineer’s HECRAS v 4.1 program was used for the hydraulic modelling.

The study concluded the following:

- According to SANRAL’s guidelines (Drainage Manual 2013), a design return period of 67 years would be applicable in this case for a Class 2 Road.
- The applicable 1:5 year design flood was found to be 90 m3/s and the corresponding flood level is 875.000m (amsl).

Environmental Conditions

The site is located in a non-aggressive environment. C30 Class concrete will therefore be specified for the structural concrete. The designated environmental classes of exposure are severe for the substructure and moderate for the superstructure.

Construction Materials

Construction materials will be obtained from commercial sources in Camperdown. It is expected that all concrete will be sourced from ready-mix concrete suppliers.

Existing Services

Field observations reveal no services within the bridge location.

Future Services

Service ducts will be provided within the parapets to allow for possible future installation of electrical/ Telecommunication cables.

Figure: Existing causeway crossing vs new proposed crossing



Images: New proposed crossing (see further site photos under appendices)



Images of the site for the proposed crossing.



Images of existing crossing on existing crossing,



Images of existing crossing on existing pathway.

No significant or controlled emissions to the atmosphere are expected for this project. However, dust entrainment will occur during windy conditions and from vehicles travelling along the adjacent gravel road and is expected to be low to moderate.

The existing gravel access road is expected to be used to access the site.

No waste other than normal sewage will be generated by the project. Waste will be disposed at a legal land fill authorised to accept such waste.

No hazardous waste is expected on site, apart from chemicals and hydrocarbons. Waste will be disposed at a legal land fill authorised to accept such hazardous waste.

Solid waste generated on site will include refuse, concrete chunks and excess spoil. Where such waste cannot be re-used or recycled, these will be disposed of at a registered landfill site authorised to accept such waste.

No waste permits will be required for the proposed project.

Low-moderate noise levels arising from construction related activity is expected, which will be temporary.

The activity will require water for cement mixing and consumption during construction. The contractor must obtain water from a municipal or private source.

Construction will be confined to daylight hours and generators will be used where feasible as an alternative energy source.

4.2 Phases of Development

4.2.1 The Planning and Design Phase

This EIA and water use licence application phase comprises the planning and design phase, together with all investigative and preliminary studies.

Overall Goal for Planning and Design is to undertake the planning and design phase of the development in a way that:

- Ensures that the design of the plant responds to the identified environmental constraints and opportunities.
- Ensures that the best environmental options are selected for all components of the project and provides mitigation and contingency plans.

4.1.2 The Construction Phase

The construction phase involves actual construction of the project. The EMP is to be implemented during this phase.

The bulk of the impacts during this phase will have immediate effect (e.g. noise, dust and river pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from the Applicant.

The proposed bridge construction was to have commenced in June 2021, however due to unavoidable delays the planned construction start date will be moved to late 2021.

4.2.3 The Post Construction and Rehabilitation Phase

This phase will involve restoring the land impacted during the construction phase back to its original state, if not possible to a state that conforms to the principles of sustainable development. This process will mainly on rectifying the negative impacts that have been caused during construction by the removing pollution or contaminants and other dangerous substances, removal of contaminating waste material, removal of alien plant species and improvement of the soil and reestablishment of basic groundcover.

4.2.4 The Operation and Maintenance Phase

The proposed development will require maintenance work when needed throughout the operation phase. By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete. The operational phase will not be considered in this EIA and will be left to the Applicant to monitor and maintain the infrastructure.

SECTION 5: APPLICABLE LEGISLATION

5.1 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014

In terms of the Environmental Impact Assessment (EIA) Regulations (2014) (as amended), promulgated in terms of the National Environmental Management Act (Act 107 of 1998) (as amended), certain Listed Activities are specified for which either a Basic Assessment (GNR 324 and GNR 327) or a Full Scoping and Environmental Impact Assessment (GNR 325) is required.

The following Listed Activities in GNR 327 (Listing Notice 1) and GNR 324 (Listing Notice 3), requiring a Basic Assessment process, are applicable to the proposed Makhokhoba Road in Cosmoore, Camperdown, within Mkhambathini Municipality, KwaZulu-Natal.

Table 6: EIA Listing Notices

Listing	Activity	Listed Activity	Applicability
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Notice	No:		
GN R327 – Listing Notice 1 of the EIA Regulations, 2014 (as amended)	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 (i) a watercourse;	Construction through the watercourse will result in the movement or deposition of 10m ³ or more of material into or out of a watercourse.
GN R327 – Listing Notice 1 of the EIA Regulations, 2014 (as amended)	12	<i>The development of [iii] bridges exceeding 100 square metres in size and [vi] bulk storm water outlet structures exceeding 100 square metres in size; where such development occurs [a] within a watercourse; or [c] if no development setback exists, within 32 m of a watercourse, measured from the edge of a watercourse.</i>	The proposed development will occur within a watercourse, or within 32m of the watercourse.
GN R324 – Listing Notice 3 of the EIA Regulations, 2014 (as amended)	4	<p><i>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</i></p> <p>d. KwaZulu-Natal</p> <ul style="list-style-type: none"> <i>i. In an estuarine functional zone;</i> <i>ii. Trans- frontier protected areas managed under international conventions;</i> <i>iii. Community Conservation Areas;</i> <i>iv. Biodiversity Stewardship Programme Biodiversity Agreement areas;</i> <i>v. World Heritage Sites;</i> <i>vi. A protected area identified in terms of NEMPAA;</i> <i>vii. Sites or areas identified in terms of an international convention;</i> <i>viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i> <i>ix. Core areas in biosphere reserves;</i> <i>x. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;</i> <i>xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</i> <i>xii. Outside urban areas:</i> <ul style="list-style-type: none"> <i>(aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or</i> <i>(bb) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or</i> <i>xiii. Inside urban areas:</i> <ul style="list-style-type: none"> <i>(aa) Areas zoned for use as public open space;</i> <i>(bb) Seawards of the development setback line or within 100 metres from the high-water mark of the sea if no such development setback line is determined; or</i> <i>(cc) Within urban protected areas.</i> 	The proposed site is a sensitive area as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority and the road is 5.5 metres with a reserve of 10 metres.

<p>GN R324 – Listing Notice 3 of the EIA Regulations, 2014 (as amended)</p>	<p>12</p>	<p><i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i></p> <p>d. d) KwaZulu-Natal</p> <p><i>i. Trans-frontier protected areas managed under international conventions;</i></p> <p><i>ii. Community Conservation Areas;</i></p> <p><i>iii. Biodiversity Stewardship Programme Biodiversity Agreement areas;</i></p> <p><i>iv. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</i></p> <p><i>v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i></p> <p><i>vi. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;</i></p> <p><i>vii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning;</i></p> <p><i>viii. A protected area identified in terms of NEMPAA, excluding conservancies;</i></p> <p><i>ix. World Heritage Sites;</i></p> <p><i>x. Sites or areas identified in terms of an international convention;</i></p> <p><i>xi. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;</i></p> <p><i>xii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or</i></p> <p><i>xiii. In an estuarine functional zone.</i></p>	<p>xii) The area is classified Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or and the clearance will be more than 300 square meters of indigenous vegetation.</p>
<p>GN R324 – Listing Notice 3 of the EIA Regulations, 2014 (as amended)</p>	<p>14</p>	<p><i>The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</i></p>	<p>viii) the development occurs within a watercourse where the area is Sensitive as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority and channels exceeds 10 square metres in size.</p>

