NEAS REF NO: KZN/EIA/0015627/2021
EDTEA REF NO: DC23/005/2021

The Construction of Culvert on Local Road L2013 in Okhahlamba Local Municipality Kwazulu-Natal

Consultation Basic Assessment Report

Prepared by:

@Gedezar Consulting
Green is the Future!!!

Prepared for:

transport
Department:
Transport
PROVINCE OF KWAZULU-NATAL

Client:
KwaZulu-Natal Department of Transport [KZN DoT]

Reference Document as:
Consultation Basic Assessment Report [cBAR] for the Proposed Construction of Culvert on Local Road L2013 within Okhahlamba Local Municipality Kwazulu-Natal

At Gedezar Reference Number:
BA01-14-20

Competent Authority Reference:
NEAS REF NO: KZN/EIA/0015627/2021
EDTEA REF NO: DC23/005/2021

Report Compiled by:
Nonjabulo Dladla

Date of Report:
05 April 2021

Report reviewed by:
Andile Mnyandu

Report approved by:
Andile Mnyandu

Applicant:
KwaZulu-Natal Department of Transport [KZN DoT]

Competent Authority:
Department of Economic Development, Tourism and Environmental Affairs [KZN EDTEA]

Environmental Assessment Practitioner:
Andile Mnyandu of **At Gedezar Consulting**
31 Macleroy Road, Northern Park
Pietermaritzburg
3200
andilemn@gedezar.co.za

NOTICE

This document and its appendices are a public document and made available to the Competent Authority [CA], commenting authorities, stakeholders, Interested and Affected Parties [I&APs], and the general public. This **Consultation Basic Assessment Report [cBAR]** is available for comment for a period of **30 days** from **13 May 2021 & 14 June 2021**. This report will then be amended and updated in response to the comments received during this review period. Once finalised the BAR will be submitted to the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs, eThekwini District [KZN EDTEA] for decision-making.

Copies of this cBAR are available at strategic public places in the project area [see below] and upon request from At Gedezar Consulting.

- Okhahlamba Local Municipality ward 5 Councillor Offices
- AmanGwana Traditional Council Court/Offices;

OPPORTUNITIES PUBLIC REVIEW

The following methods of public review of the cBAR are available:

- Completing the comment sheet enclosed with the Background Information Document [BID – which was circulated on 13 May 2021 and can be requested from At Gedezar Consulting];
- Written submissions by post, e-mail or fax; and
- Telephonic submissions.

DUE DATE FOR COMMENT ON CONSULTATION BASIC ASSESSMENT REPORT [cBAR]: 14 June 2021

SUBMIT COMMENTS AND QUERIES TO:

Miss Nonjabulo Dladla
At Gedezar Consulting
31 Macleroy Road
Northern Park
Pietermaritzburg
3200
Nonjabulodl@gedezar.co.za

Disclaimer

The opinions expressed in this cBAR are been based on the information supplied to At Gedezar Consulting. At Gedezar Consulting has exercised all due care in reviewing the supplied information. Whilst At Gedezar 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 are entirely reliant on the accuracy and completeness of the supplied data. At Gedezar 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 At Gedezar's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this cBAR, about which At Gedezar had no prior knowledge nor had the opportunity to evaluate.

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

TABLE OF PLATES

APPENDICES

A – MAPS
A1 – LOCALITY MAPS
A2 – LAYOUTPLAN
A3 – SENSETIVITY MAP
A3.1 – WETLAND SENSETIVITY MAP
A3.2 – ECOLOGICAL SENSETIVITY MAP
A3.2.1 – DEFF ANIMAL SENSITIVITY MAP AND SENSITIVE SPECIES MAP
A3.2.2 –TERRESTRIAL BIODIVERSITY SENSETIVITY MAP AND SENSETIVITY FEATURES MAP.
A3.2.3 – BRU ECOLOGICAL SENSITIVITY MAP
A3.2.4 – GEOLOGY MAP AND ECOLOGICAL SESITIVITY MAP
A3.2.5 – KWAZULU NATAL VEGETATION
A3.2.6 – IMPORTANT BIRD AREAS MAP
A3.3-PAELONTOLOGICAL SENSETIVITY MAP
B – SITE PHOTOGRAPHS
C – FACILITY ILLUSTATION
D – SPECILIST REPORTS
D1 – WETLAND FUNCTIONALITY REPORT
D2 – ECOLOGICAL IMPACT ASSESSMENT REPORT
D3 – HERITAGE IMPACT ASSESSMENT REPORT
D4 – PALEONTOLOGICAL ASSESSMENT REPORT
D5 – ENGINEERING DESIGN REPORT
D6 – GEOTECHNICAL REPORT
E – COMMENTS AND RESPONSE
E1 – PUBLIC PARTICIPARTION REPORT
E2 – ADVERTISEMENT
E3 – SITE REGISTER AND MEETING MINUTES
E3.1 – PRE-APP ATTENDENCE REGISTER
E3.2 – PRE-APP MEETING MINUTES
E3.3 – PUBLIC ATTANDENCE REGISTER
E3.4 – PUBLIC MINUTES
E4 – ISSUES OF TRAILS/COMMENTS AND RESPONSE REPORT AND COMMENTS RECEIVED
E5 – NOTIFICATION OF THE PROJECT
E6 – I&AP DATABASE
E7 – SITE NOTICE
E8 – BID

E8.1 – ENGLISH CULVERT BID

E8.2 – ZULU CULVERT BID

F – EMPR

F1-WETLAND REHABILITATION PLAN

G – DETAILS AND EXPERTISE OF EAP

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 authorisation.

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
CBAR	Consultation Basic Assessment Report
CMA	Catchment Management Agency
C-PLAN	Conservation Plan
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
KZN EDTEA	KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment [refers to environmental management tool]
EIA	Early Industrial Age [refers to historical era]
EIS	Ecological Importance and Sensitivity
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
GA	General Authorisation [refers to type of water use licence authorisation]
GA	General Arrangement [refers to drawing / illustration of structures]
GIS	Geographic Information System
GPS	Geographical Positioning System
I&AP	Interested and Affected Parties
IDP	Integrated Development Plan
KZN	KwaZulu-Natal
KZN DoT	KwaZulu-Natal Department of Transport
NBSAP	National Biodiversity Strategy and Action Plans
NEMA	National Environmental Management Act [Act No. 107 of 1998] [as amended]
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]
NEM: AQA	National Environmental Management Air Quality Act [Act No. 39 of 2004]
NFA	National Forests Act [Act No. 84 of 1998]
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NWA	National Water Act
NGO	Non-Governmental Organisation

OHSA	Occupational Health and Safety Act [Act No. 85 of 1993]
PES	Present Ecological State
PPP	Public Participation Process
PU	Planning Unit
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
SWL	Static Water Level
SWMP	Storm water Management Plan
OKLM	Okhahlamba Local Municipality
WMA	Water Management Agency
WUL	Water Use Licence

EXECUTIVE SUMMARY

Project Background and Introduction

Vumesa (Pty) Ltd was appointed by KwaZulu-Natal Department of Transport [KZN DoT] to provide professional engineering services for the construction of a culvert structure on local road L2013 for Okhahlamba Local Municipality (Bergville). These services all need the necessary environmental Authorisations and environmental monitoring during the planning and construction stage of the programme. The road was identified by the KwaZulu Natal Department of Transport as one of the problematic roads that needed to be attended to as it is currently inaccessible after rains and not safe to be used by community members.

The Okhahlamba Local Municipality area is situated in the Southern part of the KwaZulu Natal and is located in the uThukukela District Municipality. The project is located about 13,2 km of Bergville Town. An assessment of the environmental impacts of the proposed culvert on environmental resources will be provided. The proposed culvert will take place within existing road servitude L2013. The section of the Road where the culvert is located is within a rural tribal authority area. Location of the culvert is in KwaZulu-Natal uThukela District Municipality in the uKhahlamba Local Municipality the Culvert Coordinates are 28°46' 32.55" South and 29°14' 54.51" East

The Basic Assessment [BA]

This 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 cBAR, 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, a 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.

Technical Project Description of the Construction of a Culvert Structure

Construction of a Culvert Structure on L2013

The proposed new bridge culvert will be constructed on the District Collector Road (Class 4 road) over the L2013 stream at an old crossing which has been washed-away. The proposed bridge culvert will consist of 3 cells of 2.4mx 2.4m box culverts making a total span of 4.8 m.

Regulatory Environmental Requirements

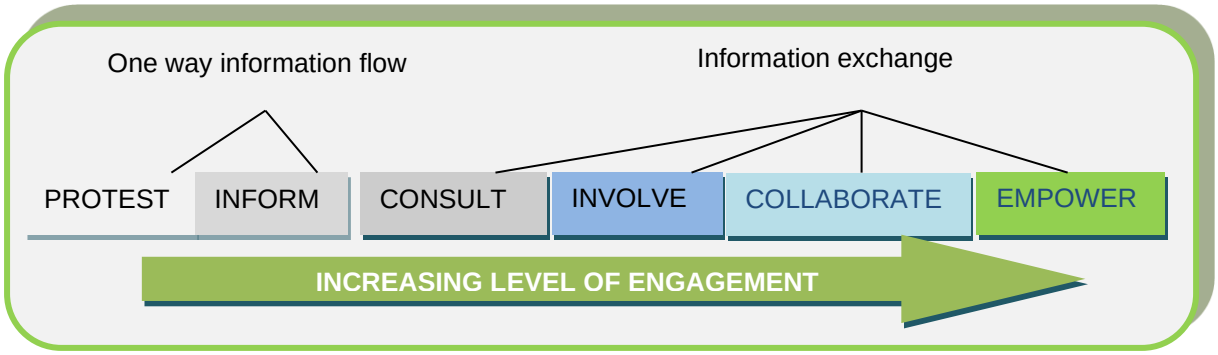
The KZN EDTEA – r is the lead / competent authority for this BA process and the development needs to be authorised by this Department in accordance with the NEMA. The EIA Regulations under the NEMA consist of three [3] categories of activities1 namely: Listing Notice 1 Activities [GNR 327 of 2014] which require a BA Process, Listing Notice 2 Activities [GNR 325 of 2014] which require S&EIR process, and Listing Notice 3 Activities [GNR 324 of 2014] which requires a BA process for specific activities in identified sensitive geographical areas.

Furthermore, this application complies with the NWA and the relevant water uses under Section 21 of the NWA are being applied for. The PPP for the WUL Application has therefore been executed in conjunction and combined with this BA process.

Public Participation Process [PPP]

At Gedezar Consulting 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 At Gedezar Consulting, where one-way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.



Key Findings and Conclusions

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

Key findings of the specialist studies are:

The following findings require consideration due to the significant negative and positive impacts they would likely have along the proposed alignment within the study area:

According to the **Ecological Impact Assessment**: The faunal assessment study shows that there is low conservation value for faunal species found in the study area where development is set to take place.

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

However, the study site has a potential to shelter and accommodate some species of conservation importance but due to heavily eroded nature and overgrazing of the culvert site there is a reduced likelihood of these species occurring. Habitat for foraging is present at the culvert site, however fauna being mobile, will result in faunal species moving to adjacent areas during construction. This is unlikely to affect the status of species of conservation concern in the study site hence it is not anticipated that the proposed construction will have a long-term negative effect on the fauna of the area. The fauna of the site is directly dependent on the vegetation of the site; therefore, a careful management of the vegetation (and soil) will benefit the fauna of the area. The erosion channels leading into the drainage line (which feeds into the Tugela River) are likely to have been caused by numerous crossing points entering the drainage line. This leads to sedimentation of the river in the drainage line feeding into the Tugela River. A formalised crossing point and rehabilitation of the erosion channels will reduce sedimentation and have a positive overall impact on the Strategic Water Source Area; therefore, the development is supported in this regard.

According to **Wetland Delineation Assessment**: The assessment of the Present Ecological State of the wetlands reveals that most HGM units are Largely Modified, while wetland HGM unit 1 is Seriously Modified through changes within the catchment and the removal of wetland soils through erosion. The assessment of the current importance of the wetland unit in terms of ecosystem service provision indicates that wetland units provide medium to moderately-high levels of wetland functioning. The EIS score indicates that the assessed unit falls into EIS Category C, which corresponds to a Moderate importance and sensitivity. All four identified wetlands on site have been impacted upon by subsistence crop production, livestock grazing, and changes to their hydrology (increased hardened surfaces) and geomorphology thus leading to an associated infestation by alien vegetation.

According to the **Heritage Impact Assessment**: There are no heritage features that exist within the project footprint. The area is also not part of any known cultural landscape, the proposed construction of culverts along the road L2013 will not affect any heritage features therefore the proposed project may proceed from a general heritage perspective. There are no mitigation measures in place since there is no heritage features found on study site.

According to the **Paleoethological Assessment**: The lack of previously recorded fossils from the area, show that it is not likely that any fossils would be preserved in the Normandien Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup). No fossils occur in the dolerite. However, there is a slight chance that fossils may occur in the shales of the late Permian. Therefore, the Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

EAP Opinion and Recommendation to CA

This BAR provides an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed Culvert, KwaZulu-Natal. Having duly considered the proposal, there is unlikely to be any significant negative environmental impacts, and the socio-economic benefits are evident.

The findings conclude that there are no environmental fatal flaws that could prevent the proposed development, provided that the recommended mitigation and management measures contained within the EMPr are implemented. Given the findings of the specialist studies conducted, as outlined in summary above, it is safe to say that no significant impacts have been identified by these studies. This has resulted in an impact assessment yielding an overall result of having “negative low” impact. This is attributed mostly to the short-term negative impacts, which are likely to occur during the construction phase, which can be adequately mitigated and rehabilitated to an acceptable state of environment. It is therefore the

recommendation of the EAP that the environmental authorisation is granted for the proposed development, KwaZulu-Natal.

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

- The proposed new bridge culvert will be constructed on the District Collector Road (Class 4 road) over the L2013 stream, the proposed culvert will consist of 3 cells of 2.4 x 2.4 box culverts making a total span of 4.8m. The bridge width will be 5.0m and therefore the total number of culverts to be used will be 15. This section of the road is a District Collector and is therefore classified as a Class 4 road. The SANRAL Drainage Manual specifies a return period of between 10 and 20 years for bridge designs on District Collectors, depending on the value of Q20. The return period (T) is calculated using the formula T = 4,231 + 0.0385Q20. In this case T was calculated as being equal to 7.1.
- The EMPr and Rehabilitation Plans provided in the Ecological Impact Assessment and Wetland Delineation Assessments appended to the EMPr] and conditions thereto must be adhered to;
- An ECO must be appointed and all Contractor staff to be trained on the EMPr requirements prior to commencement of activities;
- Monthly environmental compliance monitoring to be conducted during construction and incidents recorded and addressed accordingly;
- The 30 m buffer must be maintained from wetlands;
- All mitigation measures of the specialist studies must be adhered to, particularly those associated with the 4 wetlands identified within the study area.
- The Rehabilitation plan must be costed for in tender documents, along with the rest of the EMPr.

Way Forward

The impacts identified and assessed by way of risk ratings, have been extensively reported herein. The report at hand [i.e. cBAR] will now be made available for comment [as per the timeline diagram presented above] and amended post comment period to form the final BAR [i.e. fBAR].

The fBAR report will, together with a comprehensive issues trail, the final draft of the EMPr, and all addenda as referred to, will be submitted to the KZN EDTEA, for decision making. The fBAR report will thus be a culmination of scientific specialist studies' findings, public contribution via formal comment, comment made at meetings held, and the drawing of conclusions by the EAP as the environmental specialist.

1 BASIC ASSESSMENT DATA

1.1 Approach to the Study

This Consultation Basic Assessment Report [cBAR] 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 cBAR further incorporates the findings and recommendations of the specialist studies conducted for the project.

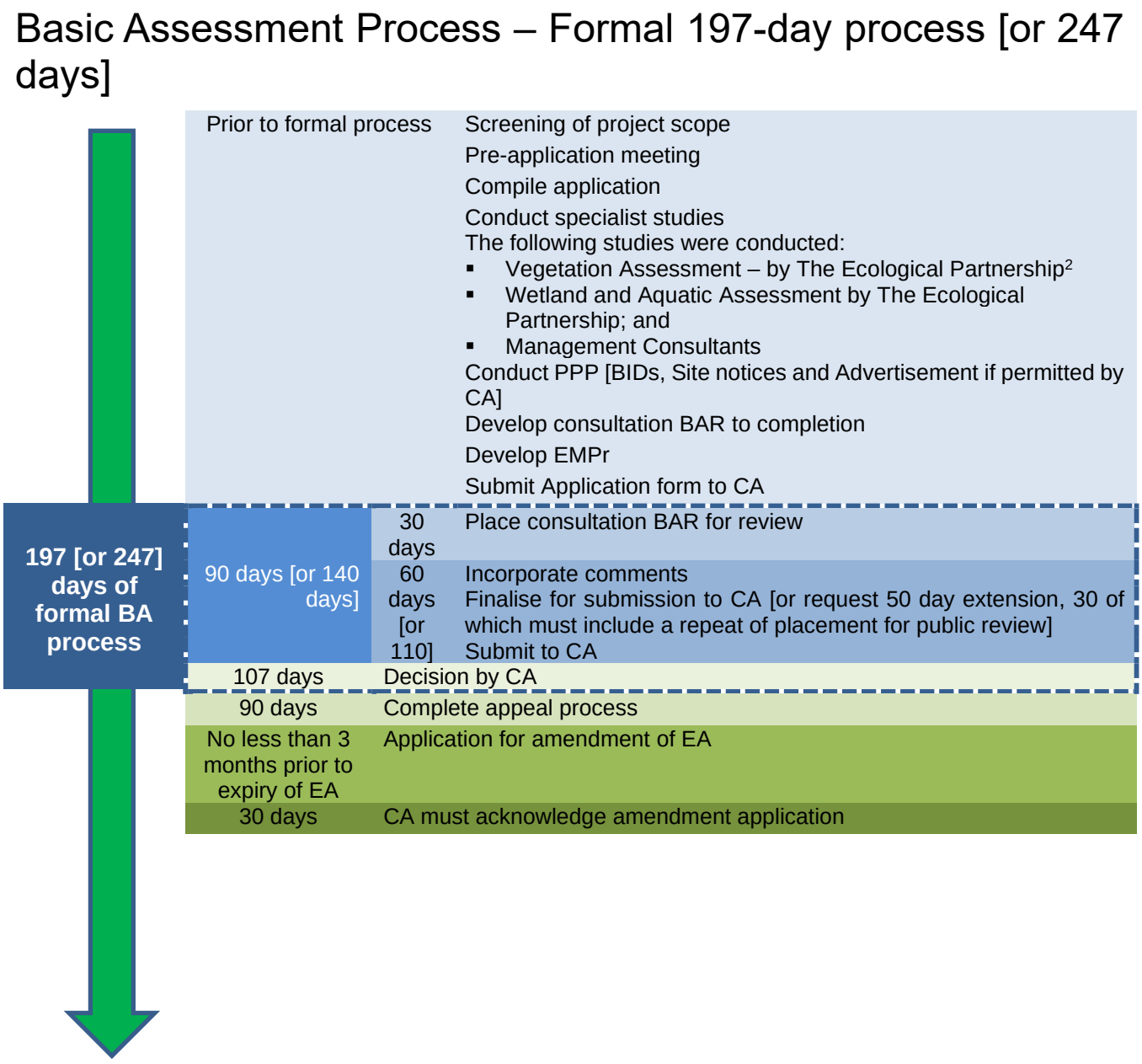
The proposed project is situated in the OKhahlamba Local Municipality which is one of the five (5) local municipalities making up uThukukela District Municipality. Therefore, the Competent Authority [CA] is the Department of Economic Development, Tourism and Environmental Affairs [EDTEA], uThukela Region.

