



ENVIROPRO

IN ASSOCIATION WITH INKANYEZI YETHU



+27 31 765 2942



+27 86 549 0342



suzelle@enviropro.co.za



P.O. Box 1391, Kloof, 3640



www.enviropro.co.za



**FEBRUARY 2021
DRAFT BASIC ASSESSMENT REPORT
CONSTRUCTION OF THE L2068 PIPE CULVERT WITHIN
A WATERCOURSE
KZN DEPARTMENT OF TRANSPORT
EIA REF NO: DC24/0003/2021**

EVP1270



KZN DOT

**This report was prepared by EnviroPro Environmental Consulting in terms of
Appendix 1 to GNR 982**

3 (1) (a) details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP. Please see Appendix I for EAP declaration and full Curriculum Vitae;

Josette Oberholzer BSc (Hons) MSc Pr.Sci.Nat EAPASA Registered 2019/221

Tertiary Education:	BSc (Hons) MSc	Zoology By thesis in estuarine fish ecology.
Work Experience:	2001 - 2002 2003 - 2010 2010 - Present	MSc formed part of EIA for National Ports Authority Senior Manager for KSEMS cc. Director of EnviroPro Environmental Consulting

Iain Jourdan BSc (Hons)

Tertiary Education:	BSocSci (Hons) Geographical Science	
Work Experience:	2006 - 2007 2007 - 2010 2010 - Present	Environmental Manager Service for Inhlanhla Civils (Pty) Ltd Senior Manager for KSEMS cc Director of EnviroPro Environmental Consulting

Rob Rowles MSc (Masters) (JHB)

Tertiary Education:	MSc BSc (Hons)	Environmental Management Geographical Science and Environmental Management
Work Experience:	2010- 2013 2013 –present	Environmental Consultant (Golder Associates) Senior Consultant for EnviroPro Environmental Consulting

Executive Summary

The KwaZulu-Natal Department of Transport (DOT) propose to construct a new box culvert within Ward 6 of the Umvoti Local Municipality, Umzinyathi District Municipality. The L2068 Box culvert will be located in the Tongwe area at the following point location, 28°51'20.58"S, 30°51'30.18"E. The box culvert will be constructed across a riparian area and drainage line in the upper reaches of the Tugela Valley (Jamerson's Drift).

The L2068 Road is a small access road that services two households and a small primary school. The road intercepts a small drainage line and riparian area that currently has no stormwater infrastructure in place. Both pedestrians and vehicles cross the bed of this watercourse in times of high flow which becomes dangerous for vehicles and pedestrians. The culvert will be a single cell 1.8m x 1.8m in-situ concrete box culvert with an inlet and outlet on either side of the structure. Reno-mattresses will be placed at the inlet and outlet within the watercourse bed. The road will be re-aligned 20m downstream of the existing road. This will therefore entail the infill and removal of more than 10m³ of material from a watercourse which requires environmental authorisation.

The following key impacts and mitigation measures were assessed:

- **Damage to the watercourse and riparian area from the construction activities:** Caution must be exercised when working near and within the watercourse. The 'no-go' riparian area outside of the construction corridor must be clearly demarcated for the duration of construction. Construction materials must be stockpiled more than 32m from this boundary. Heavy vehicles must be kept at least 32m away from the watercourse except where needed for the construction process. The footprint of the culvert must not be widened more than is necessary.
- **Encroachment of alien vegetation into areas disturbed during the upgrade:** Alien vegetation is present in this riparian area but must not be allowed to encroach onto the site during or after construction. It must be continually removed during construction. Construction must not promote further alien plant disturbances in the surrounding area.
- **Damage to surrounding properties, services, and businesses:** The construction activities could impact on services such as sewer, water or electrical lines. All services must be identified prior to construction and all stakeholders must be notified prior to any service disruptions.
- **Improved safety and maintain connectivity:** The lack of a formal crossing structure across this watercourse makes crossing on foot and by vehicle dangerous when the watercourse levels are raised. The proposed box culvert will ultimately allow pedestrians and vehicles to cross the watercourse safely and efficiently.

These impacts can be mitigated by following the recommendations in this report and EMPr. Construction activities will be monitored and controlled through the implementation of the Environmental Management Programme (EMPr).