		<p>d. KwaZulu-Natal</p> <ul style="list-style-type: none"> <i>i. In an estuarine functional zone;</i> <i>ii. Community Conservation Areas;</i> <i>iii. Biodiversity Stewardship Programme Biodiversity Agreement areas;</i> <i>iv. A protected area identified in terms of NEMPAA, excluding conservancies;</i> <i>v. World Heritage Sites;</i> <i>vi. Sites or areas identified in terms of an international convention;</i> <i>vii. Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i> <i>viii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</i> <i>ix. Core areas in biosphere reserves;</i> <i>x. Outside urban areas:</i> <ul style="list-style-type: none"> <i>(aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any terrestrial protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or</i> <i>(bb) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or</i> <i>xi. Inside urban areas:</i> <ul style="list-style-type: none"> <i>(aa) Areas zoned for use as public open space;</i> <i>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose; or</i> <i>(cc) Areas seawards of the development setback line or within 100 metres from the high-water mark of the sea if no such development setback line is determined.</i> 	
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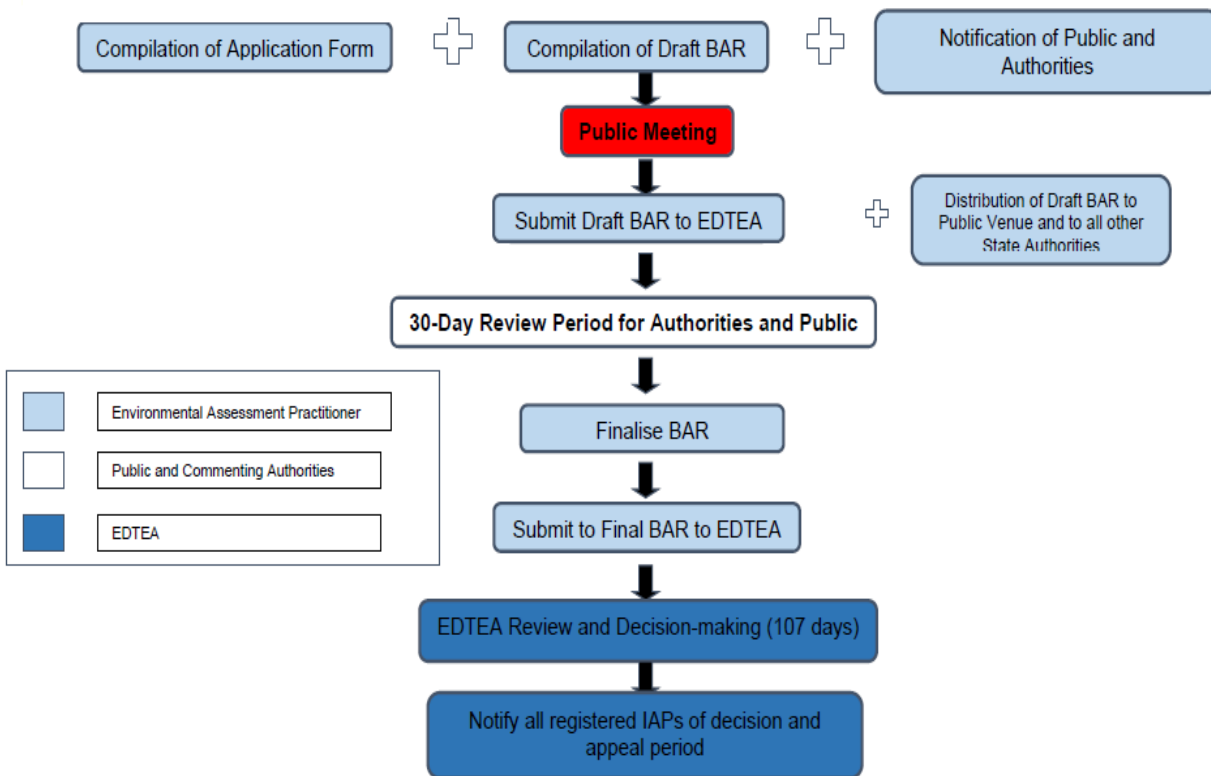
Based on the above proposed activities, a Basic Assessment process is required. The associated Environmental Authorisation Application form is attached to this report as Annexure H.

A **Pre-Application Meeting** was held with Shawn Janneker, Mavis padayachee,

Sphelele Makhwasa and Janine Cumberledge of the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs on the 1st of February 2021. The meeting minutes thereof are attached as **Annexure H**. The purpose of the Pre-Application Meeting was to introduce the project to EDTEA and to present and confirm the relevant Listed Activities and Specialist Studies pertinent to proposed project.

A flow-chart of the Basic environmental Assessment process is provided in Figure 2 for reference purposes.

Figure 2: BA application process



5.2 NATIONAL WATER ACT (ACT NO. 36 OF 1998)

As per the National Water Act (Act No. 36 of 1998), A Water User, as defined in Section 21 of the Act, will be required to obtain a Water Use License or a General Authorisation registration will be required prior to the activity being undertaken. The Competent Authority in this regard is the Department of Water and Sanitation (DWS).

Water Uses (as applicable to this project), in terms of Section 21 (c) (i) of the Act include:

- Impeding or diverting the flow of water in a watercourse;
- Altering the bed, banks, course or characteristics of a watercourse;

The proposed project will require a water use licence as the bridge will be constructed within the watercourse/wetland habitat.

The water use licence application is included in this BAR process (concurrent) and also seeks to obtain comment on the water use licence application.

The National Water Act (NWA) (Act No. 36 of 1998) pertains to the country's water resources. Moreover, this Act regulates including wastewater, the pollution of water bodies and the extraction and use of water resources.

The purpose of the act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors:

- Meeting the basic human needs of present and future generations
- Promoting equitable access to water
- Redressing the results of past racial and gender discrimination
- Promoting the efficient, sustainable and beneficial use of water in the public interest
- Facilitating social and economic development
- Providing for growing demand for water use
- Protecting aquatic and associated ecosystems and their biological diversity
- Reducing and preventing pollution and degradation of water resources
- Meeting international obligations
- Promoting dam safety
- Managing floods and droughts

5.3 FURTHER RELEVANT LEGISLATION, POLICIES AND GUIDELINES

5.3.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The Constitution of the Republic of South Africa (Act No. 108 of 1996) sets the legal context of which environmental law in South Africa occurs and was formulated. All environmental aspects should be interpreted within the context of the Constitution, National Environmental Management Act (NEMA) (Act No. 107 of 1998) and the Environmental Conservation Act (Act No. 73 of 1989).

The Constitution has enhanced the status of the environment by virtue of the fact that an environmental right has been established (Section 24) and because other rights created in the Bill of Rights may impact on environmental management through, for an example, access to health care, food and water and social security (Section 27). An objective of local government is to provide a safe and healthy environment (Section 152) and public administration must be accountable, transparent and encourage participation (Section 195(1)(e) to (g)).

5.3.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998

According to Section 2(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), "development must be socially, environmentally and economically sustainable", which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

The proposed Makhokhoba bridge project requires authorization in terms of NEMA and the Basic Assessment (BA) process is being undertaken in accordance to the Environmental Impact Assessment (EIA) Regulations (2014) (as amended).