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; determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
    - 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 1 below illustrates the approach / methodology employed.



BA = Basic Assessment
BAR = Basic Assessment Report
CA = Competent Authority [EDTEA eThekwini]
EA = Environmental Authorisation
EMPr = Environmental Management Programme
PPP = Public Participation Process

FIGURE 1: BASIC ASSESSMENT PROCESS

[2] For complete CVs and detailed expertise of specialists refer to **Appendix D1, D2** and **D4**– Specialist Reports.

1.2.1 Details of the Project Proponent

The Applicant for the proposed project is Okhahlamba local MunicipalityThe details of the Applicant are as follows:

TABLE 1: APPLICANT DETAILS

Applicant	Okhahlamba Local Municipality	
Representative	Mr. N.D Millar	
Physical Address	1 Sharrat Street, Bergville, 3350	
Postal Address	1 Sharrat Street, Bergville, 3350	
Telephone	036 448 2018	
E-mail	Nkululeko.Miller@Kzntransport.gov.za	

1.2.2 Details of the Environmental Assessment Practitioner

The environmental team of At Gedezar Consulting [hereafter referred to as At Gedezar] are appointed as the Environmental Assessment Practitioner [EAP] by the engineers on the project, Vumesa (Pty) Ltd. At Gedezar is therefore undertaking the appropriate environmental studies for this proposed project.

At Gedezar 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 G of this cBAR.

TABLE 2: EAP DETAILS[3]

	Detail	At Gedezar Consulting
	**Contact Persons**	Mr Andile Mnyandu [EAP]
	Address	31 Macleroy Road Northern Park Pietermaritzburg 3600
	Telephone	082 973 1291
	Facsimile	086 723 4520
	E-mail	andilemn@gedezar.co.za
	Qualification	Bachelor's Degree in Geography and Environmental Management, University of KwaZulu- Natal
	Experience	16 years

1.3 Structure of the Report

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:

[3] Full curriculum vitae of the above practitioners can be found in **Appendix G** of this report.

TABLE 3: REPORT STRUCTURE

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

Vumesa (Pty) Ltd was appointed by Province of KwaZulu-Natal Department of Transport to provide professional engineering services for the construction of a culvert structure which spans over a bridge which is no longer accessible. These services all necessary environmental Authorisations and environmental monitoring during the planning and construction stage of the programme.

The culvert site is located in the rural area of Hoffenthal near Bergville town in Okhahlamba Local Municipality. The road connects the Hoffenthal community with the nearest town of Bergville. Construction of culvert will entail construction of road approaches on both sides of the structure to match the structure. The gravel road is about 5.0m wide along the length of the structure. Appropriate drains, protection works and road furniture to be incorporated.

The road was identified by the Municipality as one of the problematic roads that needed to be attended to as it is currently inaccessible after rains. The proposed new bridge culvert will be constructed on the District Collector Road (Class 4 road), at the same location as the previous pipe culvert crossing which was flooded. The flooded culvert debris are situated 37m downstream from the proposed bridge culvert. The structural assessment of the previous structure is not discussed in this report due to a lack of historical data but it is assumed that the structure did not have the required hydraulic capacity. The proposed bridge culvert will consist of 3 cells of 2.4 x 2.4 box culverts making a total span of 5m. The bridge width will be 5.0m and therefore the total number of culverts to be used will be 15.

2.2 Property Descriptions:

2.2.1 Surveyor General Numbers

The proposed activity is situated on the following properties which are both state lands. The 21-digit surveyor-general codes are provided in Table 4 below.

TABLE 4: SURVEYOR-GENERAL 21 DIGIT SITE [ERF / FARM / PORTION] REFERENCE NUMBERS

Road / Structures	21 Digit Reference Number & Erf, Farm and Portion Number
L2013 Culvert	N0FU00000001645900000
	FARM 4794 UPPER TUGELA

2.2.2 Land Use Zoning

TABLE 5: LAND USE ZONING

The site is zoned	Rural Residential
Is a change of land use or a consent use application required?	No
Must a building plan be submitted to the local authority?	No

2.2.3 Coordinates

The following coordinates are provided for the proposed Culvert. The Culvert Coordinates are Longitude :28°46’ 32.55” South and Latitude:29°14’ 54.51” East.

TABLE 6: Coordinates of the culvert structure

Points	Latitude/ Longitude	Degrees	Minutes	Seconds
Start	**South**	28°	46'	33.16"
	East	29°	14'	54.97"
Middle	**South**	28°	46'	32.56"
	East	29°	14'	54.46"
End	**South**	28°	46'	32.47"
	East	29°	14'	54.31"

2.2.4 Access / Directions

The proposed structure site is situated in the Hoffenthal area near Bergville travel to site, from Bergville town towards Woodstock area. Turn left into Road P288 and travel on it for about 13,2 km then turn left into Road L2013. The location of the structure is about 900m from the intersection.

2.2.5 Length of the Activity

TABLE 7: LENGTH OF THE ACTIVITY PER ALTERNATIVE

Infrastructure	Proposed Length	Width
Culvert The proposed culvert bridge over the L2013 stream will comprise of 2-lane unsurfaced gravel carriageway with earth side drains, consisting of three cells of 2.4m by 2.4m making a total span of 4.8m and bridge width of 85m. The adjoining road will be re-surfaced with gravel over a length of 1.4km. Earth side-drains will be installed to prevent storm-water damaging the road; deep cut-slopes and fill-slopes will be protected against erosion. The earth trapezoidal drains will be constructed on top cuttings, along the cut-line to drain water away from the cut-slopes and minimise erosion.	30.50 m	85 m

2.2.6 Size of Servitude

TABLE 8: SIZE OF SERVITUDE

Total	Size of Servitude
Total Servitude	0 metres

2.2.7 Surrounding Land Uses

TABLE 9: 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	Y	~~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	Y	~~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	Y
~~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	P
~~Airport~~	~~N~~	~~Other:~~	~~N~~

Key: Y = Yes P = Possibly N = No

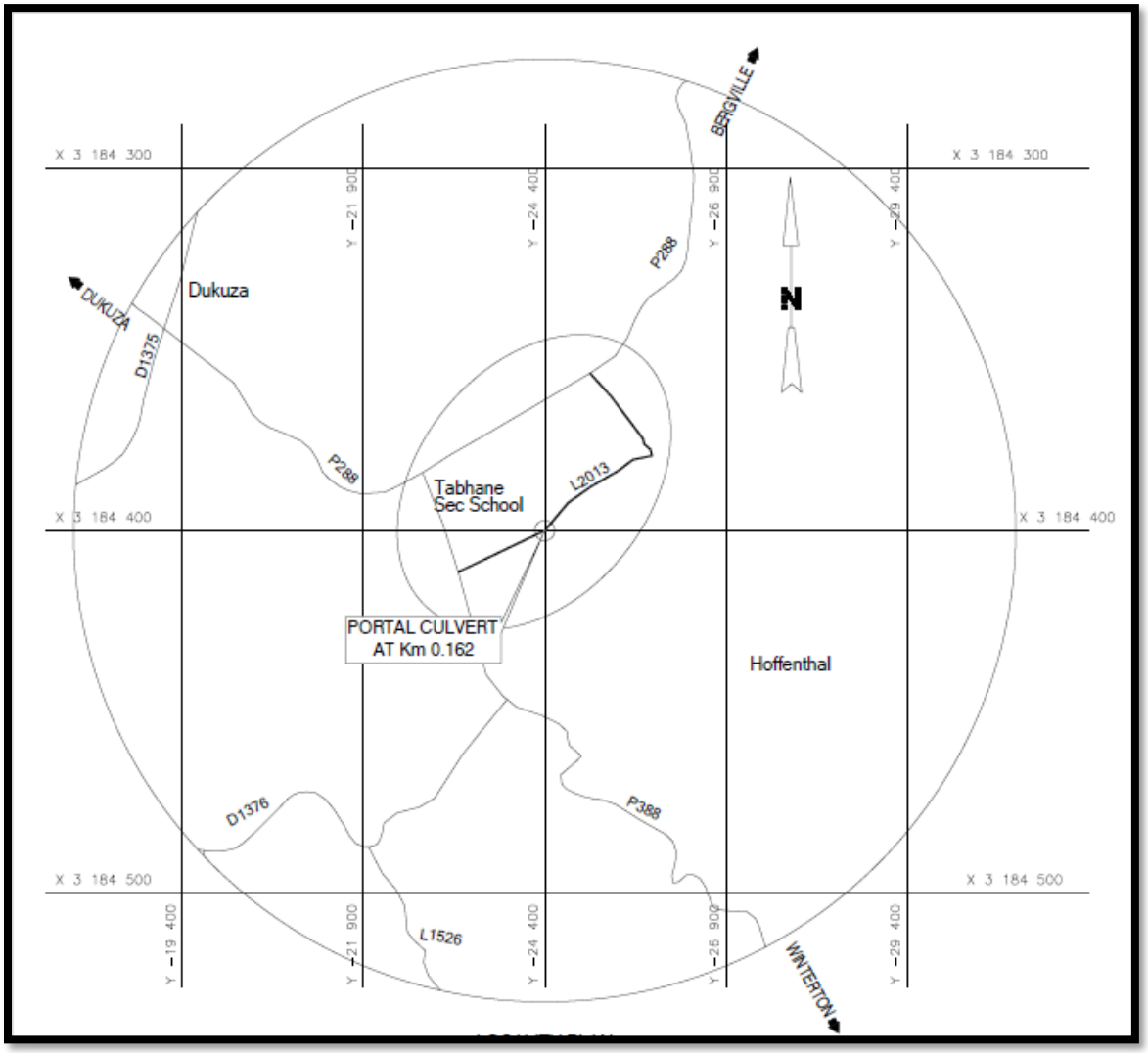


FIGURE 2: SITE LAYOUT PLAN

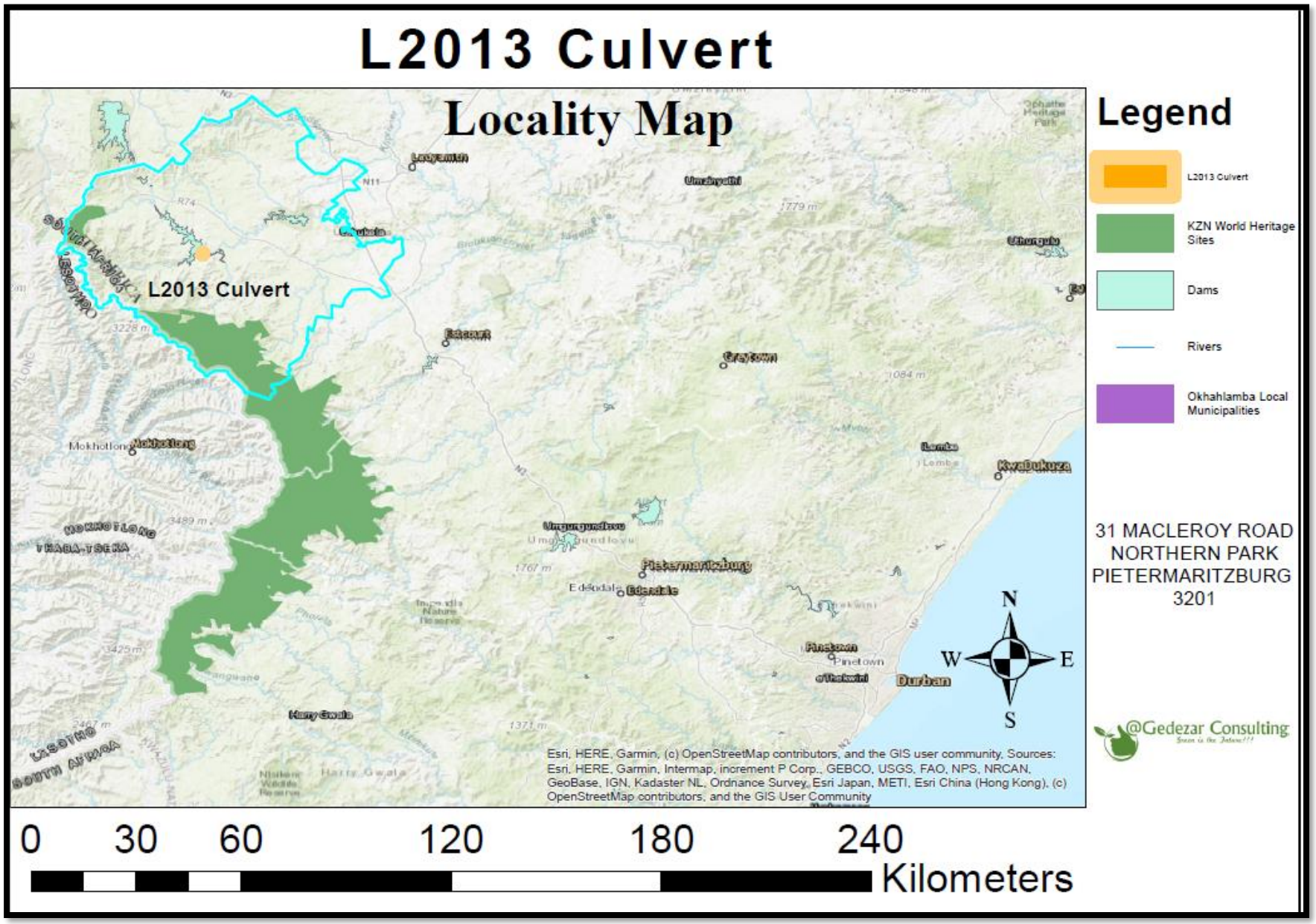


FIGURE 3: SITE LOCALITY MAP

3 PROJECT MOTIVATION AND NEED AND DESIRABILITY

TABLE 10: PROPOSED PROJECT NEED, DESIRABILITY AND BENEFITS

Project Need			
1.	**Was the relevant provincial planning department involved in the application?** The Okhahlamba Local Municipality responsible for local road infrastructure and road planning, and is also the project Applicant.	YES	
2.	**Does the proposed land use fall within the relevant provincial planning framework?** The proposed project is a construction of a culvert on an existing road. Therefore, land use will not change.	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 fit the surrounding area?** The proposed project is essentially a culvert. Therefore, land use will not change, nor is it a new development. The culvert will be constructed on an already existing road L2013 and will fit to the surrounding environment.	YES	
2.	**Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?** The proposed infrastructure falls within the adopted plans. Furthermore, the culvert is in keeping with the planning visions of the area in that the Department of Transport Integrated Development Plan [IDP] which states their vision including the provision of sustainable infrastructure for its communities. In order to develop and provide adequate rural accessibility, provincial roads need to be of a safe standard as well.	YES	
3.	**Will the benefits of the proposed land use / development outweigh the negative impacts of it?** The proposed development will have more long-term benefits than negative impacts, the latter of which are more short-termed and associated with the construction phase. The reasons for this are: ▪ Improved riding quality; ▪ Improved safety of the road, culvert; ▪ Improved storm water management; and ▪ Contributes to the long-term vision of providing sustainable infrastructure to the people of the Okhahlamba Local Municipality, and better access and connectivity. The benefits stated above, far outweigh the harmful impacts the development might have during construction phase of the project. The culvert structure will lead improve the social, environmental and economic status quo.	YES	
4.	**If the answer to any of the questions 1-3 was NO, please provide further motivation / Explanation** – N/A.		
5.	**Will the proposed land use / development impact on the sense of place?** The proposed development will not change or alter with the attachments individuals or groups hold for the area where development is set to take place. The proposed development aims to provide a safe and reliable crossing structure for the locals.		NO
6.	**Will the proposed land use / development set a precedent?** The project is a construction of a culvert structure and is not considered to be of a large enough scale to set a precedent.		NO

7.	**Will any person's rights be affected by the proposed land use / development?** All landowners have been notified.		NO
8.	**Will the proposed land use / development compromise the "urban edge"?** The development is within a rural area hence urban edge policies will not be affected.		NO
9.	**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 culvert will directly improve ridding quality, provide a safe crossing structure and connect communities served by the culvert. The L2013 road is currently utilised for agricultural and community transport and linking the surrounding homesteads with the nearest town in Bergville.		
3.	**Will the land use / development have any benefits for the local communities where it will be located?**	YES	
4.	**Explain:** Currently erosion is occurring on either side of the entrance into the river / drainage line. A formalised culvert across the drainage line will reduce erosion resulting from numerous crossing points entering and exiting the drainage line. This will also allow access across the drainage line during flood events. The culvert will ensure that crossing for road users is safe and reliable.		

3.1 Socio-Economic Value of the Activity

TABLE 11: SOCIO-ECONOMIC VALUE OF THE PROPOSED PROJECT

Description	Value
What is the expected capital value of the activity on completion?	R6 147 200.00
What is the expected yearly income that will be generated by or as a result of the activity?	R 5 110 400.00
Will the activity contribute to service infrastructure?	YES
Is the activity a public amenity?	YES
How many new employment opportunities will be created in the development phase of the activity?	30
What is the expected value of the employment opportunities during the development phase?	R1 764 000.00
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?	N/A
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

4 TECHNICAL DATA

4.1 Design of the L2013 culvert

4.1.1 Rationale for Design Considered

A construction of triple celled 2,4m x 2,4m precast box culvert concrete and with earth side drains. Headwalls will also be constructed on either side of the culvert, with associated stormwater discharge outlets within v-drains.