Two route alignment alternatives were considered for this project. The preferred alignment alternative 1 is to construct the box culvert 20m downstream of the current L2068 road alignment. Site alternative 2 is to construct the box culvert on the current road alignment.

The preferred technology alternative is to construct the 1.8m x 1.8m concrete box culvert, while the technology Alternative 2 is to construct a concrete pipe culvert in the watercourse. The defining fact in deciding between Technology Alternative 1 and 2 relate to the suitability of the structure. A smaller pipe structure would not be functional for a watercourse on such a steep slope.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that there are no significant environmental impacts associated with the proposal which cannot be mitigated. Therefore, it is recommended that the preferred site and technology alternatives be authorised for the L2068 Box culvert.

Contents

Executive Summary	3
Section 1: Scope of Work and Location of Activity	5
1.1 Project Title	5
1.2 A Description of the Activities to Be Undertaken Including Associated Structures and Infrastructure As per Section 3(d) (ii)	6
1.2.1 Construction Methodology	6
1.3 Description of Feasible Alternatives as Per Section 3(h)(i)	7
1.4 All Listed and Specific Activities to Be Triggered and Being Applied For As Per Section 3(d) (i)	8
1.5 Location of Activity as per Section 3 (b)(i)-(iii)	8
Section 2: Site Description and Surrounding Land Use as per section 3(h)(iv) and (k)	12
2.1 DEFF Screening Report	12
2.2 Topography and Physical Characteristics of Site	13
2.3 Soils and Geology.....	14
2.4 Climate.....	14
2.5 Surface Water and Ground Water	14
2.6 Riparian area ¹ (Appendix B)	14
2.7 Fauna and Flora	15
2.1 Ecological Risks and Recommendations ¹	16
2.2 Heritage and Cultural Aspects.....	18
2.3 Socio Economic Environment.....	18
2.4 Surrounding Environment and Land Uses	18
Section 3: Policy and Legislative Context	20
3.1 Identification of All Legislation, Policies, Plans, Guidelines, Spatial Tools, Municipal Development Planning Frameworks And Instruments As Per Section 3(e) (i) And Compliance Of Proposed Activity With Legislation And Policy 3(e) (ii)	20
Section 4: Motivation, Need and Desirability	22
4.1 Need and Desirability as Per Section 3(F)	22
4.2 Motivation for Preferred Site, Activity and Technology Alternative	25
4.2.1 Preferred Site Alternative.....	25
Section 5: Public Participation	26
5.1 Notification of Interested and Affected Parties	26
5.2 Registered Interested and Affected Parties.....	27
5.3 Comments	27
Section 6: Impact Assessment	27
6.1 Methodology to Determine and Rank Significance and Consequences of Impacts Associated With All Alternative as Per Section 3(h) (vi).....	27
6.2 Preferred Site and Technology Alternative	29
6.3 Site and Technology Alternative 2.....	38
6.4 Environmental Impact Statement as per section (l).....	40
6.5 Impact Management Objectives and Outcomes for the Development for Inclusion in the EMP as Per Section 3(m).....	40
6.6 Assumptions, Uncertainties and Gaps in Knowledge Relating To the Assessment and Mitigation Measures Proposed As Per Section 3(o)	40
6.7 Period for Which Authorization Is Required, Proposed Monitoring and Auditing and Post Construction Requirement's	40
6.8 Financial Provisions as Per Section 3(s)	40
6.9 EAP Opinion on Whether Or Not to Authorize Activity and Recommendations and Conditions for Authorisation as Per Section 3(n) and (p)	40
6.10 Summary of Recommendations for the construction of the L2068 Culvert:.....	41

Figures

Figure 1: 1:50 000 Map Indicating the Location of The L2068 Box Culvert.	9
Figure 2: Aerial Photograph Showing an Overview of the L2068 Culvert and the Surrounding Topography (Source Google Earth Image, 2020).	10
Figure 4: Aerial Photograph Showing the L2068 Culvert. Google Earth Image, 2020.	11
Figure 5: The Gcoti High School, 100m from the L2068 Road Culvert. Source: Google Earth, 2020	13
Figure 6: The In Stream Habitat of the Riparian Area As Described By the Biodiversity Company, 2020.	14
Figure 7: (a) The current access road is narrow and badly eroded. (b) An overview of where the current drainage line flows over the road and where the new culvert will be located in the watercourse. (c) A view of the upstream conditions in the riparian area above the proposed culvert location.....	19