5.3.3 MKHAMBATHINI MUNICIPALITY SPATIAL DEVELOPMENT FRAMEWORK

Reference is made to the Mkhambathini Local Municipality's Development Framework (SDF) 2019/2020.

The SDF will serve as a principal strategic spatial planning instrument, which guides and informs all planning, land management, development and spatial decision-making in a municipality. It is a component of the Integrated Development Plan (IDP) and aims to create a spatial interpretation of the strategies and projects already contained within the IDP.

The draft SDF for Mkhambathini Local Municipality is neither a development nor a master plan, but a strategic guide for the spatial transformation of the area. It provides a framework for future location of land uses and development. Makhokhoba Access Road is one of the projects included in Mkhambathini SDF.

5.5.4 INTEGRATED DEVELOPMENT PLAN

Reference is made to the Mkhambathini Municipality's Integrated Development Plan (IDP) 2020/2021 Review.

Mkhambathini Municipal Council undertook to prepare a five-year plan (2017/2022) in line with the Municipal Systems Act. The plan that has been prepared is a single inclusive and strategic plan for the development of Mkhambathini Municipality. As a strategic document, the IDP responds to the needs of the Cosmoore residents being premised on the following international, national and provincial strategic imperatives:

International, national and provincial strategic imperatives:

- Millennium Development Goals
- National Development Plan – 2030
- The New Growth Path Framework
- National Spatial Development Perspective
- Local Government Turnaround Strategy;
- Provincial Growth and Development Strategy
- Provincial Action Plan (Priorities) for 2009-2014
- Provincial Spatial Economic Development Strategy
- uMgungundlovu District IDP
- uMgungundlovu District Growth and Development Summit Resolutions

The majority of the households in the Cosmoore area have access to roads within 20m or less. This however does not paint the true picture of transport accessibility in the area, as many of these roads are poorly maintained or designed, causing vehicle access to the adjacent or nearby areas to be problematic, especially considering that the road is gravel and becomes dangerous during wet season in the area.

Due to the current crossing not having any structure but just bricks, any appreciable rainfall event causes water to flow over. As a result, this causes inconvenience to the many school children and general pedestrians who use the crossing as a link to many services on the other side of the watercourse. However, the new Makhokhoba Road project is an initiative to work towards increasing

the level of service and benefits to the nearby communities and will provide all year access to the education and health facilities in the area. The project is budgeted for and stated in the IDP.

5.3.5 OTHER APPLICABLE LEGISLATION

The table below lists all other applicable legislation, policies and/or guidelines of any sphere of government that are relevant to the application as contemplated in the EIA Regulations (2014) (as amended).

Table 6:

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
NEMA Biodiversity Act (10 of 2004)	Protection of any chance biodiversity features, permitting requirements.	Provincial and National	1998
National Heritage Resources act (Act 25 of 1999)	Excavations/drilling may occur which will expose substrates and possibly impact on heritage effects. Should archaeological artefacts be uncovered accidentally, then the contractor must stop work and inform Amafa, so that these may be preserved.	Provincial and National	1999
NEMA Waste Act (Act 59 of 2008 as amended)	Safe and correct, legal disposal of waste generated on site, by the generator of waste.	Provincial and National	2008
Conservation of Agricultural Resources Act (Act 43 of 1983)	The project must implement erosion controls to stabilize soil.	Provincial and National	1983
Hazardous Substances Act (Act 15 of 1973)	The contractor may be storing chemicals and fuel on site.	National and Provincial	1973
National Spatial Biodiversity Assessment (2011)	This assessment hopes to inform all private and public sector activities and provides tools for use in planning.	National (Sanbi)	2011
Construction Regulations	The contractor will construct according to these laws.	Provincial and National	2003
Occupational Health and Safety Act, as amended	The contractor will comply with all requirements of the OHSACT.	Provincial and National	1993

SECTION 6: DEVELOPMENT MOTIVATION

6.1 NEED AND DESIRABILITY

The existing informal track crossing makes it difficult for the community to cross especially during rainy days. In addition, the existing gravel road is approximately 5km drive to Cosmoore and it most suitable for high ride vehicles as you cannot do more than 30km p/h when driving on it. It is also a private road that passes through a private farm.

The access road towards the homesteads is inaccessible during high flooding and on normal occasions. The poor condition of roads in Cosmoore make travelling means very difficult, dangerous

and risky, during rainy conditions many the road become impassable making the community around the village isolated and essential services inaccessible.

Due to the low-level crossing, any appreciable rainfall event causes water to flow over. As a result, this causes inconvenience to the many school children and general pedestrians who use the crossing as a link to many services on the other side of the watercourse.

The new Makhokhoba Access Road project is an initiative to work towards increasing the level of service and benefits to the nearby communities and will provide all year access to the education and health facilities in the area. The project is budgeted for and stated in the IDP.

6.2 MOTIVATION FOR THE DEVELOPMENT OF MAKHOKHOBHA BRIDGE

The existing land use rights will permit the construction of the Access road, and the community require the crossing. There is an existing informal track that leads to the site off P502 therefore the site is currently used as a crossing it just need to be formalised to a structure for safety and usable all seasons.

This is an infrastructure (road and bridge) project, thus it can be considered to be part of the Spatial Development Framework, by virtue of increasing commutability, safety and improving road network. A good road network is important for socio-economic growth.

In terms of the IDP, vulnerability to disasters such as floods is prevalent. The approval of the application will thus not compromise the IDP but assist in contributing to the solution of the above challenge. Construction of causeways (bridge and culverts) is noted in the IDP as a KPA, as is improvement and expanding of the road infrastructure. The proposed development is in line with the projects and programmes and is identified as priority 2 within the IDP.

The local community needs this bridge, on a local scale. The construction falls in line with both national (national development plan) and local priorities (IDP), in terms of job creation, infrastructure development and access to services and climate concerns and this This project has been financially budgeted for by the applicant.

The construction of the bridge will not impact on the conservation priorities in the Environmental Management Framework but only if the structure is well designed, limited to disturbed areas, and if management measures are implemented.

The positive benefits will outweigh the negative impacts in the socio-economic sense in that that it will improve commutability during high rainfall events; improve road network, but the design of the structure must be adequate and incorporate erosion control.

The bridge will allow improved mobility amongst adjoining areas. The local community will benefit directly from the improved infrastructure, access to schools, healthcare and other services and the neighbouring settlement, and much needed temporary job creation.

NEMA S23 general objectives have been considered as below:

- The affected community leaders, the general public, authorities and state departments have been engaged and consulted with in the BA process from the onset
- Potential environmental, cultural and socio-economic risks and impacts have been assessed and assigned significance ratings.
- Lodging of an application for environmental authorisation as required
- The 'Duty of Care' principle is incorporated into the EMPr.
- Mitigation measures incorporated into the EMPr for all potential impacts

SECTION 7: ALTERNATIVES CONSIDERED

As per GNR 326, Appendix 1 (2) (b), alternatives for the proposed development are to be identified and considered. Chapter 1 of EIA Regulations (2014) (as amended) provides an interpretation of the word 'alternatives', which is to mean, 'in relation to a proposed activity means different means of meeting the general purpose and requirements of the activity may include alternatives to the –

- (a) Property on which or location where the activity is proposed to be undertaken;
- (b) Type of activity to be undertaken;
- (c) Design or layout of the activity
- (d) Technology to be in the activity; or
- (e) Operational aspects of the activity; and includes the option of not implementing the activity'

Based on the above, the following alternatives are presented for the proposed Makhokhoba Road and bridge.