The culvert was assessed on the basis of the dimensionless inlet control performance curves given in the (Natal Province Roads Department) Design Manual for Standard Box Culverts. The structure was checked for conformance with the freeboard (Existing freeboard FD) and (Shoulder breaking point freeboard FSBP) requirements in terms of Chapter 8.3 of the SANRAL Drainage Manual. The requirements are:

- The submergence limit, H/D = 1.2D, of the design flood, QT,
- The maximum allowable submergence level, smallest of 2D or Shoulder Break Point, for the Q2T flow rate.
- FD> or = 0.3 m
- FSPB< or = 0 m

In selecting alternative structural forms suitable for both culverts (river crossing), consideration has been given to the design goals applicable to new structures, these include:

- Safety (strength, robustness, etc.);
- Durability and serviceability;
- Economy and constructability, and;
- Aesthetics.

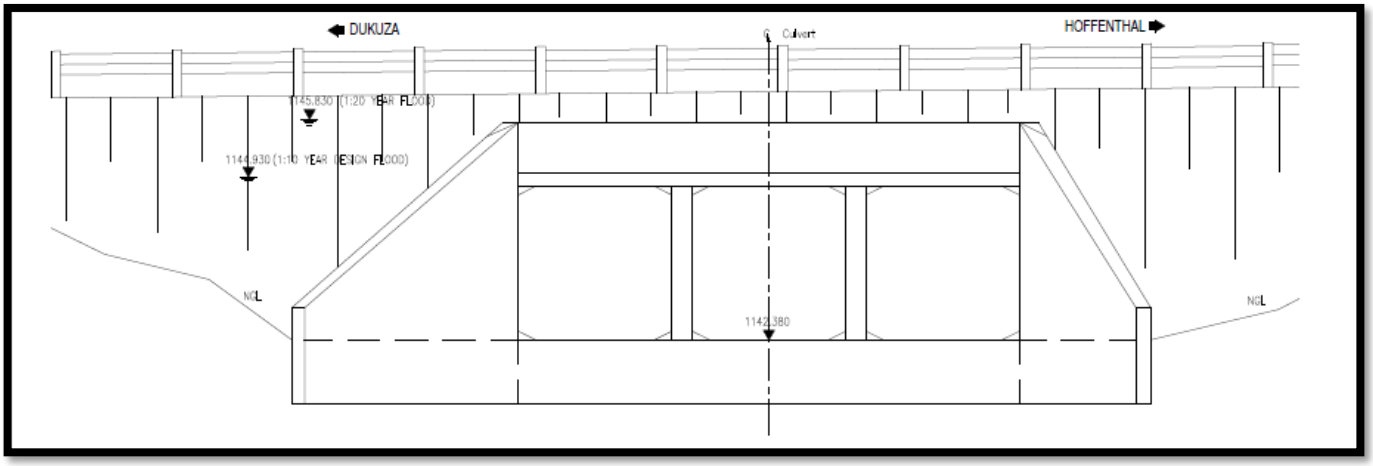


FIGURE 4: UPSTREAM ELEVATION

4.1.2 Hydrology

Hydrologic analyses for the structure was carried out using SANRAL's Drainage Manual followed by hydraulic analyses using headwater to depth ratios to check the hydraulic capacities.

The estimated flood peaks were based on the Rational Method as the catchment area for the culvert is less than 15 km^2. The Standard Design Flood (SDF) method was also used in the evaluation for comparison.

TABLE 12: CULVERT CATCHMENT PARAMETERS

Culvert Name	Catchment Area (Km^2)	Longest Collecto R (Km)	10/85 Height Difference (M)	SDF Method Drainage Basin No.	Time Of Conc. (Hrs.)
L2013 Structure	9.101	6.397	207	26	0.93

SANRAL Drainage Manual was used to determine the design flood frequency based on a Q20 peak flow rate. The Rational method and the SDF method - flood peak estimates as summarized below.

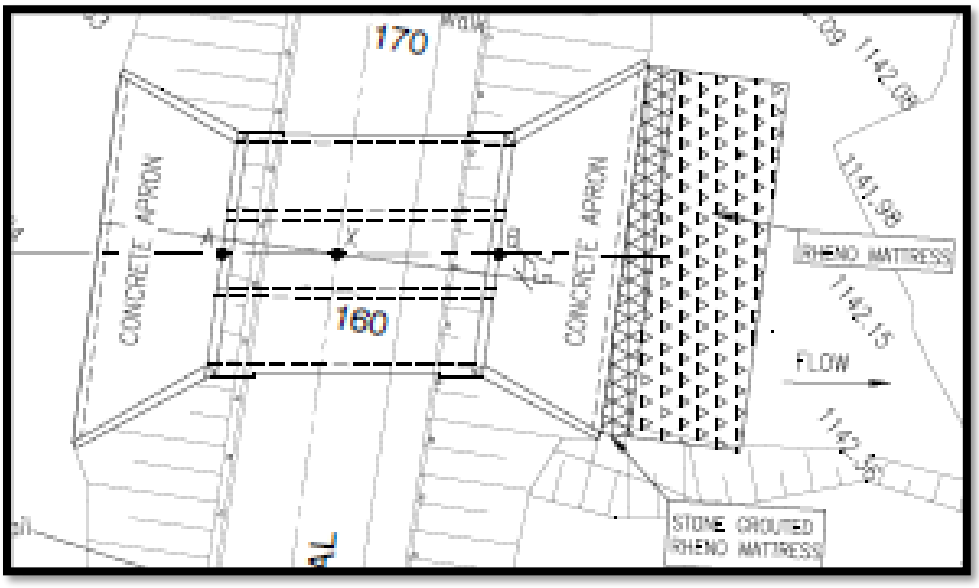


FIGURE 5: PLAN OF VIEW OF CULVERT

TABLE 13: CLASS 2 FLOOD PEAK ESTIMATES (RATIONAL METHOD)

Culvert Name	Q20 (m^3/s)	Design Flood Qt		Design Flood Q2T	
		Return Period (Years)	Peak Flow (M3/S)	Return Period (Years)	Peak Flow (M^3/S)
L2013 Structure	112.8	4	58.13	8	77.96

TABLE 14: CLASS 1 FLOOD PEAK ESTIMATES (SDF METHOD)

Culvert Name	Q20 (m^3/s)	Design Flood Qt		Design Flood Q2T	
		Return Period (Years)	Peak Flow (M3/S)	Return Period (Years)	Peak Flow (M^3/S)
L2013 Structure	65.78	3	15.54	6	31.88

4.1.3 Hydraulics Assessment

SANRAL Drainage Manual 6th Edition will be used for most of the hydraulic calculations to analyse the culvert requirements, using headwater to depth ratios to check the hydraulic capacity. The river crossing will require

improvement to provide adequate capacity, a structure with adequate capacity. The hydraulic requirements are reviewed in terms of major drainage structures.

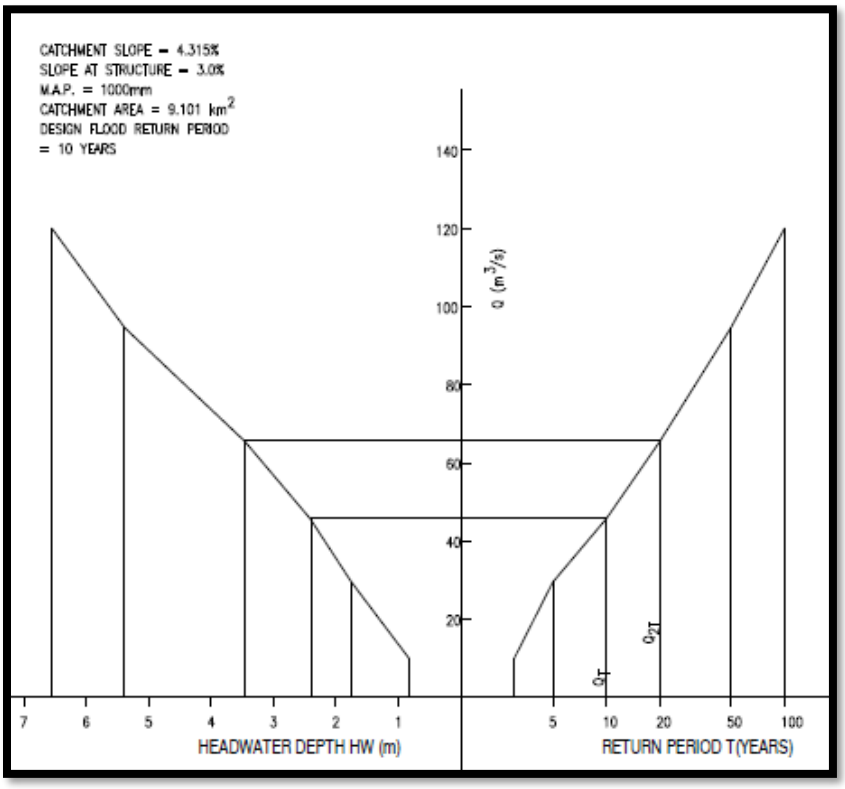


FIGURE 6: HYDROLOGIC ANALYSIS

4.1.4 Accommodation of Traffic During Construction

Maintaining a safe flow of traffic during construction is to be carefully planned and executed. Although detours may be considered, specifically for the construction of the culvert, construction will predominantly be done by means of half width construction. The layout of construction areas and detours in the use of delineators and warning signs is to be in accordance with the latest SARTSM and comply with the latest editions of the SADC Road Traffic Signs Manual. The establishment of areas for contractor operations is necessary to minimize the impact on safety of both motorist and worker.

The following plates provide a photographic context of the drainage on site.

Plate 1: Culvert approach

Plate 2: Upstream

Plate 3: Downstream

5 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. These include the following items of legislation.

5.1 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.

5.2 National Legislation and Regulations

This section outlines the applicable national legislation which needs to be taken cognisance of.

5.3 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 has, as its primary objective to provide 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.

5.3.1 EIA Regulations [2014] [as amended in 2017]

On April 7th 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] and GNR 324 [Listing Notice 3] of the EIA Regulations [2014] – refer to Table 15 below.

TABLE 15: LISTED ACTIVITIES OF THE EIA REGULATIONS [2014 AS AMENDED IN 2014]

Relevant notice	Activity No[s]	Description [Verbatim and as per applicability to proposed development]
Government Notice Regulation No. [GNR] 327 of 2014	*Activity 12[ii] [a]*	*The development (ii) infrastructure or structures with a physical footprint of 100 square metres or more, the development occurs (a) within a watercourse.* The proposed culvert structure for road L2013 has a length of 30.50 m and width of 85 m. The culvert structure will cross over stream along road L2013.
	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 than10 cubic metres.* The proposed project will have infilling of 90m^3 and extraction of material of 105 m^3.

Relevant notice	Activity No[s]	Description [Verbatim and as per applicability to proposed development]
Government Notice Regulation No. [GNR]324 of 2014	*Activity 14[ii][d][x][a][aa]*	*The development of infrastructure or structures with a physical footprint of 10 square metres or more.* *(x) Outside urban areas* *(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;* The project will entail the development of infrastructure exceeding 240 square metres within a watercourse, in KwaZulu-Natal within 10 kilometres from world heritage site.
Government Notice Regulation No. [GNR] 325 of 2014	*No relevant activity*	

5.3.2 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.

As the proposed development involves the abstraction of water as well as the crossing of watercourses, a WUL application will be submitted to the DWS for both consumptive and non-consumptive water uses. The NWA, as applicable to the proposed development [see comment in brackets after each item], defines the identified water uses, which are potentially applicable under Section 21 as follows:

The following water uses of Section 21 of the NWA are being applied for the WUL:

- *[a] Abstraction of water from a watercourse* [abstraction of water from the construction purposes];
- *[c] Impeding or diverting the flow of water in a watercourse* [applicable for the culvert within];
- *[i] Altering the bed, banks, course or characteristics of a watercourse* [applicable for the culvert within the].

5.3.3 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.

Apart from the presence of Critically Endangered grassland, the study area falls within an irreplaceable Critical Biodiversity Area, which further emphasises the conservation importance of the area and its biodiversity (Fig. 8; Jewitt, 2011). No protected or endemic plant and animal species or plant and animal species of conservation concern were found in the study area. Potential negative ecological impacts resulting from the proposed re-gravelling of the Class 4 road include physical damage to the Critically Endangered grassland, habitat and associated biodiversity, further alien plant invader establishment, downstream siltation and pollution of the study area L2013 by liquid and solid waste

5.3.4 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.

5.3.5 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.

5.3.6 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.

5.3.7 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.

No red data species were identified to be impacted by the proposed development. There have been a number of protected species identified.

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

5.3.8 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.

5.3.9 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 Culvert 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 resources 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.

5.3.10 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.

5.3.11 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.

5.3.12 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.

5.3.13 National Environmental Management: Air Quality Act [Act No. 39 of 2004]

The NEMA Air Quality Management Act [NEM: AQA] states the following as it 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."

5.3.14 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.

5.4 Climate Change Consideration

The proposed project will take into account energy efficient equipment's and consider best practice in terms of the construction methodologies and management of limited resources.

6 THE STUDY

6.1 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.

6.2 Site and Type of Activity Alternatives

The proposed development is along L2013 route, within the Okhahlamba Local Municipality. There are no site alternatives that have been investigated in this development, as the development is along an existing road. The preferred activity is the construction of triple celled 2,4m x 2,4m box culvert.

No other activity alternative exists that would meet the need and desirability of the Application.

6.3 Layout and Design Alternatives

Based on the drainage flow calculations, three watercourse crossing design alternatives have been investigated by the engineer during the pre-planning phase.

The culvert structure designs have taken numerous engineering methodologies into consideration which has minimal impact on the environment, by improving safety, drainage and reducing erosion along the route. Following the initial site visit it was evident that there has been a significant amount of erosion surrounding the proposed project area. This has led to the deepening of the drainage lines.

The following structural designs alternatives were considered for the proposed development:

TABLE 16: DESIGNS ALTERNATIVES

Culvert Name	No. Cells Required	Proposed Upgrade	Motivation
Option 1	3	The construction of a triple celled 2,4m x 2,4m box culvert	▪ Ease of maintenance; ▪ Less earthworks required than the alternate design.
Option 2	4	The construction of a four celled 1,8m x 1,8m box culvert	▪ This layout is not preferred as it would require a greater amount of earthworks operations within the watercourse and is not as favourable to maintain.

Culvert Name	No. Cells Required	Proposed Upgrade	Motivation
			▪ This alternative is not within the budget of the Department of Transport.
Option 3	4	The construction of a causeway consisting of four of 1,8m x 1,8m precast portal culvert	▪ This layout is not preferred as it would require a greater amount of earthworks operations within the watercourse and is not as favourable to maintain. ▪ This alternative is not within the budget of the Department of Transport.

The first option was considered for this project, which is the construction of a triple celled 2.4m x 2.4m box culvert. The selected structural design takes into consideration safety design requirements. It also addresses the needs of the target community; environmental factors were also 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.

6.4 No-go Alternative

No culvert structures will be constructed, therefore there will be no negative impacts associated with construction activity. However, there will also be no positive impacts associated with the construction of the culvert such as the improved connectivity and access for residents and the increased delay in emergency service response will remain unchanged. Erosion along the entrance of the drainage lines of L2013 will be further eroded and will lead to deepening of the drainage lines. During flooding events and during rainfall seasons which in turn, will lead to further erosion of the drainage lines if surface runoff and drainage are not dealt with accordingly

7 DESCRIPTION OF THE STUDY AREA

7.1 TOPOGRAPHY

The Drakensberg Mountains form a ±300Km border between Lesotho and South Africa, covering an area of ±40 000Km². The altitude of the mountains ranges from ±1800m above sea level (asl) to 3482m asl at certain peaks. The site in question is situated just within the Northern Drakensberg at a mean altitude of ±1275m asl; a mere ±11Km north of the famous Cathedral Ridge and Cathedral Peak, which sits at an elevation of 3004m asl. The topography of the Northern Drakensberg is characterised as a mountainous region with steep slopes and wide valleys with the study area falling into one of these wide valleys.

7.2 Climate

The average annual precipitation for the study area ranges between 800 and 1 200 mm per annum, with the mean daily maximum temperatures fluctuating between 20°C to 25°C for January, and the lowest daily mean temperatures for June and July of −2°C to 0°C. The daily mean relative humidity for the most humid month, March, varies between 68% and 72%, with the daily minimum relative humidity for July and August varying between 32% and 38% (Mucina & Rutherford 2006; Schulze 1997; South African Weather Services 2007; Van Zinderen Bakker 1973).

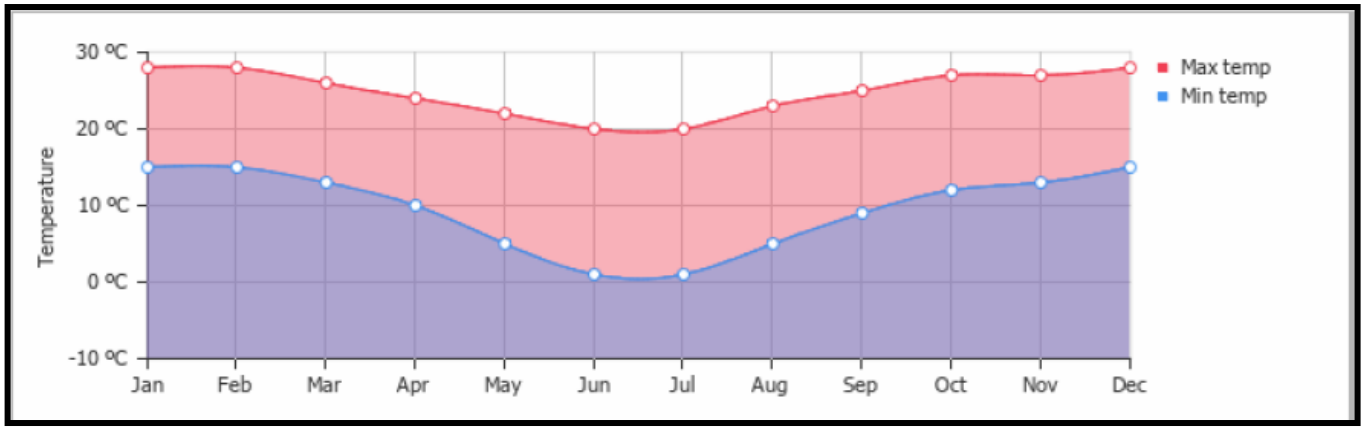


FIGURE 7: AVERAGE MIN AND MAX TEMPERATURES IN OKHAHLAMBA LOCAL MUNICIPALITY

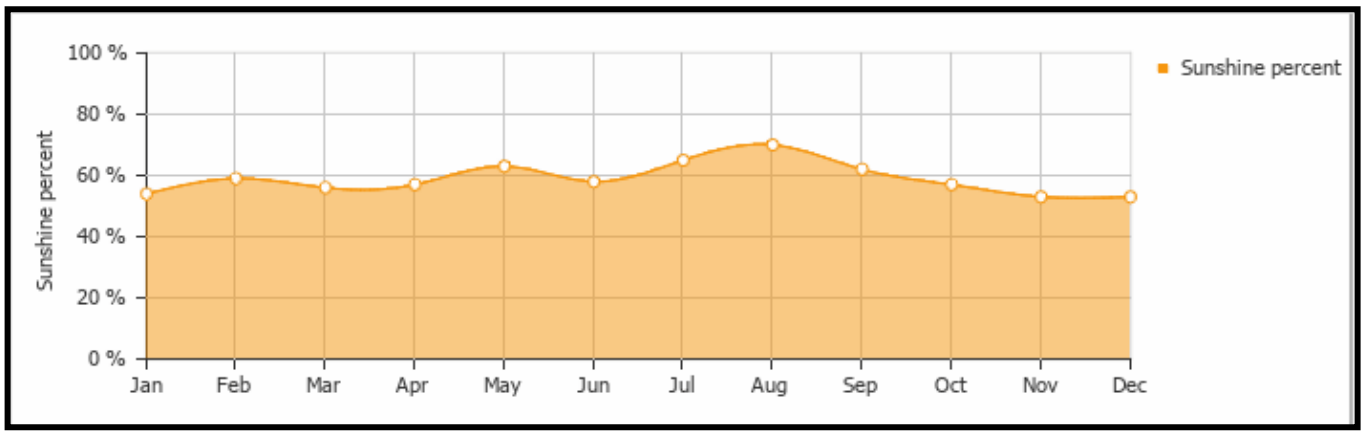


FIGURE 8: AVERAGE PERCENT OF SUNSHINE IN OKHAHLAMBA LOCAL MUNICIPALITY

Bergville normally receives about 601mm of rain per year, with most rainfall occurring mainly during mid-summer. Figure 9 below shows the average rainfall values for Bergville area per month. It receives the lowest rainfall (6mm) in July and the highest (128mm) in January.

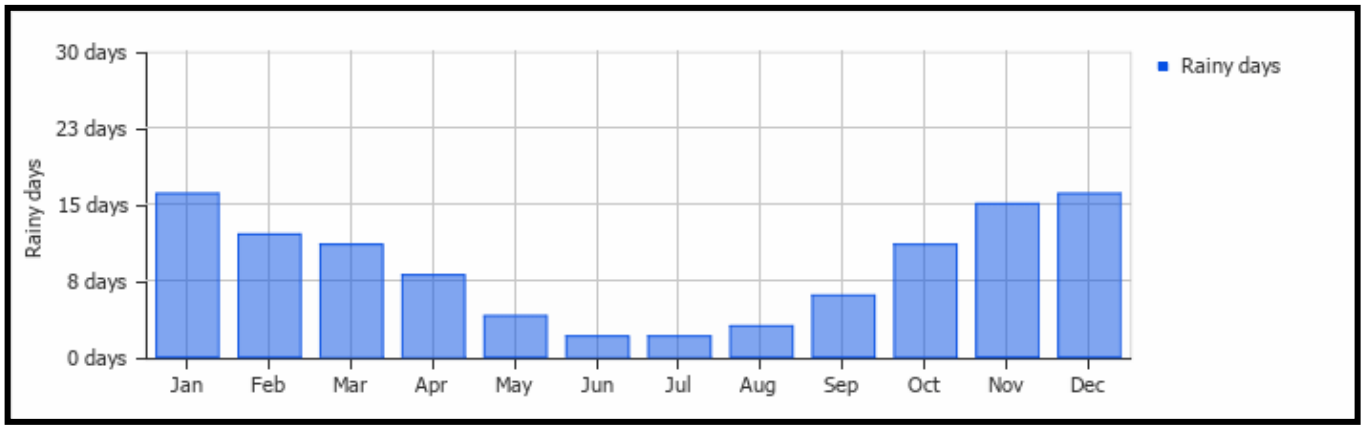


FIGURE 9: AVERAGE RAINY DAYS (RAIN/SNOW) IN OKHAHLAMBA LOCAL MUNICIPALITY

7.3 Geology

The study area, and much of the Drakensberg as a whole, is comprised of layers of the Karoo Supergroup which is the most widespread statigraphic unit in South Africa. The Karoo Supergroup is made up of mostly shales and sandstones. Below is a figure taken from the 'Central Drakensberg Information Centre' which illustrates the Drakensberg geology in a simplistic manner.

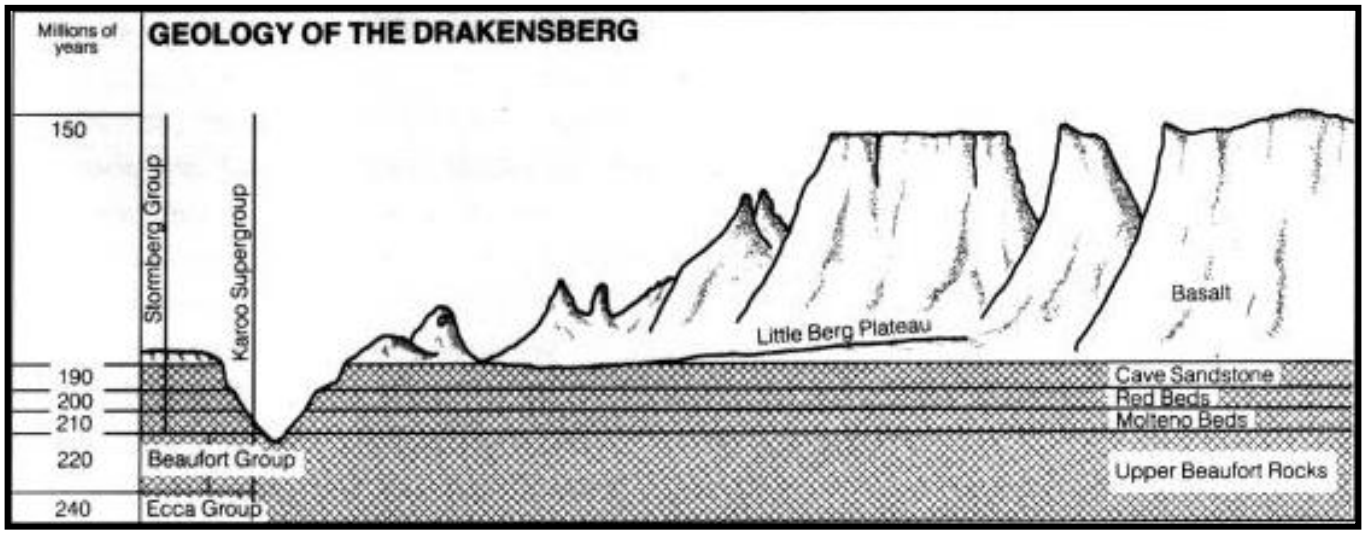


FIGURE 10: GEOLOGY OF DRAKENSBERG (HTTP://WWW.CDIC.CO.ZA)

7.4 Vegetation

The vegetation of the study area is that of a mountainous region characterised by steep slopes of broad valleys and supporting mainly short, sour grasslands, rich in forbs. So-called ‘Protea savannas' - grasslands that contain widely scattered trees of Protea caffra and occasionally P. roupelliae – fall within this unit. Sandstone cliffs, a major characteristic of this landscape, create a multitude of special habitats (often fire-protected) for many special plant communities (Mucina and Rutherford, 2006: 510).

7.5 Hydrological

The escarpment of the Drakensberg lies between 2 800 and 3 000 meters and determines the watershed between the interior catchments of Lesotho that feed into the Orange River and the shorter and steeper catchments of rivers feeding into KwaZulu-Natal such as the Tugela, Mooi and Mkomazi Rivers that flow towards the east coast. The key river arising in the Okhahlamba area is the Tugela River. The Tugela is the largest river system in KwaZulu-Natal. The funnel shaped catchment area of the Tugela River lies predominantly in the KwaZulu-Natal. The Tugela River rises in the Drakensberg Mountains near Bergville where peaks rise to over 3 000 m. The river and its tributaries, meander through central KwaZulu-Natal, draining from the Drakensberg escarpment towards the Indian Ocean.

7.6 Heritage

The greater Drakensberg area is well endowed with cultural heritage, including various wilderness areas within and outside the formal protected area network. Although most literature refers to this heritage mainly in terms of San rock art, the region also contains other categories of cultural heritage features representative of various cultures and time-periods.

The cultural heritage of the Drakensberg is diverse and highly fragile. Cultural heritage, unlike natural heritage, is non-renewable and irreplaceable. Once damaged, it is gone forever. San rock paintings and associated Later Stone Age sites, as well as the palaeontology of the area, are unique and have global significance. The remaining categories, however, certainly have national, provincial, and regional significance.

The area has had several different cultural groups associated with it, from the San to the southern Sotho, the Zulu-speaking and Xhosa-speaking groups, and, more recently, the Griqua and Anglo-Boer descendants. Each of these groups has its own unique cultural expressions and has related in various ways to the others. These differences are found in the building styles of homes, their way of life as they interact with their environment, traditional dress, and so on. In addition, there are a number of living heritage values associated with all of these groups, many of which are unknown or poorly recorded. The following section is a more detailed description of the various cultural heritage features.

8 PUBLIC PARTICIPATION PROCESS

Public participation is a process that is designed to enable all interested and affected parties [I&APs] to voice 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 40 and 44 [GNR 326] under the NEMA [as amended].

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

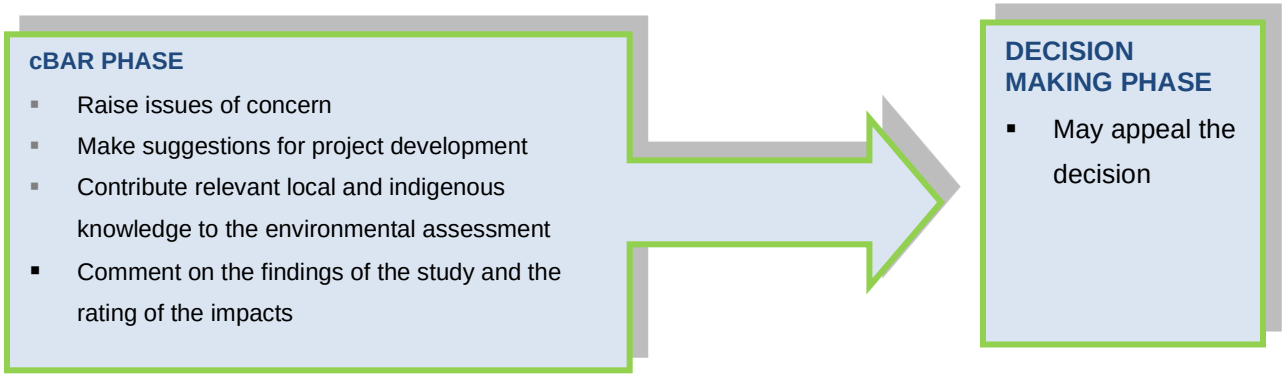


FIGURE 11: RESPONSIBILITIES OF I&APS IN THE DIFFERENT PPP STAGES

Figure 12 [below] depicts the approach taken by At Gedezar, where one way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.

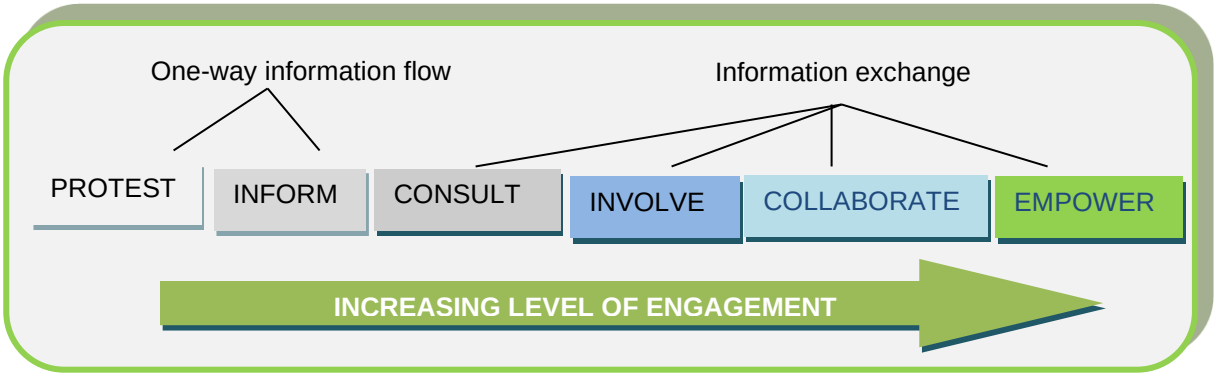


FIGURE 12: THE STAKEHOLDER ENGAGEMENT SPECTRUM [DEAT, 2002]

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 leaders forming part of the AmaNgwane Traditional Council. 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.
- Specifically, the proposed construction of a Culvert structure, PPP has entailed the following activities as outlined in the following Sections.

8.1 Authority Consultation

The competent authority which is the KZN EDTEA is required to provide an environmental authorisation [EA] [whether positive or negative] for the project. The KZN EDTEA has been consulted from the onset of this study, and has been engaged throughout the project process.

Authority consultation included / will include the following activities:

- Pre-application consultation in the form of a meeting with Ms Onwabile Ndzumo and Ms Nozipho Mthembu of the KZN EDTEA on the 30th June 2020.
- Submission of an application for environmental authorisation in terms of Section 26 of the EIA Regulations [2014].

8.2 Consultation with Other Relevant Stakeholders

Consultation with other relevant key stakeholders was undertaken through telephone calls and 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 sent pamphlets or BIDs and other information packs [where requested].

All relevant stakeholders were allowed an opportunity to comment on the cBAR.

The identified stakeholders of this project include:

TABLE 17: KEY STAKEHOLDERS CONTACTED AS PART OF THE PUBLIC PARTICIPATION PROCESS

OWNERS AND OCCUPIERS OF LAND ADJACENT TO THE SITE	
Ingonyama Trust Board	
LOCAL AUTHORITY	
uThukela District Municipality oKhahlamba Local Municipality	
PROVINCIAL AUTHORITY	
Mrs Bernadet Pawandiwa	Amafa KwaZulu-Natal
Ms Onwabile Ndzumo Ms Nozipho Mthembu	KwaZulu-Natal Department of Economic Development Tourism and Environmental Affairs [uThukela]
Ms Judy Reddy	Department of Transport
Nerrisha Pillay	Ezemvelo KZN Wildlife
Mr Sboniso Khumalo	Okhahlamba Local Municipality
Ms Cindy Coetzee	uThukela District Municipality
STATE DEPARTMENTS	
Mrs Jabulile Mngoma Madibe	National Department of Water and Sanitation

8.3 Site Notification

The EIA Regulations [2014] 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 stakeholders and inform them of the PP Process.

At Gedezar erected a number of notices in Zulu on the 2nd November 2020 at various traffic locations around the perimeter of the site and at the start and end of the project [refer to **Appendix E7**].

8.4 Identification of Interested and Affected Parties

I&APs were identified throughout the BA process primarily from responses received from the notices mentioned above. A number of stakeholders were also identified in the focus group meeting held with AmaNgwane Traditional Council. As well as through the local ward councillor.

E-mails were sent to key stakeholders and other known I&APs, informing them of the application for the project, the availability of the cBAR for review and indicating how they may become involved in the project.

Additionally, hard copies of the cBAR are made available at the offices of the local Councillor and AmaNgwane Traditional Council.

The contact details of all identified I&APs are updated on the project database, which is included in **Appendix E6**. This database was updated on an on-going basis throughout the BA process.

8.5 Briefing Paper

A briefing paper or BID for the proposed project was compiled in English [refer to **Appendix E8**] and distributed to key stakeholders on 10 February 2021.

The aim of this document is to provide a brief outline of the application and the nature of the development. It is also aimed at providing preliminary details regarding the BA process, and explains how I&APs could become involved in the project.

The briefing paper was distributed to all identified I&APs and stakeholders, together with a registration / comment sheet inviting I&APs to submit details of any issues, concerns or inputs they might have with regards to the project. BIDs were also distributed *via* email to relevant Departments. Refer to **Appendix E5**.

8.6 Focus Group Meeting

Following consultation with KZN EDTEA, the EAP convened a Focus Group Meeting with the local as representatives of all local I&APs affected by the proposed project on the on 2nd November 2020.

Refer to **Appendix E3.4** for meeting minutes and attendance register on **Appendix E3.3**.

8.7 Advertising

In compliance with the EIA Regulations [2014], notification of the commencement of the BA process for the project is advertised in advertised in a local newspaper as follows:

- Ladysmith Gazette a local newspaper on the 13th May 2021 (Refer to **Appendix E2**).

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.

8.8 Issues Trail

Issues and concerns raised in the public participation process during the cBA process will be compiled into an Issues Trail.

The Issues Trail is attached as **Appendix E4**, in which all comments received and responses provided to date have been captured.

8.9 Key Issues Raised by the Public [Summarised]

- Will the new Culvert be able to withstand torrential flooding?
- When will construction on the project begins?
- Enquired about employment opportunities during the construction period.

8.10 Public Review of the draft Consultation BAR

All registered I&APs are notified of the availability of the report through the local ward councillor.

The cBAR is made available for authority and public review for a total of 30 days from 13 May 2021 & 14 June 2020.

The report is made available at the following public locations within the study area, which are all readily accessible to I&APs:

- AmaNgwane Traditional Council offices; and
- Ward councillor offices

8.11 Final Consultation BAR

The final stage in the BA process entails the capturing of responses and comments from I&APs on the cBAR in order to refine the BAR, and ensure that all issues of significance are addressed.

The final BAR [i.e. fBAR] will be the product of all comments and studies, before being submitted to KZN EDTEA for review and decision-making.