7.1 PREFERRED AND ALTERNATIVE SITE ALTERNATIVE

Preferred site alternative:

The proposed site has been disturbed by human activities on either side of the river, which includes road/tracks and housing and a disturbed riparian area. There is a track leading from the northern bank of the river to the houses.

The proposed site is located near the existing road. There is an existing informal track (extending off the P502 leading to the settlement flanking the site) used by the community for accessing and crossing the river on the opposite bank.

Additionally, the new bridge construction at this point and within the existing road, will result in greater cost savings. **The preferred site alternative above is the most economically feasible for the Applicant and has been budgeted for by the municipality.**

Alternative site:

The alternative site is the point of the current crossing of the P502 road.

7.2 PREFERRED LAYOUT ALTERNATIVE

7.2.1 Preferred Layout Alternative: Layout Alternative 1

This alternative (favoured scheme) comprises of 9.45 wide x 60.0 m long continuously supported solid slab decks, supported on wall type piers and closed face abutments, which are all founded on Strip footing.. The deck has a width of 6.07 m between the pedestrian guard blocks.

The advantages of continuous solid slab deck are as follows:

- No expansion joint will be required at the intermediate supports.
- Simple to design and construct.
- Very good load distribution properties.
- Cranage is not required, and it labour intensive as compared to other alternative thereby creation work opportunities for the local communities.

7.2.2 Recommended/Selected/Preferred Layout Alternative

With regards to the above layout alternatives, **the recommended/preferred layout alternative is Alternative 1**, discussed in **Section 7.2.1** above as it is the preferred feasible alternative which meets the need and desirability of the application, as well as take cognisance of the funds available.

7.3 PREFERRED TECHNOLOGY ALTERNATIVE

Technology alternatives are not applicable for the proposed project, which is the construction of a road and a bridge. Labour intensive methods will be employed; technology alternatives have not been considered. Large scale machinery will enable the construction to proceed at a quicker and easier pace but will facilitate far fewer employment opportunities. The use of standard machinery and manual labour is therefore preferable.

7.4 NO-GO ALTERNATIVE

The project is required to provide transit over the watercourse for both vehicles and pedestrians. This will improve access to medical and healthcare, shorten travel time to schools and neighbouring settlements and serve as a marginal response to climate change. Should the bridge not be constructed, then the current status quo will remain, and residents can continue using the current

crossing. However, maintenance costs and flooding risks will continue to cause inconvenience and hamper accesses to essential services when residents have to use the existing crossing.

SECTION 8: PUBLIC PARTICIPATION

To fulfil necessary public participation required as part of the Basic Assessment process, the following methods of stakeholder engagement were conducted by the EAP (refer to ANNEXURE I):

8.1 Placement of site notices

Site notices were placed at strategic places in the project area:



Site notice placed on a tree near Nolu's place.



Site Notice on a tree near Prince's place.



Site notice on the pole near Matu's place.



Notice sent on the community whatsapp group

8.2 Newspaper advert

A newspaper advert was placed on the 20th of May 2021.



8.3 Community Meeting with ward councillor:

To help inform the community of the project and gain comments via the ward councillor on the 20th of April 2021.



8.4 Circulation of BID (background information document), Draft BAR

A BID was circulated to pre identified IAPs to garner comments on the 15th of march 2021.

8.5 IAPS and Authorities Consulted

IAPs Consulted were:

- Department of Environmental Affairs, Forestry, and Fisheries
- Ezemvelo KZN Wildlife
- Department of Transport
- South African civil aviation authority
- Amafa KZN
- Municipalities
- Ward councillor

8.6 Comments from IAPs on BID

All comments received will be addressed in the Final BAR.

SECTION 9: DESCRIPTION OF THE AFFECTED ENVIRONMENT AND SUMMARY OF SPECIALIST STUDIES

9.1 TOPOGRAPHY

The proposed site of the Makhokhoba access road lies directly West of the existing P502 tarred public road. Approximately 20m to the west of the P502 road, in the valley bottom, there is a medium sized wetland and associated watercourse is present. Observing the slope from the P502 road (i.e. directly

to the West), the eastern slope of the site is characterised by a large open grassland to the north and dense, alien invasive plant infested thicket to the south.

9.2 VEGETATION AND BIODIVERSITY

(Please refer to attached Terrestrial Vegetation Assessment, appendix D1)

The proposed site of the Makhokhoba access road does not fall within a CBA or any other protected area. The route of the proposed Makhokhoba access road can be divided into two (2) distinct areas, namely “degraded grassland” to the north and “severely degraded woody thicket” to the South. The grassland to the North of the proposed road site is dominated by *Aristida junciformis*, *Melanis repens* and *Digitaria eriantha*. These three species were the only grass species found within the 50m buffer on the northern buffer, and provided excellent basal cover to the site (100% cover), with no bare ground being evident. The grassland appears to have been subjected to severe grazing intensity by local livestock, whilst the entire area is consistently disturbed by human foot traffic

Additionally, there was a single, medium sized Red leaf Fig Tree (*Ficus ingens*), which appears to be in excellent health. This single individual of *F. ingens* that would be directly impacted by the road construction and will require removal. However, *Ficus ingens* is not a protected species and does not require further permitting for its removal.

The Southern buffer zone of the proposed access road site is best described as “seriously modified”, whereby the landscape is dominated by dense stands of alien invasive species, namely *Lantana camara*, *Solanum mauritanum* (Bugweed), *Morus alba* (Mulberry) and *Chromolaena odorata* (Siam weed). The stand of alien invasive plant species to the south of proposed road route is nearly impossible to traverse on foot further than 30m from the edge of the proposed road route. Similar to the northern buffer zone, *A. junciformis*, *M. repens* and *D. eriantha* are the dominant grass species. Moreover, there is a dense sward of *Stenotaphrum secundatum* (Buffalo grass), an alien grass species, on the eastern slope just above the wetland and watercourse. On the hilltop in the vicinity of the village, there are several large individuals of *Melia azedarach* (Syringa berry) and *Morus alba* (Mulberry).

9.2 WETLAND ENVIRONMENT

(Please refer to attached **WETLAND FUNCTIONALITY & HABITAT IMPACT ASSESSMENT**, appendix D2)

The study area falls within the DWS quaternary catchment U60B which forms part of the Pongola-Mzimkhulu Water Management Area (WMA). The catchment is drained by two perennial rivers namely the uMlazi River and its right-bank tributary the Mkuzane River. The uMlazi River is the main collecting river within the catchment. The drainage network within the quaternary catchment is shown in Figure 3.1 of the report. No prioritised wetlands (Wetland FEPA) were identified within the 500m regulated area

Overland flows from the development area feed a small seasonal stream running in a southerly direction. The stream discharges into the lower reach of the uMlazi River located 4.5 km downstream. Instream dams were recorded both upstream and downstream of the proposed river crossing point. The drainage network within the 500m regulated area is provided

Wetland Habitat

Infield watercourse delineation confirmed the presence of wetlands and two (2) instream artificial dam (Units AD1 and AD2) within the 500m DWS regulated area (Figure 3.5). The wetlands were subdivided and classified into four (4) channelled valley bottom wetlands (Units CVB1, CVB2, CVB3 and CVB4). Only Wetland Unit CVB2 stand to be quantifiably impacted by the proposed road and bridge development. Therefore, the focus of this assessment was placed on Wetland Unit CVB2 only.