8.12 PPP Summary

TABLE 18: SUMMARY OF PUBLIC PARTICIPATION PROCESS THUS FAR

Activity	Description	Reference
Identifying stakeholders	Stakeholders were identified and a database of all I&APs were compiled.	**Appendix E6**
Publishing newspaper adverts	Advertisements regarding the proposed project scope of works, location, and date for consultation Basic Assessment Report review as well as details of EAP were placed in the Ladysmith Gazette publication on the 13th May 2021.	**Appendix E2**
Distribution of a BID	BIDs were distributed electronically and by hand to I&APs on 2nd November 2020 and 10 February 2021.	**Appendix E5**
Erection of site notices	A number of A2 site notices were erected on the perimeter of the site on 2nd November 2020	**Appendix E7**
Preparation of an on-going Issues Trail	Comments, issues of concern and suggestions received from stakeholders thus far have been captured in a Comment and Response Report.	**Appendix E4**
Release of Draft Reports	This Consultation Basic Assessment Report [cBAR] has been advertised and made available for a period of 30 days for public review and comment. The cBAR is available for review from 13 May 2021 & 14 June 2021.	**Appendix E2**
Public Meetings / Focus Group Meeting	A focus group meeting was held with the local residents on 2nd November 2020	**Appendix E3**
Release of final Reports	The final Basic Assessment Report will be the product of all comments and studies, before being submitted to KZN EDTEA for review and decision-making.	—

9 SUMMARY OF KEY SPECIALIST FINDINGS

9.1 Wetland Health and Functionality Assessment

This assessment was conducted by Stephen Burton from ***Sivest SA (Pty) LTD***. For the full report, refer to **Appendix D1.**

9.1.1 Methodology

The outer temporary boundaries of the wetlands onsite were delineated using the method contained within the DWAF guideline 'A practical field procedure for the identification and delineation of wetlands and riparian areas' (DWAF, 2005). The guideline uses four indicators which are required to determine the outer edge of the temporary boundary of a wetland, i.e., Terrain unit, Soil wetness, Soil form and Vegetation.

Features within the study area were delineated and classified using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. WET-Health tool developed by Macfarlane et al. (2009) was used to determine the current (pre-development) and post-development health of the affected wetland systems. The current (pre-development) and post-development value of the affected wetland units was determined using the WET-Ecoservices tool developed by Kotze et al. (2009).

9.1.2 Study Findings

Four (4) wetland units, are located within the investigation area. The wetland units and their HGM category (prior to modification) are provided in Table 19 below.

TABLE 19: WETLAND UNITS WITHIN THE DEVELOPMENT AREA AND THEIR HYDRO-GEOMORPHIC DESIGNATIONS

Wetland HGM Unit	Hydro-Geomorphic Type (Under natural conditions)
1	Channelled Valley Bottom Wetland
2	Unchannelled Valley Bottom Wetland
3	Unchannelled Valley Bottom Wetland
4	Unchannelled Valley Bottom Wetland

9.1.2.1 Channelled Valley Bottom Wetland

The wetland systems on site are generally extensive, and historically every valley bottom within the hilly study site would have had a wetland system. In some cases the valley bottoms have been purposefully drained through the creation of drainage ditches. However, the area also has a number of systems (HGM 1) that drain relatively large areas that would naturally have developed channels as the volumes are greater (see **Plate 4** below). As the area drains towards the lower valley systems the volume of water that the wetlands can hold is exceeded, and canalised flow develops (rivers and streams). In general, the channelled valley bottom system within the project area have been impacted upon through the hardening of surface within the catchments, and through direct impacts of subsistence and commercial farming practices. Much of the riparian vegetation that would have inhabited the systems has been cleared to make way for crop production, and thus the hydrological regime has been altered.

PLATE 4: HGM UNIT 1 IS A NATURALLY CHANNELLED VALLEY BOTTOM WETLAND, WHICH HAS BEEN FURTHER IMPACTED BY STORMWATER FLOWS AND THE OVERGRAZING OF THE CATCHMENT, WHICH HAS LED TO INCREASED EROSION.

9.1.2.2 Unchannelled Valley Bottom Wetlands

Unchannelled valley bottom wetlands are relatively common system within the area, and range from small to extensive in nature. The valley bottoms are generally of a gentle gradient along their length, and thus perfect conditions exist for the creation of valley bottom wetlands. As with the channelled systems discussed above, the unchannelled valley bottom systems have been impacted upon by the clearing of the wetlands and catchments for commercial crop production, and through the creation of drains in order to maximise crop production. The systems are generally seasonal in nature, as evidenced by the mottling present in the wetland soils (see **Plate 5** below).

PLATE 5: THE UNCHANNELLED VALLEY BOTTOM WETLAND SOILS EXHIBIT THE PRESENCE OF MOTTLES, WHICH INDICATE THAT THE WETLAND IS MOST PROBABLY ONLY WET FOR A PORTION OF THE YEAR, AND THE SYSTEM IS LIKELY A SEASONAL WETLAND.

9.1.2.3 Results: Wetland Health (Pes)

Based on the results from the wetland delineation assessment it has been observed that the Channelled Valley Bottom Wetland systems on site are extensive, the results show that the valley bottoms have been purposefully drained through the creation of drainage ditches. However, the area also has a number of systems (HGM 1) that drain relatively large areas that would naturally have developed channels as the volumes are greater.

The unchanneled valley bottom wetlands are relatively common system within the area, and range from small to extensive in nature. The unchanneled valley bottom systems have been impacted upon by the clearing of the wetlands and catchments for commercial crop production, and through the creation of drains in order to maximise crop production. The wetland soil indicate that systems are seasonal in nature.\

Wetland units from the wetland health assessment indicate that wetland HGM's 2, 3 and 4 units are Largely Modified resulting from past and current land uses and activities. Whereas wetland HGM unit 1 is Seriously Modified through changes within the catchment and the destruction of wetland soils by uncontrolled erosion. The wetland units were assessed as being of medium to moderately-high importance in terms of ecosystem service provision. The ability of the wetlands to trap additional sediment is of medium importance, while its tourism and cultural services are of low importance. The wetlands' ability to reduce floods and stream flow are generally considered of medium importance. Correspondingly, the ability of the wetlands to store carbon, and maintain biodiversity is of medium importance. The ability of the wetlands on site to remove toxic elements phosphate, Nitrate is of medium high importance.

The results for the Wetland Ecological Importance and Sensitivity show that minimal faunal activity was noted on study site, and the possibility of wetland faunal and avi-faunal species being present at different times of the day and season is probably limited. The confidence levels for the assessment were generally moderate.

A summary of the Present Ecological Status (PES) based on results from the WET-Health Tool is provided in Table 20 below.

TABLE 20: WET-HEALTH SCORE

	MODULE				
Unit	**Hydrology Impact Score and Class**	**Geomorphology Impact Score and Class**	**Vegetation Impact Score and Class**	**Combined Impact Score**	**PES Category**
1	4.8 (D)	7.8 (E)	7.1 (E)	6.31	E (Seriously Modified)
2	4.2 (D)	3.1 (C)	5.8 (D)	4.34	D (Largely Modified)
3	4.7 (D)	4.4 (D)	5.7 (D)	4.90	D (Largely Modified)
4	4.8 (D)	3.2 (D)	6.2 (E)	4.74	D (Largely Modified)

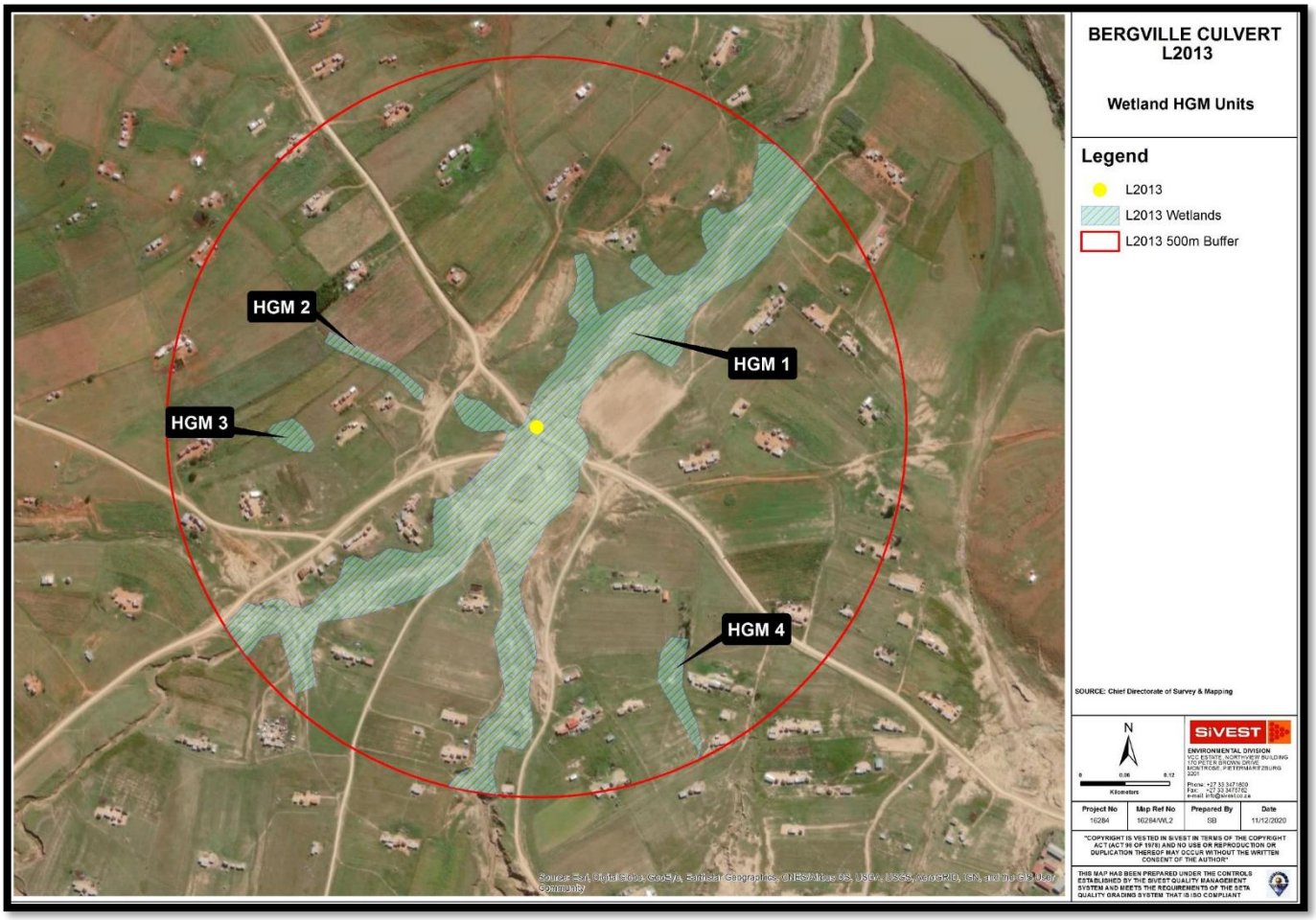


FIGURE 13: WETLAND DELINEATION MAP OF HGM UNITS.

9.1.3 Construction Phase Potential Impacts

The culverts will be built across the channelled valley bottom systems that exist in the area. Direct disturbances to the wetlands associated with the construction of the road include the excavation of trenches and outfalls within the wetland and the compaction of the wetland vegetation and soils by heavy vehicles involved in the excavations and the laying of the culverts. Indirect disturbances arising from these direct impacts include erosion, sedimentation and alien plant encroachment.

Mitigation measures to the above potential negative impacts are provided in a full Wetland Health and Functionality report, refer to **Appendix D1**.

9.1.4 Conclusion

An assessment of the Present Ecological State of the wetlands reveals that most HGM units are Largely Modified, while wetland HGM unit 1 is Seriously Modified through changes within the catchment and the removal of wetland soils through erosion.

An assessment of the current importance of the wetland unit in terms of ecosystem service provision indicates that wetland units provide medium to moderately-high levels of wetland functioning.

The EIS score indicates that the assessed unit falls into EIS **Category C**, which corresponds to a Moderate importance and sensitivity.

All four wetlands on site have been impacted upon by subsistence crop production, livestock grazing, and changes to their hydrology (increased hardened surfaces) and geomorphology thus leading to an associated infestation by alien vegetation.

9.2 Terrestrial Ecological Impact Assessment Report

The study was conducted by Mark Summers and Stephen Burton from ***Sivest SA (Pty) LTD***. on the 4th December 2020. For the full report, refer to **Appendix D2**.

9.2.1 Methodology

The study site was analysed using a two-phased approach. Firstly, a desktop assessment of the study site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. Different databases have been examined in the process of undertaking the desktop analysis. A summary of the methodology utilised for the generation of each of the databases is available on the full Ecological Impact Assessment Report attached on this report [refer to **Appendix D2**].

Vegetation sampling and fauna sampling was undertaking during the site visit. Vegetation was sampled using the random sampling technique. The “hotspot1” assessment technique was utilised in the process. The “hotspot1 technique focuses on the sampling effort on areas with natural vegetation or where the vegetation was dominated by indigenous species (i.e., not comprising a large proportion of alien invasive plant species). Individual plant species observed during the assessment were recorded to give an indication of species diversity and the overall species assemblage.

Fuana species were sampled using the taxa specific lists that were compiled with the use of databases such as the Animal Demographic Unit (ADU) Virtual Museum. The lists were compared with species seen during site visit. Verification of fauna on site was done per faunal unit with a focus on movement, foraging, nesting and sites. Point count bird surveys, with a clear view of the surrounding vegetation, and walk-through surveys were conducted in all of the habitat types around the culvert site. Birds were identified visually or by their vocalisation. Active searches for reptiles and amphibians were conducted within habitats likely to harbour or be important for species.

9.2.2 Study Findings

The area is surrounded by low density communal housing and communal grazing areas associated with the communal housing. Grazing camps and / or old cultivated fields surround the culvert area on the L2013 road. Heavy erosion is associated with the L2013 road leading into the drainage line associated with the proposed culvert. Vegetation associated with the culvert and 5m buffer comprises of typical roadside vegetation and species associated with erosion channels.

According to Mucina and Rutherford 2006, the site is classified as Northern KwaZulu-Natal Moist Grassland (GS 4) which is a Vulnerable vegetation type. Upon undertaking the groundtruthing exercise it was found that the site is transformed by erosion and communal grazing adjacent to the culvert site. This is evident in Plate 1 below, showing a heavily eroded site.

A total of 32 plant species were recorded during the field survey, of which 6 were alien. Two plant species fall under the KwaZulu-Natal Nature Conservation Management Act were noted within the development footprint (*Asparagus spp., Ledebouria revoluta*).

The vegetation found along the existing road reserve is dominated by *graminiod* species. The majority of the road reserve resembles **Plate 6** below.

PLATE 6: TYPICAL VEGETATION ALONG THE MAJORITY OF THE ROAD RESERVE

Sward height was low due to a combination of communal grazing and being relatively early in the growing season. Grass species included Gongoni Grass (*Aristida junciformis subsp. junciformis*), Bermuda Grass (*Cynodon dactylon*), Lemon Scented Grass (*Elionurus muticus*), Narrow Heart Love

Herbaceous plants consisted of a mix of indigenous herbs and occasional alien plants. The level of alien infestation was relatively low. Species identified include Berkheya species, Golden Everlasting (*Helichrysum aureonitens*), Leeubekkie (*Nemesia denticulata*), Cats Whiskers (*Ocimum obovatum subsp. obovatum var. obovatum*), Black Jack (*Bidens pilosa*), Thistle (*Cirsium vulgare*) and Batchelor's Button (*Gomphrena celosiodes*).

A total of 32 plant species were recorded during the field survey, of which 6 were alien. Two plant species fall under the KwaZulu-Natal Nature Conservation Management Act were noted within the development footprint (*Asparagus spp., Ledebouria revoluta*).

9.2.2.1 Biodiversity noteworthiness

In terms of the vegetation classifications that were identified from the aerial photography and ground truthed on site, the following assessment was made in terms of the noteworthiness of the vegetation that would be immediately impacted upon by the proposed Development.

TABLE 21: BIODIVERSITY NOTEWORTHINESS OF THE CULVERT L2013 AND ROAD RESERVE.

	Scores				
Biodiversity Noteworthiness	0	1	2	3	4
Diversity	✓				
Rarity		✓			
Conservation Status			✓		
Red Data Species	✓				
Uniqueness / Special features		✓			
OVERALL VALUE	Total Score/number of categories is 4 / 5= 0.8				

9.2.2.2 Functional Integrity and Sustainability

The Functional Integrity and Sustainability speaks to the impact of the proposed activity on the receiving environment. It also speaks to the likelihood that it will be of significance, and whether there are significant mitigation and or amelioration measures that are required to be put in place to ensure that the impacts are manageable, and will not prove deleterious to the vegetation type as a whole.

TABLE 22: FUTURE INTEGRITY AND VIABILITY OF THE CULVERT L2013 AND ROAD RESERVE

	Scores				
Integrity & Future Viability	0	1	2	3	4
Buffer	✓				
Connectivity			✓		
Alteration		✓			
Invasive/pioneers		✓			
Size	✓				
OVERALL VALUE	Total Score/number of categories is 4 / 5= 0.8				

- The average score of the culvert L2013 and road reserve is 0.8, which indicates that this area is functioning at a low level.
- The average score of the culvert L2013 and road reserve is 0.8, which indicates that this area is functioning at a moderately low level.

9.2.3 Faunal Findings

9.2.3.1 Avifauna

A total of 31 bird species were seen during the sampling period. Of the 31 species seen, 28 birds were identified in flight. This assumes that these birds were using the sample site as a viable home range and movement corridor, which is understandable as the sample site is surrounded by wetland and grassland habitat, surrounded by hillsides. Additionally, the suite of birds seen tend to inhabit the above-mentioned vegetation types. Ten (10) birds were seen foraging, with the majority of these species feeding on wing (such as the swallows and swifts). The degraded state of the roadside vegetation associated with the culvert and drainage line is a likely reason as to why the avifaunal richness is low. No species of conservation concern were identified during the assessment; however, a kettle of Cape Vultures was seen in the general area. The Cape Vultures will range over a large area and are likely to feed on carcases and vulture restaurants provided by the farmers in the greater area. There is potential for Lanner Falcon

(Vulnerable) to forage through the area, with cliff sides from the foothills of the Drakensberg Mountain Range providing nesting and roosting habitat. Some avifaunal species seen, can be found from Plate 7 & 8.

PLATE 7: CAPE WAGTAIL (MOTACILLA CAPENSIS)

PLATE 8: PIED CROW (CORVUS ALBUS)

Herpetofauna include both reptiles and amphibians. No amphibians were seen during the assessment, however drainage lines and a wetland in close proximity to site are available habitats for amphibians. Amphibians are indicators of ecosystem health due to their sensitivity to polluted aquatic environments.