Wetland Unit CVB2 is a channelled valley bottom wetland with a small incised perennial stream running through it. The wetland is narrow (40m wide) and confined to the narrow valley floor. It has a longitudinal slope of 1.7%. An Instream agricultural dam (AD2) was recorded 180m upstream of the proposed bridge location. The two bridges confine flows and contribute to the incision of the river channel

The wetland was found to be largely modified which means a large change in ecosystem processes and loss of natural habitat and biota and has occurred. Key impacts recorded include: (i) damming of flows upstream of the wetland habitat which has resulted in reduced flows and alteration of flow dynamics, (ii) limited invasion of the wetland habitat by invasive alien plants and weeds, and (iii) limited excavation and vegetation removal within the wetland habitat.

The wetland was assessed as being of moderate EIS. Whilst the wetland habitat likely lacks and conservation important aquatic biota, it harbours a habitat (Sedge/Reed Marsh) that is ideal for Red Listed species such as frogs.

Wetland Unit CVB2 was evaluated as particularly good at providing flood attenuation services, nitrate removal, erosion control, carbon storage and maintenance of biodiversity

9.4 GEOLOGY AND SOILS

(refer to provisional **GEOTECH STUDY**, appendix D3)

The regional geology of the area comprises of Preterozoic Natal Metamorphic Province. The Natal Metamorphic Province is overlain by Palaeozoic Natal Group Sandstone which is overlain by Karroo Supergroup (Dwyka Group Tillite. The Dwyka Group covers the study area.

Soil profile

The soil profile across the site comprises of Diamictite and Quaternary sands.

Ground profile

The ground profile encountered on sites:

- Silty Sand- Dry, Dark brown, Loose to Medium dense, Clast supported, Silty sand with Diamictite Boulders. Present across all test pits.
- Weathered Diamictite- Grey mottled white, grey and orange, highly weathered Diamictite. Present across all test pits.

Drainage

As general practice surface drainage will be required along the roads to prevent ingress of water into the pavement layers. The lack of groundwater means there is no need for subsoil drainage systems however the occurrence of groundwater must be monitored during construction.

Climate

Umkhambathini normally receives about 748mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall (14mm) in June and the highest (100mm) in March. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Umkhambathini range from 22.3°C in July to 27.3°C in February. The region is the coldest during July when the mercury drops to 9.3°C on average during the night.

Rock Head

Rock was not encountered in any of the test pits excavated on the site.

Groundwater

No groundwater or seepages were encountered in any of the test pits inspected during the investigation.

9.5 HERITAGE AND CULTURAL

(Refer to provisional **Palaeontological Impact Assessment**, appendix D3)

The findings of the study were that the proposed road lies in the eastern part of the main Karoo Basin that is filled with Karoo Supergroup rocks. Karoo Supergroup rocks range in age from about 300 million years ago (Myr) to 183 Myr Lower Jurassic, and cover a large proportion of the surface area of South Africa. The Karoo Basin was bounded to the south by the Cape Fold Belt mountains and to the north by the Cargonian Highlands while the continent was positioned over the South Pole and was part of the supercontinent Gondwanaland. Due to this position, there was a series of ice sheets covering the land. As the continent moved northwards the ice sheets melted and the meltwater filled the Karoo Basin, together with debris and sediments. These deposits are known as the Dwyka Group. Overlying the Dwyka Group sediments are the Ecca Group sandstones, shales and mudstones. The basin subsequently filled with Beaufort Group and Stormberg Group strata, and was capped by the Jurassic Drakensberg basalts, and dolerite dykes (Bamford:6).

Of relevance to this project are the basal Dwyka Group tillites, diamictites and mudstones. The Dwyka Group is made up of seven facies that were deposited in a marine basin under differing environmental settings of glacial formation and retreat. In the north and east these are called the Mbizane Formation, and the Elandsvlei Formation in the south and west. The mudrock facies is the only fossiliferous facies of the Dwyka Group (Bamford: 6-7).

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures, however, suggest that the rocks are either much too old and not the correct type (Natal Group) to contain fossils. Fossils have only been recorded from mudstone facies in the Dwyka Group and in the project area, the rocks are tillites and diamictites. Since there is an extremely small chance that fossils may be found in the Dwyka Group, a Fossil Chance Find Protocol has been included in the desktop study which must be included in the Environmental Management Programme (EMPr) for the project. (Bamford:9).

9.6 SOCIO-ECONOMIC PROFILE

All details as presented in this section have been extracted from the Mkhambathini IDP for 2020/2021.

A comparative demographic analysis demonstrates that the geographic size of Mkhambathini is the second smallest (following Msunduzi Municipality) within Umgungundlovu District Municipality, as per the IDP.

According to the IDP (2020/21) Mkhambathini had a population of 57,075 in 2016, with 27736 being male and 29339 being female. the population structure of the area demonstrates that approximately 51% of the population consists of working age-group members aged between 20 and 60 years. This

is followed by the infancy and school age populations which amount to 41% of the population. The aged population (older than 60 years) is relatively low at 8%.

The unemployment rate is currently at 12% within the area .Although this may appear to be relatively low when a comparison is drawn with the national unemployment rate which is sitting at 25%, Mkhambathini has a very high proportion of non- economically active population (46%) and discouraged job seekers (8%) and this implies that the dependency rate is quite high.

The level of education is slowly improving rate of people who have no schooling has dropped from 37.6% (in 1996) to 12% in 2011 and has increased to 24,9% in 2016 .However, the number of people who did not complete school is very high, with approximately 29% of the population failing to complete primary school, while an alarming 37% did not complete secondary school in 2011 but there shows an improvement in 2016 of 33.5% did not complete secondary. Only 14% of the population completed Matric (grade 12). The number of people with higher education has however constantly increased from 1.9% (1996) to 2.5% (2001) , to 3.4% in (2011) and eventually 3,7% in 2016 . This shows a growing number of people accessing funds to further their education and the results being produced are at least suitable for submission to tertiary institutions.

9.7 CURRENT LAND-USES, ACCESS, SERVICES AND IMPACTS

The site is located within an open valley, being located within a watercourse, soils are erosive and dispersive within the watercourse. There are several distinct, well used and compacted footpaths that traverse the wetland and crisscross the open grassland adjacent the proposed road construction site.

The site consists of wooden informal bridge that is used by pedestrians to cross the river.

No vehicle access through the river is possible in its current form at the site of the proposed crossing.

On either side, the site is disturbed by a road, track, sparse housing developments and agriculture

No services were visible at the proposed site.

Figure 2: Image of proposed crossing point, note cleared vegetation, informal track and a small bridge made up of wood



The wetland and riparian assessment confirmed the following:

- The wetland habitat (Unit CVB2) which stands to be impacted by the proposed development of the Makhokhoba Access Road and Bridge was found to be largely modified (D PES Class) in terms of the PES and of moderate EIS.

- Key ecosystem services provided by the wetland include flood attenuation services, nitrate removal, erosion control, carbon storage and maintenance of biodiversity. Given its moderate EIS rating and importance in providing ecosystem services, a need was identified to protect the wetland from further degradation.
- Overall, anticipated adverse impacts linked with the construction and operation of the Makhokhoba Access Road and Bridge are expected to be of medium significance.
- Implementation of recommended standard best practice mitigation measures (listed in Section 4.2 of this report) will lower the impact significance ratings. Construction and operational impacts will likely be reduced to a negligible to low impact significance.

A review of the terrestrial ecology confirmed the following:

- The proposed bridge falls within the Dry Coast Hinterland Grassland vegetation type.
- A portion of 'natural' Dry Coast Hinterland Grassland, which lies to the North of the Makhokhoba access road development site is set to be impacted by construction activities. The greatest impact imposed on the surrounding terrestrial vegetation will occur to the South of the construction site, but its condition was appraised as poor.
- The area has been heavily impacted and altered by human activities (such as excessive rainwater run-off and sediment loading from the hilltop village, compacted footpath creation and subsequent trampling of plants), along with overgrazing and trampling by livestock.
- The Southern buffer zone of the proposed access road site is best described as "seriously modified", whereby the landscape is dominated by dense stands of alien invasive species.
- The entire study area was identified as non-Critical Biodiversity Area: Optimal, which means it is not critical for the conservation of biodiversity resources. No ecological support areas (ESA) were identified within the study area.
- **Identified impacts are of 'Low' significance.**

Land uses within 500m of the site:

Land uses within 500m of the site include a road, school, low density residential/informal residential (traditional houses), and agriculture.

These are expected to be impacted upon via construction traffic (safety), noise, and dust impacts. Mitigation measures for these impacts are included in the EMPr.

9.8 SPECIALIST STUDIES IDENTIFIED IN THE DEA SCREENING TOOL WHICH WERE NOT COMMISSIONED:

Landscape/Visual Impact Assessment:

This study was not commissioned as the visual impact expected due to bridge operation is expected to be minimal. Other visual disturbances in the area include houses and the road, which already carries traffic and ensuing lights during the night hours.

Archaeological, Cultural, Heritage, and Palaeontological Impact Assessment

Heritage Impact Assessment and Palaeontological Impact Assessment for the proposed Makhokhoba Road and bridge were undertaken and management measures as per EMPr for these aspects will be adhered to.

Hydrology Assessment

Hydrological/hydraulic calculations were undertaken as per design report for the bridge, and is stated in this report as per project description. It is not expected that the bridge will alter hydrological pathways significantly. Hydrology is also mentioned in the aquatic, wetland biodiversity report. Management measures as per EMPr for these aspects.

Plant Species and Animal Species Assessment:

Vegetation types are included in the wetland, biodiversity and aquatic report compiled for the project.

Discussion of fauna/impacts is noted in the same report. Management measures as per EMPr for these aspects.

SECTION 10. IMPACT ASSESSMENT

10.1 Assumptions, Limitations, Uncertainties and Gaps in knowledge & Description of the process undertaken to identify, assess and rank the impacts:

A description of impacts used in this assessment was based on a site visit, desktop studies, planning tools, aerial maps and GIS, professional experience and judgement, literature review, as well as site specialist studies, and is based on the condition of the site and watercourse and its surrounds at the time of the visit.

The assessment is also underpinned by the project information provided to the consultant, available drawings, design report and layouts provided by the Applicant (via the engineer) at the time of the assessment and is to date, taken to be correct.

Impacts were analysed and ranked using the following formula:

Overall Score (Significance) = (NxMxS) x (E+DxP) *Where:* N = Nature; E = Extent; M = Magnitude D = Duration; P= Probability; S = Significance

Extent

- Local - extend to the site and its immediate surroundings (1)
- Regional - impact on the region but within the province (2)
- National - impact on an interprovincial scale (3)
- International - impact outside of South Africa (4)

Magnitude or degree to which impact may cause irreplaceable loss of resources:

- Low - natural and social functions and processes are not affected or minimally affected (1)
- Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way (2)
- High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease (3)

Duration

- Short term - 0-5 years (1)
- Medium term - 5-11 years (2)
- Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention (3)
- Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient (4)

Probability

- Rare/Remote - the event may occur only in exceptional circumstances (0.1)
- Unlikely - the event could occur at some time (0.2)
- Moderate - the event should occur at some time (0.4)
- Likely - the event will probably occur in most circumstances (0.8)
- Almost certain - the event is expected to occur in most circumstances (1)

Significance

- Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-
- Impact will not affect the environment. No mitigation necessary (0)
- No impact after mitigation (1)
- Residual impact after mitigation / some loss of populations and habitats of nonthreatened species (2)
- Impact cannot be mitigated / exceeds legal or regulatory standard / increases level of risk to public health / extinction of biological species, loss of genetic diversity, rare or endangered species, critical habitat (3)

The overall rating was then assessed according to the following impact classes:

Impact Rating	Impact Rating Low/Acceptable	Medium	High	Very High
Score (-ve)	0-18	19-36	37-54	55-72

10.2 CONSTRUCTION AND POST CONSTRUCTION / OPERATIONAL PHASE IMPACTS

Table 7: Impacts/risks and mitigation summaries (refer to EMPr for full mitigation measures) for both site alternatives and design alternatives

Impact assessment for Site alternatives 1 and 2, and design alternatives

Impacts	Description of impact and risk	Brief Mitigation Summary
Direct and Indirect Impacts during Construction		
General Construction Related Impacts		
Geotechnical	<ul style="list-style-type: none"> • Geology must be considered during construction, and selection of materials, otherwise there could be structural failure of the bridge and significant scour 	<ul style="list-style-type: none"> • All recommendations as per geotechnical report must be implemented.
Bridge design	<ul style="list-style-type: none"> • Appropriate design is required, otherwise there could be constraints to fish movement and erosion and scour impacts with increased shading effects • Impacts on instream habitat and the active channel resulting from hydrological changes can be mitigated through consideration of certain design features during the detailed planning of the crossing 	<ul style="list-style-type: none"> • Bridge design is important and should ensure that minimal flow disturbance is achieved. • Bridge design – consideration must be given by the engineers of factors that are required in order to minimise the influence of the structure on the hydrology or the wetland and river ; and in particular the avoidance of disturbance of the active channel. • Ideally, the proposed structure should not significantly affect the flow of water, thereby minimising impacts brought about by attenuation and turbulence. It is recommended that consideration be taken of the following in the design of the structure: • Allow for high flows (1:10 year flood or similar) to pass unimpeded beneath the crossing. • Columns/culverts must offer as little resistance to flow as possible. For example, the use of column supports rather than numerous box

		<p>culverts or stacked pipe culverts.</p> <ul style="list-style-type: none"> Given the width of the active channel, supports should be positioned outside of the active channel. Consideration of the direction of flow. The structure should not cause the flow of the river to deviate.
<p>Riparian, aquatic, wetland impacts</p> <p>Soil Impacts</p> <p>Surface and ground water quality</p> <p>storm water runoff</p> <p>erosion</p> <p>(general construction impacts)-</p>	<ul style="list-style-type: none"> Surface water impacts can occur due to hydrocarbon spills, mixing of cement directly on the ground and on unprotected surfaces, cement/concrete spills, waste mismanagement. These spills can in turn be carried off via runoff. Spillage of cement powder, waste, can cause pollution of both surface and subsurface water and eventually pollute downstream areas via the river channel. Increased hard panned area will be available from tarring of the road and pavement construction. Surrounding soils are susceptible to erosion. Excavation, earth moving, and vehicular movement will increase the susceptibility of the site to erosion during the construction phase The flood peak, flow volumes and velocities experienced by the watercourse have been altered from their natural state due to the existing surrounding development. The additional runoff produced by the runoff is unlikely to significantly alter the prevailing hydrological conditions. 	<ul style="list-style-type: none"> Spill kits and containers for spilled and contaminated material to be on standby on site. A materials storage area must be identified and designated within the Site Camp. Materials, specifically liquid and potentially environmentally hazardous materials must be stored within a bunded area (110% capacity of largest container) and on a hard surface. The storage area must be under cover. Decanting from large containers (e.g. 210L drums) must be done using a hand pump. If no hand pump is available, liquids must be decanted on a drip tray using a funnel. This must not be carried out within 32m of the river. All handling of hazardous materials including cement must take place on a hardened surface or within a drip tray or cement mixing tray. Install chemical toilets and ensure appropriate disposal of waste at a licenced disposal facility. Proof of disposal must be kept on site at all times. No waste may be buried or burned on site or dumped on surrounding properties.