No reptile species were seen during the assessment. Habitat for grassland and wetland reptile species is present, however the disturbed / fragmented nature of the site reduces the chance of reptiles being present on site. No species of conservation concern were noted in site. The Reptile MAP predicts the presence of the Near Threatened Drakensberg Dwarf Chameleon (*Bradypodion dracomontanum*), which is found in grasslands and small forest patches above 1500m. This species is unlikely to occur on site due to the disturbed nature of the study area. The Near Threatened Coppery Grass Lizard (*Chamaesaura aenea*) is found on grassy slopes and plateaus of the eastern escarpment and is predicted to occur on site; however, the degraded nature of the study site is unlikely to house this species.

9.2.3.2 Mammals

No mammal species were seen during the site assessment. Grassland habitat is available for Vaal Rhebok (Near Threatened - *Pelea capreolus*) and Serval (Near Threatened – *Leptailurus serval*) on the hills in close proximity to site, however these species are very sensitive to communal hunting, therefore it is unlikely that these species will occur on the application site. The Near Threatened Common *Dasymus (Dasymys incomtus*) and Southern African Vlei Rat (*Otomys auratus*) could potentially occur in the wetlands in close proximity to site, however are unlikely to inhabit the application site due to the eroded and exposed nature of the drainage line.

9.2.3.3 Butterflies

No butterfly species were seen during the assessment and no species of conservation concern are predicted to occur on site. Species predicted to occur within the study area according to Lepi MAP can be found in **Appendix 6** of the Terrestrial Ecological Assessment Report [refer to the attached **Appendix D2** of cBA Report].

9.2.3.4 Other Species

The four invertebrate species predicted to occur on site by the DEFF Screening Tool (Conocephalus zlobini, Paracilacris lateralis, *Clonia lalandei, Thoracistus aureoportalis*) are restricted to the grassland biome, which is

present alongside the proposed development and used as communal grazing. However, these species are unlikely to occur at the culvert sites themselves.

9.2.4 Impact Assessment

The nature the activity is that it has the potential to cause negative environmental effects. However, if mitigation measures for the activity are correctly implemented and the rehabilitation is successful, minimal disturbance of environment will be seen [See **Appendix 8** for Methodology of the Terrestrial Ecological Assessment Report [refer to the attached **Appendix D2** of cBA Report].

The potential impacts of the proposed development mainly related to loss of aquatic species as well as general species which are utilizing the site during construction. However, a formal culvert or bridge across this section of river will reduce the aquatic disturbance currently occurring from vehicles driving through the river. Additionally, this will reduce erosion which is currently occurring due to numerous tracks over the same river.

The overall negative impact of the proposed project is not excessive. A relatively limited area will be lost to development. This will result in the loss of some indigenous plants, but little anticipated impact on any plant or animal species of conservation concern.

9.2.5 Conclusions

The area being within the Tugela River Catchment has been identified as a Strategic Water Source Area. The erosion channels leading into the drainage line (which feeds into the Tugela River) are likely to have been caused by numerous crossing points entering the drainage line. This leads to sedimentation of the river in the drainage line feeding into the Tugela River. A formalised crossing point and rehabilitation of the erosion channels will reduce sedimentation and have a positive overall impact on the Strategic Warer Source Area; therefore, the development is supported in this regard. The ecologist has no objection to the development provided all mitigation measures can be agreed and achieved are implemented.

9.3 Heritage Impact Assessment

The study was conducted by Frans Prins from **Active Heritage cc** in March 2021. For the full report, refer to **Appendix D3**.

9.3.1 Methodology

A desktop study was conducted from the archaeological databases contained in the KwaZulu-Natal Museum. The available archaeological and heritage literature covering the greater Bergville area was consulted. The SAHRIS website was consulted for previous heritage surveys and heritage site data covering the project area. Ground survey of the site footprint was conducted on 10th January 2021. The survey was conducted by following acceptable archaeological survey methods. An area of 50m was also surveyed beyond the actual footprint.

9.3.2 Findings

9.3.2.1 Heritage sites identified

Although the areas surroubding the footprint is extremely rich in rock art none were located during the ground survey. In fact, there are no sandy outcrops suitable for rock art occurrence, within 50 m from any of the proposed culverts. The ground survey did not locate any heritage sites (including archaeological, historical, graves, and living heritage sites) on the footprint. Graves occur in the area and are associated with local homesteads. However, none

of the homesteads sitated close to the proposed culverts had any graves. The area is not part of any known cultural landscape.

In terms of active stakeholder consultation, the consultant spoke to local residents whom he encountered adjacent to L2013, during the survey. None of them had knowledge of any heritage sites and/or graves that may occur in the immediate vicinity of the proposed culverts.

Desktop study indicates that Stone Age Sites of all periods and traditions may occur in the greater Bergville area. Middle Stone Age tools have been found in dongas and erosion gullies at various locales in the greater Drakensberg area including areas close to the study area. These sites are usually out of context and of little research value. Middle Stone Age deposits often occur in deep cave deposits throughout KwaZulu-Natal (including the Eastern Cape Drakensberg area and adjacent parts of Lesotho). Later Stone Age sites are more prolific in the Drakensberg. These include rock art sites. Almost 1000 rock art sites occur on the greater Drakensberg area. Approximately 300 rock art sites have been located my members of the Mnweni Cultural and Rock Art Group in near vicinity of the project area. The abundance of sandstone shelters and outcrops in the project area do point to the potential occurrence of these sites on the footprint.

Early Iron Age Sites typically occur along major river valleys below the 700 m contour in KwaZulu-Natal. It is very unusual to find sites above the 1000m contour. The project area is situated above the 700m contour far removed from a major river valley setting. It is therefore most unlikely to expect Early Iron Age sites at the project area. Later Iron Age sites may occur in the project area. These sites were occupied by the ancestors of the first Nguni-speaking agriculturists as well as their descendants who settled in KwaZulu-Natal. Later Iron Age sites are known from areas closer to Bergville and further to the east. Often sites are only located with reference to historical or oral data. Historical buildings, structures and farmsteads do occur scattered throughout the greater Bergville area. Historical era buildings and structures could occur at or near the project area. ‘Living heritage sites’ has previously been recorded in the nearby Mnweni Valley to the west of the project area. These are mostly rock art sites that are still being used by sheep herders and other community members as well as pools with religious values.

9.4 Paleontological Impact assessment

The study was conducted by Prof Marion Bamford. For the full report, refer to **Appendix D4**.

9.4.1 Methodology

The planetological impact assessment was conducted using consultation of geological maps, literature, palaeontological databases, published and unpublished records. This was used to determine the probability of fossils occurring within the study area and surrounding areas as well. Data sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases. Site visit by a qualified palaeontologist to locate fossil and assess their importance will not be applicable to this assessment.

9.4.2 Findings

The study area for the proposed development is on the Adelaide Subgroup and close to Jurassic dolerite. The dolerite is of volcanic origin hence does not preserve any fossils therefore it has low sensitivity. The Adelaide Subgroup have been divided into eight assemblage zones according to the dominance or temporally exclusive vertebrate fossils, this is according to the current accepted biostratigraphy.

If the vertebrate fossils were common in this region and had been well mapped the specific Assemblage Zone would have been specified in the literature. The common names for the fossils that could occur here are fish, amphibians, reptiles, therapsids, terrestrial and freshwater tetrapod, as well as freshwater bivalves, trace fossils including tetrapod trackways and burrows. Where the vertebrates do not occur, it is possible to find sparse to rich assemblages of vascular plants of the late Glossopteris Flora, including some petrified logs), and insects are also prevalent at some sites.

Vertebrate fossils are fairly common in the Adelaide Subgroup in certain parts of the Karoo Basin and have been used to subdivide the strata into biozones (Rubidge et al., 1995; Day et al., 2015; Smith at al., 2020). In the eastern part of the basin the only formation is the *Normandien* Formation, with four members, that correspond to the *Daptocephalus* Assemblage Zone (Rubidge et al., 1995) and more recently divided into two subzones (Smith *et al*., 2020). Potential vertebrate fossils are fish, amphibians, *Parareptilia, Eureptilia, Biarmosuchia, Anomodontia, Synapsida, Therocephalia* and *Cynodontia* [**Appendix D4** of the Paleontological Impact Assessment Report] attached on this cBAR.

Surface activities associated with the proposed project have a potential to impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either the wrong type to preserve fossils (dolerite) or represent a delta-plain setting where scattered bones bight have been buried and preserved the surface is already very disturbed by the present paths and tracks. There is a very small chance that fossils from the Adelaide Subgroup may occur below ground and may be disturbed, a Fossil Chance Find Protocol has been added to the Palaeontological Impact Assessment which is attached to this cBAR report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low.

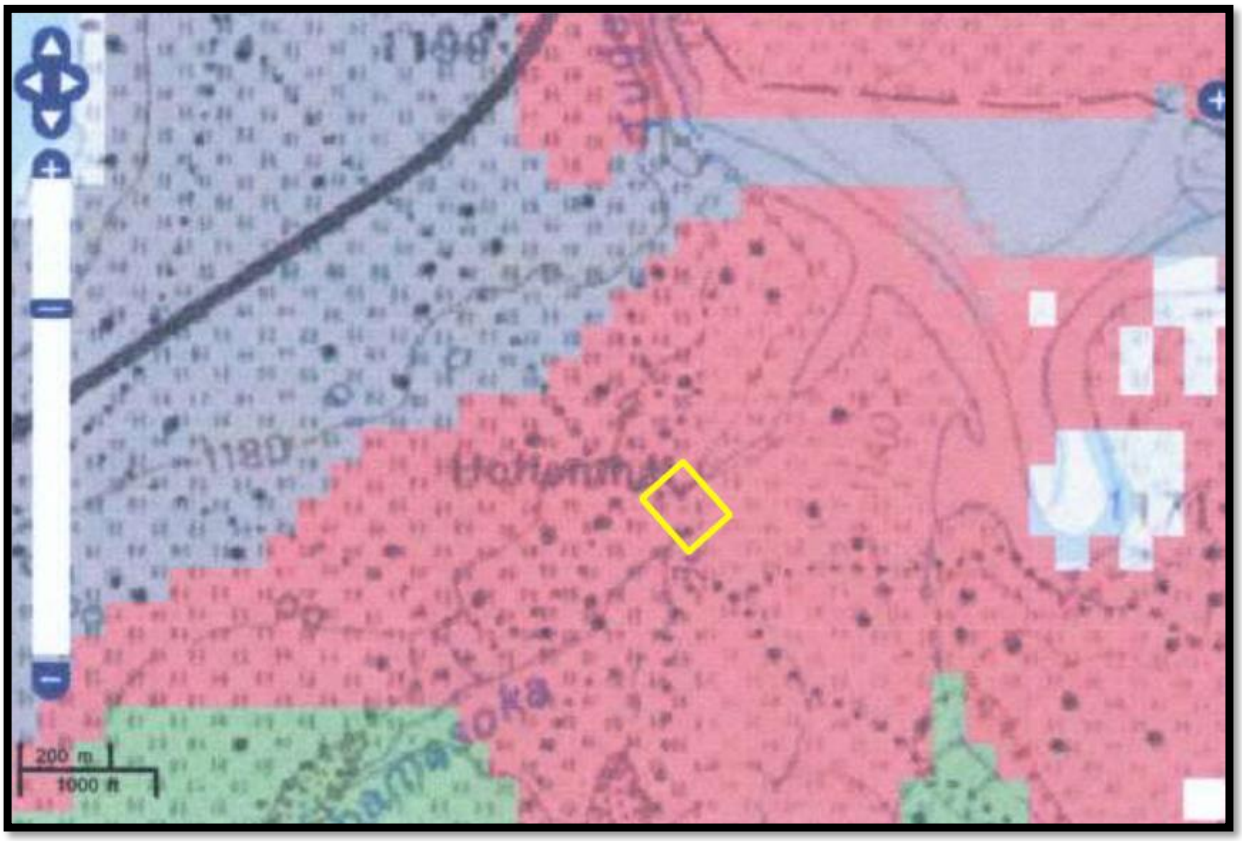


FIGURE 14: SAHRIS PALAEOSENSITIVITY MAP

Figure 14 above is a palaeosensitivity map for the site for the proposed L2013 Culvert over the Nhlambamasoka River shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

9.4.3 Conclusions

The proposed site lies on the grey-green shales of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). The rocks are potentially fossiliferous but fossils are rare and scattered because this stratum represents delta-plain deposits. The *Daptocephalus* Assemblage Zone possibly is present so there could be vertebrate bones below the surface, or fragmentary plants of the *Glossopteris* flora might occur. The culvert is over a stream and on an existing road, with paths and tracks alongside it, so the culvert site is already highly disturbed and no surface fossils would survive.

9.5 Geotechnical Investigation

The study was conducted by Shrivar Hiralal of **Geosure (Pty) Ltd** in July 2020, For the full report, refer to **Appendix D6.**

9.5.1 Methodology

The fieldwork for the investigation was carried out according to codes and guidelines relevant to geotechnical investigations of this nature.

The formation and weathering of geological materials are discontinuous processes and unexpected variations in soil, rock and groundwater regimes may occur even on sites where the conditions seem to be uniform or consistent. Variations in what is reported here may become evident during construction and it is thus imperative that an appropriately qualified and experienced Competent Person inspects all critical stages of development including, but not limited to, excavations to assess the conditions encountered and to assist in the interpretation of observations at variance with the information supplied in this report.

Twenty (20 No.) inspection pits, designated IP1 through IP20, were excavated using hand tools at the proposed culvert sites at the approximate positions.

Reference to regional geological map sheet titled “2828 Harrismith”, prepared by the Council for Geoscience to a scale of 1:250 000 (1988), indicates that the general areas of the sites are underlain by alluvium and sediments of the Tarkastad and Adelaide Formations and Jurassic Age dolerite.

The sites, at the positions profiled, were observed to be underlain by fill, colluvium (fine hillwash), alluvium, residual soils derived from in situ weathering of the underlying sandstone, mudrock and rocks, and weathered sandstone, dolerite and mudrock.

9.5.2 Findings

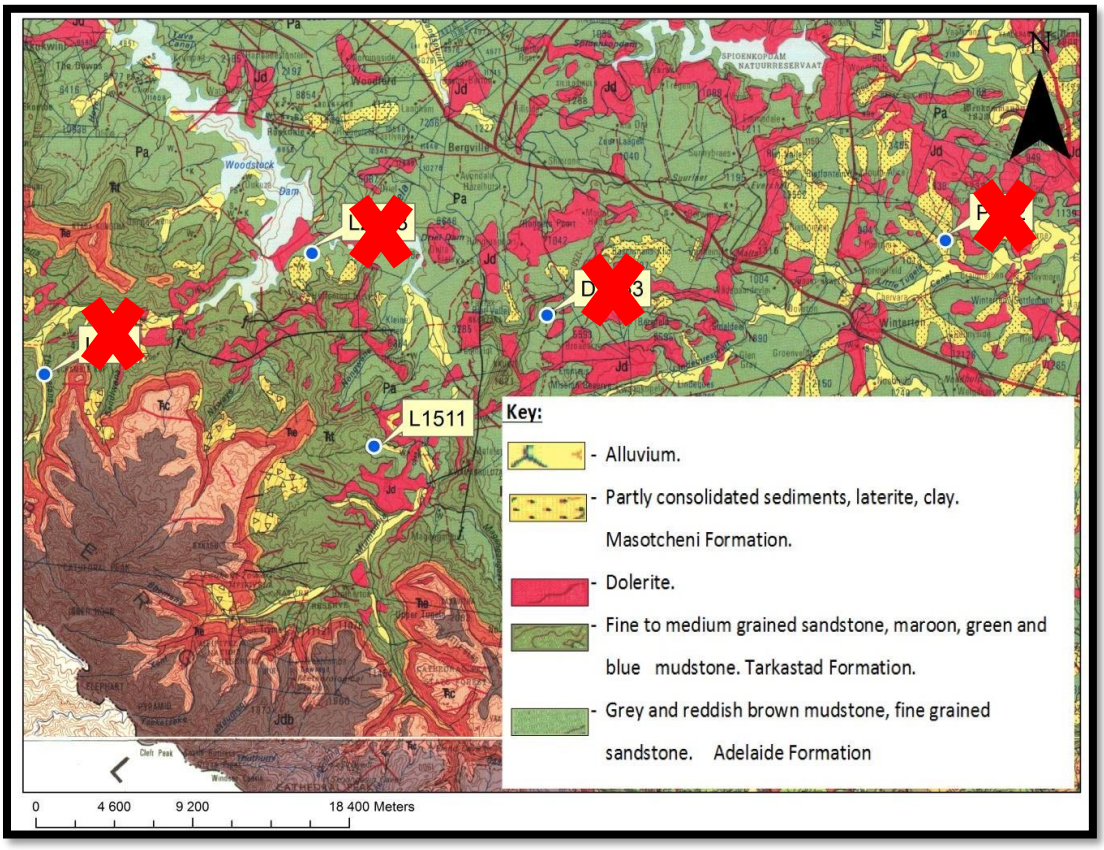


FIGURE 15: EXTRACT OF REGIONAL GEOLOGICAL MAP SHEET WITH YELLOW PIN FOR POSITION OF L1511 SITE

9.5.2.1 Inferred Founding Condition

The founding condition identified at the site can be summarised as follows:

- The topsoil, fill, colluvium, alluvium and residual soils are compressible under foundation loads with low bearing capacities and are considered poor founding horizons for the proposed culvert foundations.
- The presence of shallow groundwater occurrences near the existing stream / river.
- Shallow weathered sandstone and mudrock are considered good founding horizons for the placement of culvert foundation.
- Trench / excavation sidewalls excavated into the loosely consolidated soils are likely to be unstable and require shoring / battering back to engineer's detail.

9.5.2.2 Groundwater

Groundwater seepage was not encountered on the proposed site location for L2013 Culvert:

TABLE 23: SUMMARY OF GROUNDWATER OCCURRENCES

Culvert	IP No.	Depth of Observed Groundwater Seepage (m below EGL)	Relative Intensity of Seepage
L2013	No Groundwater Seepage Observed		

9.5.2.3 Suitability of the Sites

Based on the results of the fieldwork undertaken during this investigation, it is considered that the proposed site is generally stable and suitable for the proposed additional development, provided that the recommendations given in this report are adhered to. Such precautionary measures amount to no more than sound development practices appropriate to the site condition anticipated and the nature of the proposed development confirmed.

9.5.2.4 Excavation Characteristics

Below the final / refusal depths of the inspection pits and DPL tests, and where boulder deposits or weathered rock was encountered, excavation classes are expected to grade to **INTERMEDIATE** to **HARD**. Localised areas of **INTERMEDIATE** and HARD excavation may also be encountered at shallower depths due to geological variations.