		<p>All waste must be disposed of at a licenced waste disposal facility. Proof of disposal must be kept on site at all times. The dumping of waste in the river/riparian area/wetland is strictly prohibited.</p> <ul style="list-style-type: none"> Existing access must be used. No new access roads must be created.
<p>Waste (general construction impacts)</p>	<ul style="list-style-type: none"> Generation of waste will be expected during construction. 	<ul style="list-style-type: none"> Sufficient waste bins must be provided within the camps. These bins should be labelled or colour coded to facilitate waste separation. Storage of waste must be on a hard surface, and under cover. Liquid waste must be situated within a bunded area. Liquid waste and accumulated waste must be removed from site regularly by a recognized Waste Contractor
<p>Noise (general construction impacts)</p>	<ul style="list-style-type: none"> Operation of construction equipment, movement staff will generate a potential for increased noise at the work area. 	<ul style="list-style-type: none"> Workers must be trained regarding noise on site and construction hours must be kept to working hours (07h00 to 17h00).
<p>Air quality (general construction impacts)</p>	<ul style="list-style-type: none"> Dust entrainment and vehicular emissions (exhaust fumes) are expected during construction, from driving of vehicles on cleared surfaces, and operation of equipment, stripped groundcover/soil/bare surfaces, stockpiles 	<ul style="list-style-type: none"> Vehicles must adhere to speed limits at all times. Dampening of exposed surfaces must be undertaken to reduce dust emissions, as required.
<p>Heritage and cultural (general construction impacts)</p>	<ul style="list-style-type: none"> During construction, subsurface artefacts or graves may be uncovered from excavations. No cultural elements are expected to be affected. No relocation of communities or cultural and religious elements will be required. 	<ul style="list-style-type: none"> Should any items with historical or archaeological value be found during construction, these must be reported to the ECO, who will engage a heritage specialist to report to AMAFA and work in the affected area must be stopped immediately. A 5m buffer

		<p>must be maintained around the affected area and demarcated with danger tape or a fence or similar.</p>
<p>Vegetation (Habitat disturbance and loss)</p>	<ul style="list-style-type: none"> • The terrestrial vegetation in the vicinity of the proposed crossing can be described as degraded, consisting of transformed areas and pockets of exotic invasion. • Given the nature of the vegetation at the proposed crossing site and the extent of disturbance and current activity within the area, the significance of the habitat loss will be low. <p>Although present the low level of the bridge will only result in shading during the late afternoon and evening, during periods of natural shading</p>	<ul style="list-style-type: none"> • Limit the extent of disturbance. All construction activities must be limited to points proximal to the bridge construction footprint. The existing upstream crossing must be used to move vehicles to the northern bank and visa-versa. No temporary crossing is to be established. • The site camp must not be situated within the open areas associated with the riparian zone. The site camp must be positioned within the extent of the settled areas only. • Undertake construction during the dry winter period to limit the disturbance of flow and risk of causing downstream sedimentation. • No unauthorised clearing of vegetation is permitted and no clearing of vegetation outside the work footprint is allowed. • On-going control of alien vegetation within the construction areas to be maintained.
<p>Storm water run off</p> <p>Erosion and sedimentation</p>	<ul style="list-style-type: none"> • The control of stormwater during the operational phase requires attention, as long-term negative effects may arise as a result of the increase in unregulated stormwater entering the watercourse 	<ul style="list-style-type: none"> • Erosion controls must be implemented to prevent the expansion of existing gulleys or the formation of new erosion points. Priority areas for erosion control are areas where there is an obvious gradient and the flow of water can be expected. • Measures must include at least, the use of sand-

		<p>bags and silt</p> <ul style="list-style-type: none"> • curtains. Silt curtains must also be placed adjacent to the active channel during construction, immediately upstream and downstream of the construction activity, where work is being undertaken within or close to the active channel. The integrity of the silt curtains will need to be monitored on a daily basis and repaired or replaced when necessary
Hydrological changes	<ul style="list-style-type: none"> • The instream habitat is currently in a largely natural state. The crossing will result in changes such as upstream sedimentation and downstream scour. Changes will be localized and likely to cause changes in aquatic community within the impacted area • Bridge design is important and should ensure that minimal flow disturbance is achieved. 	<ul style="list-style-type: none"> • Undertake construction during the dry winter period to limit the disturbance of flow and risk of causing downstream sedimentation.
Post Construction and Operation		
Rehabilitation	<ul style="list-style-type: none"> • Disturbed areas can pose weed and scour/erosion concerns, collapse of embankments and structural failure, should proper reinstatement and rehabilitation not occur. 	<ul style="list-style-type: none"> • Terrestrial, riparian and channel bank areas that are damaged as a result of the construction activities must be reshaped and revegetated. The quickest and most suitable method is through the use of a grass mix that includes <i>Eragrostis tef</i>, a fast-growing pioneer grass.
Cumulative impacts		
Impacts on watercourse/aquatic environment (-)	<ul style="list-style-type: none"> • During operation, fuel leakages from vehicles will infiltrate the channel, disperse into the river, and eventually, incrementally affect aquatic life via connecting river systems. • It is possible that weeds will establish on previously rehabilitated areas, post construction monitoring. These must be removed during routine inspections and 	

<p>Shading (0) Fish migration (0)</p>	<p>maintenance.</p> <ul style="list-style-type: none"> • Minor visual impacts are expected with the alteration of land at the bridge site due to the new bridge. • Although present the low level of the bridge will only result in shading during the late afternoon and evening, during periods of natural shading • The crossing is expected to make use of piers/columns and therefore is not expected to affect fish movement 	
<p>Socio-economic (+)</p>	<ul style="list-style-type: none"> • The local economic growth and development will be promoted. • Increase in local employment related to the construction activities; • Skills transfer to local labour related to construction/maintenance activities and increased opportunities for local SMMEs 	<ul style="list-style-type: none"> • Local community members must be employed as per allowances in the contract and skills levels. • Preference must be given to females. During maintenance, preference must also be given to females at the operational phase
<p>No Go</p>		
<p>The project is required to provide transit over the watercourse for both vehicles and pedestrians. This will improve access to medical and healthcare, shorten travel time to schools and neighbouring settlements and serve as a marginal response to climate change. In addition, informal track will be formalised in future via construction of approach roads. Should the bridge not be constructed, then the current status quo will remain, and residents can continue using the crossing further down from the site. However, maintenance costs and flooding risks will continue to cause inconvenience and hamper accesses to essential services when residents have to use the existing one lane low level vented causeway.</p>		

IMPACTS RATING:

The table below provides an indication of the significance of the impacts before and after mitigation for both site alternatives and design alternatives. Where there is a variation in significance, this is indicated on the table.

EIS Score	EIS Rating	EIS Category Description
0 - 0.5	Very Low	Wetlands that are not ecologically important and sensitive at any scale due to high degradation levels.
0.6 - 1.5	Low	Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water in major rivers
1.6 - 2.7	Moderate	Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water in major rivers
2.8 - 3.5	High	Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers
<3.5	Very High	Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water in major rivers

Construction Impact	Without Mitigation					With Mitigation				
	Magnitude	Duration	Extent	Probability	Significance	Magnitude	Duration	Extent	Probability	Significance
a) Transformation of watercourse habitat	2	3	1,5	4	26 Medium	1,5	3	1	4	22 Medium
b) Direct disturbance of watercourse habitat	4	2	1	3	21 Medium	2	2	1	3	15 Low
c) Increased sediment input in watercourses	4	2	1	3	21 Medium	2	1,5	1	3	13,5 Low
d) Increased flood peaks in watercourses	3	2	2	3	21 Medium	1	1,5	2	3	13,5 Low
e) Increased nutrient input in watercourses	2	2	2	3	18 Low	1	2	2	3	15 Low
f) Increased input of toxic contaminants in watercourses	5	2	2	3	27 Medium	2	2	2	3	18 Low
g) Weeds and invasive alien plant proliferation in watercourses	4	2	1,5	3	22,5 Medium	2	2	1,5	3	16,5 Low

SECTION 11: ENVIRONMENTAL IMPACT STATEMENT

Based on the assessment undertaken, the following conclusions are made:

The site is located within an existing foot path and it is believed that the impacts associated with the proposed project will have limited to no significant, adverse, long term environmental impact on the surrounding environment if the project adheres to the conditions stated in the EMPr.

The area appears to be disturbed by invasion of exotic plants but it is low to moderate. Low levels of invasion are associated with the marginal riparian zone, while moderate levels of exotic invasion occur within the non-marginal and terrestrial areas. *S. didymobotrya*, *C. odorata* and *S. mauritianum* are the most obvious invaders of the riparian zone. There is also visible grazing of cattle that takes place within the riparian zone, particularly on the southern bank, where more grass cover is present. The area appears to not be overgrazed however trampling of the river bank is apparent. Informal sand mining is a significant disturbance within the study area. A smaller area of sand mining was found adjacent to the proposed crossing site.

A summary of impacts taken from section 10 is provided below:

Impact	Significance Before mitigation	Significance After Mitigation
Construction activities – various direct and indirect impacts	LOW	LOW
Altered hydrology and change in aquatic habitat	LOW	LOW
Shading as result of the structure	LOW	LOW
Fish migration	LOW	LOW
Habitat disturbance (loss of vegetation)	LOW	LOW
Socio-economic (+)	LOW	LOW

Identified impacts are of LOW significance and the positive impacts outweigh the negative impacts. The proposed activity will have no long-term negative impacts of medium or high significance on the receiving environment, if the mitigation measures and management of the site is undertaken.

The **preferred site alternative** is the site that has been considered. This site is already used by the community to cross the watercourse on foot. It will ensure safe crossing for the commuters of Cosmoore. This is the only site alternative which can meet the need and desirability of the Application in terms of cost and DoT requirements.

The **preferred layout** comprises 9.45 wide x 60.0 m long continuously supported solid slab decks, supported on wall type piers and closed face abutments, which are all founded on Strip footing.. The deck has a width of 6.07 m between the pedestrian guard block.

The advantages of continuous solid slab deck are as follows:

- No expansion joint will be required at the intermediate supports.
- Simple to design and construct.
- Very good load distribution properties.

Technology alternatives are not applicable for the proposed construction of the Makhokhoba Bridge. Labour intensive methods will be employed; technology alternatives have not been considered. Large scale machinery will enable the construction to proceed at a quicker and easier pace but will facilitate

far fewer employment opportunities. The use of standard machinery and manual labour is therefore preferable.

The **No-go alternative:** The project is required to provide transit over the watercourse for both vehicles and pedestrians. This will improve access to medical and healthcare, shorten travel time to schools and neighbouring settlements and serve as a marginal response to climate change. In addition, informal track will be formalised in future via construction of approach roads. Should the bridge not be constructed, then the current status quo will remain, and residents can continue using the crossing further down from the site. However, flooding risks will continue to cause inconvenience and hamper accesses to essential services when residents have to use the existing crossing. It is therefore recommended that the new bridge be approved.

It must be ensured that the construction phase, in no way, hampers the health of any ecological systems, and that post-construction rehabilitation leaves the surrounding environments in an as good, if not better, state.

Following the construction phase, the contractors must ensure that all hazardous materials are removed from the site and that rehabilitation of land is undertaken according to the requirements of the EMPr (ANNEXURE E), as well as recommendations put forward by the specialist studies (Annexure D).

Following from the assessment, there are no fatal flaws that would prevent the project from proceeding. Mitigation measures have been proposed to mitigate the potential impacts and are to be included in the Environmental Management Programme.

SECTION 12: RECOMMENDATIONS OF THE EAP

During the Impact Assessment, it was determined that the proposed project has no biophysical environmental fatal flaws provided that the recommended mitigation and management measures contained in this report and Environmental Management Programme (EMPr), attached as ANNEXURE E, are implemented. The EMPr would be used to ensure compliance with environmental specifications and management measures. The implementation of the EMPr for the entire life cycle of the project is vital in achieving the appropriate environmental management standards as detailed for this project. Mitigation measures identified as necessary will be included in an EMPr. The EMPr will form part of the Basic Assessment Report (BAR).

Weighing the positive and negative impacts and taking the need and desirability of the proposed development into account, and the opportunity for mitigation, the EAP is of the opinion that the proposed project be authorised.

Proposed monitoring and auditing

During the construction phase an onsite Environmental Officer (EO) must be appointed to conduct the day to day monitoring of environmental issues in accordance with the construction EMPr.

An independent Environmental Control Officer must be appointed to conduct monthly audits for the duration of the construction phase. Following rehabilitation, the ECO must audit rehabilitation progress on a monthly basis for three months post the implementation of rehabilitation measures.

Period of validity of the Authorisation

It is recommended that the Environmental Authorization be valid for 10 years from the date of authorisation.

ANNEXURE A: MAPS & PLANS

ANNEXURE B: SITE PHOTOGRAPHS

ANNEXURE C: DRAWINGS & LAYOUTS

ANNEXURE D: SPECIALISTS REPORTS

ANNEXURE D1: VEGETATION IMPACT ASSESSMENT

ANNEXURE D2: Wetland Functionality & Habitat Impact Assessment

ANNEXURE D3: PROVISIONAL GEOTECHNICAL REPORT

ANNEXURE D4: PALAEOLOGICAL IMPACT ASSESSMENT

ANNEXURE E: ENVIRONMENTAL MANAGEMENT PROGRAM REPORT

ANNEXURE F: DEA SCREENING REPORT AND COMMENTARY REPORT

ANNEXURE G: CV OF EAP

ANNEXURE H: ADDITIONAL INFORMATION

ANNEXURE H1: ENGINEERING DESIGN REPORT AND CONSTRUCTION METHOD STATEMENT

ANNEXURE H2: EIA APPLICATION FORM AND EDTEA MEETING MINUTES

ANNEXURE I: PROOF OF PUBLIC PARTICIPATION