Although not encountered in the inspection pits, hard to extremely hard sandstone, mudrock or dolerite boulders may be present. Accordingly, allowance is to be made for **BOULDER CLASS B** to address this risk.

The type of excavation plant utilised during construction will also determine the actual excavatability depths. Slow excavation rates below the water table are considered likely.

9.5.3 Recommendations and Conclusion

All cut slopes and fill embankments within the floodplains of the streams, including those adjacent to the proposed culverts, will need to be protected against damage due to hydraulic erosion/scour from the streams and rivers, to engineer's detail

The design of the above should consider the geotechnical information contained in this report as well as the results of a hydrological investigation of the river catchment to establish the relevant floodlines, scour depths and hydraulic loads on the proposed causeways and any proposed revetment.

Earthworks and drainage measures to be designed in such a way as to prevent ponding of, or high concentrations of, stormwater or groundwater anywhere on the site, both during and after the development.

Terraces should be shaped to a gradient to prevent water ponding on the surface and should be graded to direct water away from the fill edges and towards the culvert inlet and conversely graded away from the culvert exits, with allowance for routine maintenance to remove vegetation and any accumulation of sediment at these positions.

10 IMPACTS AND RESIDUAL RISKS ASSESSMENT

10.1 Introduction

Impact assessment must take into account 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 rehabilitation of existing infrastructure which will be permanent, decommissioning is not applicable to this project, however, impacts associated with post construction clean-up are considered.

10.2 Methodology

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

Nature
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.

10.3 Rating of Potential Impacts

The potential impacts identified are explained per phase of the project and mitigation measures are provided. The impacts are explained per pre-construction, construction and operational phases.

TABLE 24: 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, 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.

Score		Elaboration
+ [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.

10.4 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.

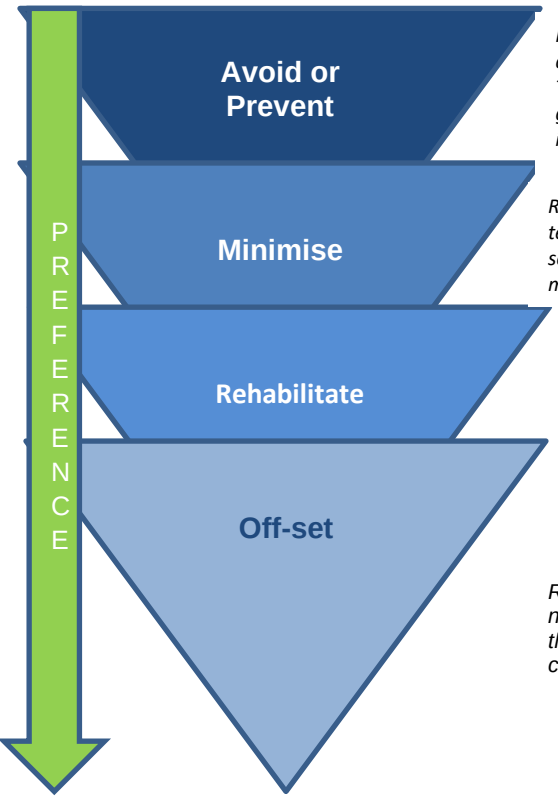
An important aspect of impact assessment is the identification and application of methods which mitigate against the impacts. In order to aid selection of mitigation measures, the mitigation hierarchy is used [

Figure 16]. 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 [

Figure 16].



*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 it is unlikely to be possible or appropriate to rely on the latter steps in the mitigation.*

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 must be made to minimise impacts.

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 16: THE MITIGATION HIERARCHY

10.4.1 Impact Assessment

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

TABLE 25: PLANNING PHASE IMPACT ASSESSMENT –CULVERT

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Planning and Design – L2013 Culvert					
Sub-phase: Direct Impacts					
1	Inadequate or incompetent Planning and Design for the road and culvert [taking into consideration the best environmental solutions which can be accommodated by the budget assigned]	1	Without	-10	Negative high
			With	-6	Negative low
	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 in the planning for the development	1	Without	-8	Negative Moderate
			With	11	Positive high
	Mitigation: All relevant plans for the area must be considered and adequate consultation with the relevant planning officials in the area.				
3	Development in sensitive habitats could lead to the diminishing of the socio-economic benefits.	1	Without	-8	Negative Moderate
			With	12	Positive high
	Mitigation: All measures and considerations for the design of the road must consider the triple bottom line and ensure optimization of social, economic, environmental and practical benefits. Socio-economic benefits will actually be enhanced.				
4	Appropriate planning of exclusion of sensitive vegetation and steep areas.	1	Without	-10	Negative high
			With	-8	Negative Moderate
	Mitigation: Avoidance of the areas with severe current gully erosion in the area and steep areas. No-go areas must be clearly marked off.				
5		1	Without	-10	Negative high

	Possible lack of consideration of what the environment can accommodate.		With	-8	Negative Moderate
	Mitigation: All measures and considerations for the design of the road must consider the triple bottom line and ensure optimization of social, economic, environmental and practical benefits.				
6	Unstable design which will require maintenance in the near future	1	Without	-8	Negative Moderate
			With	-5	Negative low
	Mitigation: Ensure that the best practicable design is used and that the professionalism and integrity of the road design is maintained.				
Sub-phase: Indirect Impacts					

TABLE 26: PLANNING PHASE IMPACT ASSESSMENT- CULVERT DESIGN ALTERNATIVES

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Planning and Design – Culvert Design					
Sub-phase: Direct Impacts					
1	Location and design of the access Culvert could lead to impacts on the natural environment	1	Without	-11	Negative high
			With	-7	Negative Moderate
		2	Without	-11	Negative high
			With	-9	Negative Moderate
		3	Without	-11	Negative high
			With	-10	Negative high
	Mitigation: All elements must be considered in the location and design of the Culvert, such as avoiding areas with greater scour probability and meanders in the river. The location of the Culvert should also avoid the removal of trees or any shrubs.				
2	Consideration for national, provincial and local plans in the planning for the development	1	Without	-8	Negative Moderate
			With	13	Positive very high
		2	Without	-7	Negative Moderate
			With	13	Positive very high
		3	Without	-8	Negative Moderate
			With	8	Positive moderate
	Mitigation: All relevant plans for the area must be considered and adequate consultation with the relevant planning officials in the area.				

3	Development in sensitive habitats could lead to the diminishing of the socio-economic benefits.	1	Without	-8	Negative Moderate
			With	-4	Negative low
		2	Without	-8	Negative Moderate
			With	-4	Negative low
		3	Without	-8	Negative Moderate
			With	-4	Negative low
	Mitigation: All measures and considerations for the design of the Culvert must consider the triple bottom line and ensure optimisation of social, economic, environmental and practical benefits.				
4	Appropriate planning of exclusion of sensitive vegetation and steep areas.	1	Without	-10	Negative high
			With	-4	Negative low
		2	Without	-10	Negative high
			With	-5	Negative low
		3	Without	-10	Negative high
			With	-5	Negative low
	Mitigation: [a] Avoidance of the point and design of the Culvert, which will require the link road to follow an alignment along the severe current gully erosion in the area. [b] The height of the Culvert should accommodate the 1:100yr flood events. [c] Culvert abutments should not be located within 10m of the edge of the delineated riparian zone to allow for natural channel migration/adjustments over time.				
5	Possible lack of consideration of what the environment can accommodate.	1	Without	-8	Negative Moderate
			With	-4	Negative low
		2	Without	-8	Negative Moderate
			With	-4	Negative low
		3	Without	-8	Negative Moderate
			With	-4	Negative low
	Mitigation: All measures and considerations for the design of the Culvert must consider the triple bottom line and ensure optimization of social, economic, environmental and practical benefits.				
6	Unsound design which will require maintenance in the near future	1	Without	-8	Negative Moderate
			With	-4	Negative low
		2	Without	-8	Negative Moderate
			With	-6	Negative low
		3	Without	-8	Negative Moderate
			With	-6	Negative low
	Mitigation: Ensure that the best practicable design is used and that the professionalism and integrity of the Culvert design is maintained.				

Sub-phase: Indirect Impacts					
7	The banks of the river will the altered which may impact on the functioning of the river and the integrity of the structure	1	Without	-8	Negative Moderate
			With	-5	Negative low
		2	Without	-8	Negative Moderate
			With	-7	Negative Moderate
		3	Without	-8	Negative Moderate
			With	-7	Negative Moderate
	Mitigation: The use of protective measures such gabions and revetments to protect the riverine habitats.				
Sub-phase: Cumulative Impacts					
8	The provision of the Culvert may lead to increased / mushroomed development	1	Without	8	Positive moderate
			With	13	Positive very high
		2	Without	8	Positive moderate
			With	13	Positive very high
		3	Without	8	Positive moderate
			With	13	Positive very high
	Mitigation: The development will promote accessibility, which can only have a positive impact in terms of socio-economic opportunities as well as safety.				
Average for Culvert Design Alternative 1 without mitigation				-7.2	Negative Moderate
Average for Culvert Design Alternative 1 with mitigation				-0.7	Negative Low
Average for Culvert Design Alternative 2 without mitigation				-7.1	Negative Moderate
Average for Culvert Design Alternative 2 with mitigation				-2.1	Negative Low
Average for Culvert Design Alternative 3 without mitigation				-7.2	Negative Moderate
Average for Culvert Design Alternative 3 with mitigation				-2.8	Negative Low

TABLE 27: 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	13	Positive very 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	The condition of the culvert and Culvert will remain unsafe and of poor quality	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 28: CONSTRUCTION PHASE IMPACTS –CULVERT

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Construction - Culvert					
Sub-phase: Direct Impacts					
1	**Activity**: Clearing of vegetation **Impact:** Loss, degradation or fragmentation of vegetation through direct clearing.	1	Without	-16	Negative very high
			With	-9	Negative Moderate
	a) Footprint of the activity needs to be strictly adhered to. b) A site-specific Environmental Management Programme needs to be developed for the construction and operation phases. c) An Environmental Control Officer (ECO) needs to be appointed for the duration of construction. d) Permits for plants collection/removal need to be obtained prior to search and rescue operations. Vegetation clearance in the construction phase is to be remove in a phased approach, as and when it becomes necessary as vegetation harbors fauna. e) Sensitive areas need to be demarcated clearly before construction commences. f) Areas outside of the construction zone are to be designated as “no-go areas.”				

2	**Activity:** Transformation of habitat for flora. **Impact:** Hard transformation Hard transformation of proposed routingresult in a marginal reduction in flora. The routing being a linear activity will result in the disturbance of the soil surface, and this often leads to the establishment of alien invasive plant species.	1	Without	-16	Negatively very high
			With	-9	Negative moderate
	Mitigation: a) Servitude widths need to be a strictly adhered to. b) Where possible, indigenous vegetation needs to be retained. c) Clearance for construction should be done in a phased approach, and rehabilitation should be done as soon as work has ceased along the section of routing. d)Where possible, construction should occur in the dry season to prevent soil loss through stormwater. e) Where possible, manual clearance of the vegetation should be done so as to prevent the unnecessary movement of machinery in nogo areas. e) The contractor should implement an alien invasive control programme, particularly in areas where soil disturbance occurs. f) Soil stockpiles need to be grassed with an indigenous mix or covered with shade cloth to prevent soil loss through wind and water erosion. g) Strictly no trapping or hunting of fauna is allowed. h) All open excavations need to be checked on a daily basis and any fauna that may be stranded will have to be caught and released by a qualified person. i) Rehabilitation should take place as soon as construction of the section of line is complete) Strictly no littering. The contractor should highlight this at daily toolbox talks and site clean-ups should occur on a daily occasion.k) A mix of indigenous grass species, should be used for rehabilitation.				
3	**Activity**; Removal of vegetation **Impact**: Vegetation binds and protects the soil surface, and when removed, increases erosion potential. This may lead to water and wind removing vital topsoil and blocking up drains and eventually clogging roadsides and drainage lines.	1	Without	-20	Negative very high
			With	-6	Negative low
	Mitigation: a) An approved Stormwater Management Plan should be implemented before construction occurs. b) Where possible, indigenous vegetation needs to be retained. b) Vegetation should be cleared only when construction occurs in that section of the routing. c) Soil stockpiles need to be grassed with an indigenous mix or covered with shade cloth to prevent soil loss through wind and water erosion. d) Rehabilitation should take place as soon as construction is complete. d) In areas of higher gradient, access roads should have erosion berms to prevent soil loss. e) Construction activities should be limited to the winter months to prevent loss of soil to water runoff. f) Spraying of the\ soil surface should occur when working industy conditions.				

4	**Activity:** Continued transformation of vegetation in the area. **Impact:** Habitat transformation and fragmentation for fauna result in a marginal reduction in flora and fauna for the area. Disturbance of the soil surface and a lead to the establishment of alien invasive plant species. Continued transformation of the land results inhabitant fragmentation, where edge effects decrease suitable habitat for a wide range of fauna in the area. This leads to an overall indirect decline in faunal diversity.	1	Without	-12	Negative high
			With	-7	Negative low
	Mitigation: a) Construction footprint needs to be a strictly adhered to. Clearance of land and vegetation is not allowed, unless clearance occurs within the authorized project area. b) Areas outside of the construction zone must be demarcated as “no-go” areas. c) Where possible, indigenous vegetation needs to be retained. D)Manual clearance of alien and invasive vegetation should be done so as to prevent the unnecessary movement of machinery in no go areas. e) An alien and invasive control] programme should implement, particularly in areas where soil disturbance has occurred. F) Soil stockpiles need to be returned to the excavations, with the subsoil being placed first, followed by the topsoil. g) Monthly ECO auditing should occur during rehabilitation of the site. Once rehabilitation is complete, one three month, and one six months follow up audit should be conducted to assess the state of rehabilitation.				
5	**Impacts**: Displacement of individuals	1	Without	-6	Negative low
			With	-6	Negative low
	Mitigation: The ECO should do a site walk through prior to construction commencing, to identify breeding or nesting fauna. Should these species be identified, permits for the capture and relocation must be applied for and a search and rescue must take place by a qualified Ecologist / Zoologist.				
6	**Activity:** Vehicles and machinery my leak oil which can accumulate in storm water run-off generated on the construction site and enter the watercourse downstream. Additionally,	1	Without	-13	Negetive very high
			With	-10	Negative high

	stored fuels, oils and other hazardous substances may leak from storage areas and enter the downstream watercourse via storm water run-off. **Impact:** Vehicles and machinery my leak oil.				
	Mitigation: a) All oils, fuels and hazardous substances or liquids must not be stored within 100m from the full extent of the watercourses and the associated buffer zones, unless such storage is unavoidable and approved by the ECO. Where these items are stored within 100m from the full extent of the watercourse, the storage area must be adequately bunded to contain any spillage from containers. Emergency spill kits must be available to clean up and remove spills b) All vehicles and machinery operating on the study site are to be checked for oil, fuel or any other fluid leaks before entering the construction areas. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction areas. No fueling, re-fueling, vehicle and machinery servicing or maintenance is to take place within 100m of the watercourses and the associated buffer zones. c)The study site is to contain sufficient safety measures throughout the construction process. Safety measures include (but are not limited to) oil spill kits and the availability of fire extinguishers. Additionally, fuel, oil or hazardous substances storage areas must be bunded to 110% capacity to prevent oil or fuel contamination of the ground and / or nearby watercourses and the associated buffer zones.d)No cement mixing is to take place in the watercourse or the associated buffer zones. In general, any cement mixing should take place over a bin lined (impermeable) surface or alternatively in the load bin of a vehicle to prevent the mixing of cement with the ground. Cement / concrete can also be trucked in ready mix vehicles. Importantly, no mixing of cement or concrete directly within the watercourse and associated buffer zone.				
7	**Activity:** Increased Hardened Surfaces in the Local Catchment due to culvert construction. **Impact:** Sedimentation during operation.	1	Without	-16	Negative very high
			With	-10	Negative high
	Mitigation: a) Adequate structures, where required, must be put into place to deal with increased/accelerated run-off and associated sediment volumes. The use of energy dissipating structures where required to prevent increased run-off and sediments contained in the run-off entering the watercourse can be use) An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site.				
8	**Activity:** Increased Hardened Surfaces in the Local Catchment due to culvert construction. **Impact:** Change in flow rate during operation	1	Without	-12	Negative high
			With	-8	Negative moderate
	Mitigation: a) Adequate structures, where required, must be put into place to deal with increased/accelerated run-off and associated sediment volumes. The use of energy dissipating structures where required to prevent increased run-off and sediments contained in the run-off entering the watercourse can be used. b) An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site.c) An appropriate operational storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with sedimentation and increased run-off on site				
Sub-phase: Cumulative Impacts					
9	**Impact**: Poor access control and mis-management of the site	1	Without	-10	Negative high

			With	-6	Negative low
	Mitigation: [a] The construction working site should be limited to the proposed development footprint only. The working site must be demarcated on both sides using orange bonox/other hazard netting prior to construction commencing. [b] The demarcation work must be signed off by the ECO before any work commences. [c] The location of stockpile areas and equipment lay down areas must be agreed to and demarcated to the satisfaction of the ECO prior to the clearing. [d] No soil stockpile areas must be located within 30m of any delineated watercourse. [e] Construction materials must only be brought to the equipment laydown area 3 days prior to use and must not be kept for more than 2 weeks. Timing of delivery is critical. [f] No equipment laydown or storage areas must be located within 50m of any watercourse and/or within the 1:100-year flood line. [g] All areas outside of this demarcated corridor must be considered 'No-Go' areas. Under no circumstances must any watercourse be impacted. [h] Watercourses outside of the demarcated construction area [i.e., water resources downslope of the road upgrade] are strictly 'No Go' areas.				
				Average for Road without mitigation	
				Average for Road with mitigation	

TABLE 29: CONSTRUCTION PHASE IMPACTS – CULVERT DESIGN ALTERNATIVES

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Construction - Culvert Design Alternatives					
Sub-phase: Direct Impacts					
1	The proposed development will likely result in clearing of and the reshaping of the bed and banks of the river, and the infilling of such riverine habitat within the Culvert footprint for the establishment of the embankments of the Culvert.	1	Without	-11	Negative high
			With	-6	Negative low
		2	Without	-11	Negative high
			With	-8	Negative Moderate
		3	Without	-11	Negative high
			With	-8	Negative Moderate

	Mitigation: [a] A method statement for each finalized Culvert crossing must be compiled by the Contractor in line with the mitigation measures proposed below and in conjunction with the appointed ECO to confirm all methods of watercourse crossing/ encroachment include effective steps to minimize the impacts to freshwater habitat. [b] Stormwater and erosion control measures must be implemented during the construction phase to ensure that erosion and sedimentation impacts to the river including in-stream habitats are minimized and avoided. In this regard, the following measures must be implemented: [1] The natural flow of rivers or streams shall not be permanently diverted or blocked. [2] Maintain adequate through flows to downstream aquatic ecosystems to protect aquatic life, and prevent the interruption of existing downstream uses. [3] Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities should be put on hold. In this regard, the contractor must be aware of weather forecasts.				
2	Increased sediment loads, increased bed sedimentation and increased turbidity that will likely contribute to decreased local water quality and degradation in local aquatic habitat integrity.	1	Without	-12	Negative high
			With	-5	Negative low
		2	Without	-12	Negative high
			With	-6	Negative low
		3	Without	-12	Negative high
			With	-7	Negative Moderate
	Mitigation: [a] In mitigating this impact it is imperative that the construction servitude/working area is defined. The construction servitude/working area will comprise the following: [1] Culvert footprint and working area. [2] Selected road upgrade area and construction servitude not exceeding 30 on either side [3] Soil stockpile area. [3] Equipment laydown and storage area. [b] No vehicle turning areas must be located within 32 m of any watercourse. [d] No equipment laydown or storage areas must be located within 50 m of any watercourse. [c] No soil stockpile areas must be located within 20 m of any watercourse.				
3	Inconvenience from noise and dust will pose a nuisance to nearby residents.	1	Without	-11	Negative high
			With	-8	Negative Moderate
		2	Without	-11	Negative high
			With	-8	Negative Moderate
		3	Without	-11	Negative high
			With	-8	Negative Moderate
	Mitigation: [a] Frequent and effective dust-suppression is advised, particularly along dirt roads. [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 in the generation of run-off. [d] Surrounding communities and adjacent landowners are to be notified upfront of noisy construction activities. [e] Provide all equipment with standard silencers. [e] Maintain silencer units on vehicles and equipment in good working order. [f] Construction staff working in areas where the 8-hour ambient noise levels exceed 60 dBA should wear ear protection equipment.				
4	Local labor will be recruited to perform short term, unskilled labor on the project.	1	Without	8	Positive moderate
			With	9	Positive moderate
		2	Without	8	Positive moderate
			With	9	Positive moderate
		3	Without	8	Positive moderate

			With	9	Positive moderate
	Enhancement: It is recommended that every effort is made to employ local labor.				
5	Negative ecological impacts on the wetlands and associated biodiversity of the proposed culvert stream during construction of the new Culvert. Impacts involve colonization by alien plant invaders due to disturbed wetlands close to the construction site.	1	Without	-10	Negative high
			With	-4	Negative low
		2	Without	-10	Negative high
			With	-4	Negative low
		3	Without	-10	Negative high
			With	-4	Negative low
	Mitigation: [a] Preventing damage and disturbance to the wetlands; [b] removing alien plant invaders which are present prior to construction of the culvert; this includes removal of alien plant invaders which are growing in the nearby wetlands on either side of the road [c] checking the area regularly for alien plant invaders during the construction of the culvert [d] rehabilitating damaged wetland areas according to the Rehabilitation Plan.				
6	Impacts caused by pollution of waste. Negative impacts on the aquatic and wetland habitats and biodiversity include pollution due to spillage of toxic fluids or substances and waste materials or disturbance of the river and stream beds causing siltation downstream during the construction phase. Chemical and toxic substance spillages	1	Without	-11	Negative high
			With	-4	Negative low
		2	Without	-11	Negative high
			With	-4	Negative low
		3	Without	-11	Negative high
			With	-4	Negative low

	Mitigation: [a] Eating areas must not be located within 15m of the wetland/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. [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 builders' wastes generated on the premises 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 and tidy and free from rubbish at all times. [h] measures involve preventing toxic spillages and severe disturbance to the bed of the river and stream and confining any impacts to the 4 m wide construction footprint. [i] Damage or destruction of protective grassland beyond this footprint that may lead to erosion should be avoided. [j] Mitigation measures are likely to result in negative low levels of significance where impacts cause small negative changes in natural habitats and biota, but ecosystem functions remain essentially unchanged.				
7	Cement - spillages from poor mixing and disposal practices.	1	Without	-10	Negative high
			With	-4	Negative low
		2	Without	-10	Negative high
			With	-7	Negative Moderate
		3	Without	-10	Negative high
			With	-7	Negative Moderate
	Mitigation: No batching or chemical / fuel storage areas to be located within 50 m of the area of residual hydromorphic soils or the stream and associated riparian corridor.				
Sub-phase: Indirect Impacts					
8	Negative ecological impacts on the aquatic environment and associated biodiversity of during construction of the new Culvert. Impacts involve siltation of the river bed in the construction and areas and downstream that may result in the death of benthic plants and animals	1	Without	-12	Negative high
			With	-5	Negative low
		2	Without	-12	Negative high
			With	-5	Negative low
		3	Without	-12	Negative high
			With	-5	Negative low
	Mitigation: Minimizing the area of these activities; rehabilitating damaged riverbed areas according to the Rehabilitation Plan.				
Sub-phase: Cumulative Impacts					
Average for Culvert Design Alternative 1 without mitigation				-9.4	Negative high

Average for Culvert Design Alternative 1 with mitigation	-4.3	Negative low
Average for Culvert Design Alternative 2 without mitigation	-9.7	Negative high
Average for Culvert Design Alternative 2 with mitigation	-5.0	Negative low
Average for Culvert Design Alternative 3 without mitigation	-9.6	Negative high
Average for Culvert Design Alternative 3 with mitigation	-5.0	Negative low

TABLE 30: CONSTRUCTION PHASE IMPACT ASSESSMENT – NO-GO

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Construction - No-go					
1	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.				
2	The condition of the L2013 crossing will remain unsafe.	1	Without	-16	Negative high
	Mitigation: The development should be planned carefully to ensure that safety is addressed adequately.				
	Average without mitigation			-16	Negative very high
	Average with mitigation			-13	Negative High

TABLE 31: OPERATION PHASE IMPACT ASSESSME- CULVERT

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Operational - Road & Culvert					
Sub-phase: Direct Impacts					
1	Far reaching community benefits of the access created	1	Without	11	Positive high
			With	14	Positive very high
	Enhancement: The road will enable far reaching connectivity.				
2	The rehabilitated road and culvert will encourage the flow of traffic and road users.	1	Without	11	Positive high
			With	14	Positive very high
	Enhancement: Over and above the encouragement to use this access, the culvert will be safer provision of travelling options for surrounding communities and also lead to further connectivity.				

3	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	11	Positive high
			With	15	Positive very high
	Enhancement: The road must be maintained responsibly by the local authority to mitigate against littering and pollution which could lead to prolonged pollution.				
4	Health care facilities are more accessible, and ambulances have increased accessibility.	1	Without	11	Positive high
			With	16	Positive very high
	Enhancement: Accessibility to healthcare and particularly emergency healthcare remains a prevalent problem in rural areas, for these communities, this impact will be significantly lessened as ambulances will be able to access patients much faster and more efficiently.				
5	Educational facilities would become more accessible to those in need.	1	Without	11	Positive high
			With	15	Positive very high
	Enhancement: Overall the development will lead to beneficial impacts for the indigent area.				
	Sub-phase: Indirect Impacts				
6	Impact to species of conservation concern- 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: No clearing of vegetation and harvesting should be allowed along L2013.				
7	Erosion is currently occurring due to numerous road crossings in the river. A formalized culvert will reduce erosion provided it is protected with gabion baskets and reno mattresses, which will reduce erosion potential even further	1	Without	-10	Negative Low
			With	10	Positive low
	Mitigation: a) An approved Stormwater Management Plan should be implemented before operation occurs. b) Where possible, Indigenous vegetation needs to be returned as soon as construction ceases. c)Soil stockpiles need to be grassed with an indigenous mix and rehabilitated to prevent soil loss through wind and water erosion before				

	operation phase begins. d)Rehabilitation should take place as soon as construction is completed. d)Operation phase should only begin once the ECO has deemed rehabilitation successful and mitigation measures have been implemented. e) A Six-month check of the area should take place for the emergence erosion gulley's, and if gulley's emerge, will need be rehabilitated immediately.		
	Average without mitigation	8.9	Positive Moderate
	Average with mitigation	12.2	Positive High

TABLE 32: OPERATIONAL PHASE IMPACT ASSESSMENT – CULVERT DESIGN ALTERNATIVES

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Operational - Culvert Design Alternatives					
Sub-phase: Direct Impacts					
1	The new Culvert link will encourage the flow of traffic and road users.	1	Without	-9	Negative Moderate
			With	10	Positive high
		2	Without	-9	Negative Moderate
			With	10	Positive high
		3	Without	-9	Negative Moderate
			With	10	Positive high
	Mitigation: [a] The attraction of traffic as an impact is twofold, being both positive and negative. [b] The increased traffic flow will be enough to promote development that is much needed but not too high that it results in a significant disturbance. [c] It is also a safer option rather than walking the currently unstable slopes and rolling topography.				
2	The Culvert structure will be more feasible. The two-lane Culvert is more compatible hence increases quality of ridership	1	Without	9	Positive moderate
			With	11	Positive high
		2	Without	9	Positive moderate
			With	11	Positive high
		3	Without	9	Positive moderate
			With	11	Positive high
	Enhancement: This is a beneficial impact which could lead to much needed development in the area.				
3	Health care facilities are more accessible, and ambulances have increased accessibility.	1	Without	9	Positive moderate
			With	15	Positive very high
		2	Without	9	Positive moderate
			With	12	Positive high
		3	Without	9	Positive moderate
			With	12	Positive high

	Enhancement: The Culvert will provide for safe and faster accessibility over stream in L2013. The best engineering design should be ensuring, which will have a long-life span with minimal maintenance required.				
4	Educational facilities would become more accessible to those in need.	1	Without	11	Positive high
			With	15	Positive very high
		2	Without	11	Positive high
			With	12	Positive high
		3	Without	11	Positive high
			With	12	Positive high
	Enhancement: This is a beneficial impact, which could lead to much needed development in the area. Access is a key infrastructure which leads to social upliftment. If the Culvert is the best option [best design] it will have a long-life span and lay the foundation for inter-provincial linkages.				
	Sub-phase: Cumulative Impacts				
	Average for Culvert Design Alternative 1 with mitigation			0.3	Positive Low
	Average for Culvert Design Alternative 2 without mitigation			-5.2	Negative low
	Average for Culvert Design Alternative 2 with mitigation			-1.5	Negative Low
	Average for Culvert Design Alternative 3 without mitigation			-5.2	Negative low
	Average for Culvert Design Alternative 3 with mitigation			-1.5	Negative Low

TABLE 33: OPERATIONAL PHASE IMPACT ASSESSMENT – NO-GO

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
	Phase: Operational - No-go				
1	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.				
2	The condition of the L2013 crossing will remain unsafe and of poor quality	1	Without	-16	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 34: DECOMISSIONING PHASE IMPACT ASSESSMENT – ALL ASPECTS

No.	Impact	Alternative	Mitigation	Significance = E+D+I+P	Interpretation
Phase: Decommissioning - Road & Culvert					
Not Applicable					
Phase: Decommissioning - Culvert Design Alternatives					
Not Applicable					

11 STUDY FINDINGS AND CONCLUSIONS

11.1 ENVIRONMENTAL IMPACT STATEMENT

11.1.1 Introduction

Potential environmental impacts [biophysical and social] associated with the construction of the culvert in KwaZulu-Natal, have been identified herein.

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

11.1.1.1 Comparative Analysis of Alternatives

An analysis of bridge design alternatives are provided in **TABLE 35** below. The alternatives assessed were discussed in Sections 6.

TABLE 35: COMPARATIVE ANALYSIS OF BD ALTERNATIVES BY IMPACT RATING SCORES

Planning Phase		
Average for Bridge Design Alternative 1 without mitigation	-6.6	Negative Moderate
Average for Bridge Design Alternative 1 with mitigation	-0.3	Negative Low
Average for Bridge Design Alternative 2 without mitigation	-7.6	Negative Low
Average for Bridge Design Alternative 2 with mitigation	-2.4	Negative Low
Average for Bridge Design Alternative 3 without mitigation	-7.7	Negative Low
Average for Bridge Design Alternative 3 with mitigation	-3.1	Negative Low
Construction Phase		
Average for Bridge Design Alternative 1 without mitigation	-9.7	Negative Low
Average for Bridge Design Alternative 1 with mitigation	-4.5	Negative Low
Average for Bridge Design Alternative 2 without mitigation	-10.3	Negative Low
Average for Bridge Design Alternative 2 with mitigation	-5.0	Negative Low
Average for Bridge Design Alternative 3 without mitigation	-10.3	Negative Low
Average for Bridge Design Alternative 3 with mitigation	-5.1	Negative Low
Operation Phase		
Average for Bridge Design Alternative 1 without mitigation	-6.2	Negative Low
Average for Bridge Design Alternative 1 with mitigation	-0.3	Negative Low
Average for Bridge Design Alternative 2 without mitigation	-7.6	Negative Low
Average for Bridge Design Alternative 2 with mitigation	-2.4	Negative Low
Average for Bridge Design Alternative 3 without mitigation	-7.7	Negative Low
Average for Bridge Design Alternative 3 with mitigation	-3.1	Negative Low
Decommissioning Phase		
N/A		

An analysis of the impact assessment scores, post application of mitigation methods, show that Alternatives option 2 and 3 have a marginally higher negative impact across all three phases of planning, construction and operation, which were assessed in this BA. It is therefore the recommendation of the EAP that **Alternative option1** be authorised and that the recommendations of the Wetland and Terrestrial Ecological Impact Assessment Reports.

The reasons for **Alternative option 1** emerging as having less of an impact when compared with option 2 and option 3 are primarily [a] Ease of maintenance [b] Less earthworks required than the alternate design.

11.1.2 Culvert 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 a better condition of transportation infrastructure for the receiving community. The following are key findings and recommendations of the impact assessment.

11.1.3 Key Conclusions and Recommendations of the Specialist Studies

11.1.3.1 Wetland Delineation Assessment

The assessment of the Present Ecological State of the wetlands reveals that most HGM units are Largely Modified, while wetland HGM unit 1 is Seriously Modified through changes within the catchment and the removal of wetland soils through erosion. The assessment of the current importance of the wetland unit in terms of ecosystem service provision indicates that wetland units provide medium to moderately-high levels of wetland functioning. The EIS score indicates that the assessed unit falls into EIS Category C, which corresponds to a Moderate importance and sensitivity. All four identified wetlands on site have been impacted upon by subsistence crop production, livestock grazing, and changes to their hydrology (increased hardened surfaces) and geomorphology thus leading to an associated infestation by alien vegetation.

11.1.3.2 Ecological Impact Assessment

Based on the faunal assessment viewpoint, the study area has a low conservation value. The study sit has a potential to shelter and accommodate some species of conservation importance however due to heavily eroded nature and overgrazing of the culvert site there is a reduced likelihood of these species occurring. Habitat for foraging is present at the culvert site, however fauna being mobile, will result in faunal species moving to adjacent areas during construction. This is unlikely to affect the status of species of conservation concern in the study site hence it is not anticipated that the proposed construction will have a long-term negative effect on the fauna of the area. The fauna of the site is directly dependent on the vegetation of the site; therefore, a careful management of the vegetation (and soil) will benefit the fauna of the area. The erosion channels leading into the drainage line (which feeds into the Tugela River) are likely to have been caused by numerous crossing points entering the drainage line. This leads to sedimentation of the river in the drainage line feeding into the Tugela River. A formalised crossing point and rehabilitation of the erosion channels will reduce sedimentation and have a positive overall impact on the Strategic Water Source Area; therefore, the development is supported in this regard.

11.1.3.3 Heritage Impact Assessment

No heritage sites or features occur on the footprint. The area is also not part of any known cultural landscape, the proposed construction of culverts along the L2013 will not affect any heritage features therefore the proposed project may proceed from a general heritage perspective. There are no mitigation measures in place since there is no heritage features found on study site.

11.1.3.4 Paleontological Assessment

Due to the lack of previously recorded fossils from the area, it is not likely that any fossils would be preserved in the Normandien Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup). No fossils occur in the dolerite. There is a slight chance that fossils may occur in the shales of the late Permian so a Fossil Chance Find Protocol

should be added to the EMPr: if fossils are found once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

11.1.4 EAP Opinion

This BAR provides an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed construction of culvert structure in KwaZulu-Natal.

Having duly considered the proposal, there is unlikely to be any significant negative environmental impacts, and the socio-economic benefits are evident.

The findings conclude that there are no environmental fatal flaws that could prevent the proposed development, provided that the recommended mitigation and management measures contained within the EMPr are implemented.

Given the findings of the specialist studies conducted, as outlined in recommendation and conclusion summary above, it is safe to say that no significant impacts have been identified by these studies. This has resulted in an impact assessment yielding an overall result of having “negative low” impact. This is attributed mostly to the short-term negative impacts, which are likely to occur during the construction phase, which can be adequately mitigated and rehabilitated to an acceptable state of environment. It is therefore the recommendation of the EAP that the environmental authorisation is granted for the proposed construction of culvert KwaZulu-Natal.

It is undeniably, the proposed development will have more long-term benefits than negative impacts, the latter of which are more short-termed and associated with the construction phase. The reasons for this are:

- Improved accessibility to the community;
- Improved reliable and safe crossing structure;
- Contributes to the long-term vision of providing sustainable infrastructure to the people of Okhahlamba Local Municipality, and better access and connectivity.

The benefits stated above, far outweigh the negative impacts, which are limited to the construction phase. The development will lead to an improvement to the social, environmental and economic status *quo*, as the development will enable improved operations and use of the road, culvert.

11.1.5 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 envisaged to have a “***negative low***” significance rating post application of mitigations proposed by the relevant specialists.

11.1.6 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: Wetland Health and Functionality Assessment

11.1.7 Recommendations

11.1.7.1 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 is confined to an existing road and the construction of a culvert required in order to meet the transportation planning needs of the area.

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 an acceptable level.

11.1.7.2 Recommendations to the Applicant

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

11.2 DECLARATIONS BY THE EAP

The following is hereby affirmed by the EAP to be included in this report:

- the correctness of the information provided in the reports;
- the inclusion of all comments and inputs from stakeholders and I&APs;
- the inclusion of all inputs and recommendations from the specialist reports where relevant; and
- any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by interested and affected parties.

_____

Andile Mnyandu [EAP]