Figure 8: (a) An overview of the crossing location showing the erosion that has taken place across the road. (b) Chromalena present in the riparian area. These are a highly alien invasive species and must be removed during construction. (c) Peanut Cassia Trees in the riparian area, also a highly alien invasive species that must be removed and prevented from spreading further. 19

Figure 9: (a) Some indigenous vegetation in the riparian area. (b) The access road leading to the school. (c) The Kwa Majola Primary school at the end of the L2068 Road. 19

Tables

Table 1: All Listed and Specific Activities to be Triggered and Being Applied For.....	8
Table 2: Locality Information	8
Table 3: DEFF Screening Report Recommendations for the L2068 Road Upgrade	12
Table 4: The Gradient of the Site	13
Table 5: The Topographical Features and Landforms of the Site	13
Table 7: Sensitive Fauna as Identified in the EDTEA Screening Report and Site Assessment	15
Table 8: Sensitive Flora as Identified in the Screening Report and Site Assessment	16
Table 9: Need and Desirability as per the 2017 Guideline on Need and Desirability	22

Appendices

Appendix A: Drawings and Maps	42
Appendix B: DEFF Screening Report and Specialist Reports	43
Appendix C: Noticeboard	44
Appendix D: Public Participation	45
Appendix E: Adverts.....	51
Appendix F: Registered I &Aps	52
Appendix G: Comments and Responses	53
Appendix H: Impacts Scoring Matrix	54
Appendix I: EAP Declaration	55
Appendix J: Environmental Management Programme	56

Section 1: Scope of Work and Location of Activity

1.1 Project Title

Construction of the L2068 Box culvert within a watercourse.

1.2 A Description of the Activities to Be Undertaken Including Associated Structures and Infrastructure As per Section 3(d) (ii)

The KwaZulu-Natal Department of Transport (DOT) propose to construct a new box culvert within Ward 6 of the Umvoti Local Municipality, Umzinyathi District Municipality. The L2068 Box culvert will be located in the Tongwe area at the following point location, 28°51'20.58"S, 30°51'30.18"E. The box culvert will be constructed across a riparian area and drainage line in the upper reaches of the Tugela Valley (Jamerson's Drift).

The L2068 Road is a small access road that services two households and a small primary school. The road intercepts a small drainage line and riparian area that currently has no drainage infrastructure in place. The current surface water flows directly over the gravel road. Both pedestrians and vehicles cross the bed of this watercourse in times of high flow which becomes dangerous for vehicles and pedestrians. The culvert will be a single cell 1.8m x 1.8m in-situ concrete box culvert with an inlet and outlet on either side of the structure. Reno-mattresses will be placed at the inlet and outlet within the watercourse bed. The road will be re-aligned 20m downstream of the existing road. This will therefore entail the infill and removal of more than 10m³ of material from a watercourse which requires environmental authorisation.

Figures 1-3 below provide an overview of the proposed development and indicate the culvert location (Additional locality maps have been attached as appendix A).

The in-situ box culvert will be comprised of the following:

- A single cell box culvert with 1.8m x 1.8m openings. An inlet and outlet with reno-mattresses will be put in place for erosion management within the watercourse (See Figures 3 and Appendix A). Larger culvert diameters are less likely to become blocked in the long term and will help facilitate water flow from one side of the road to the other.
- The road will be 6m wide. The width of the current road will be widened by 2m on either side of the road. This will result in the clearing of up to 190m² of riparian vegetation.

The specialist who assessed the site concluded that there was no definable wetland area present around the watercourse¹. There will therefore be no loss of wetland for the construction of this box culvert.

There will be no temporary structure required for crossing the watercourse during construction. The existing road on the L2068 Road will be used to cross the watercourse during construction of the new box culvert.

The total construction corridor (construction footprint) for the box culvert within the watercourse is as follows:

- Total area – **368m² (Figure 3)**

The volumes of soil/sand that will be removed for the construction of the culvert within the watercourse itself are estimated as follows:

- Total volume – **18m³** (Culvert 6m length x 3m width 1m height)

The figures below illustrate the proposed design of the L2068 Culvert (provided in Appendix A).

The construction of the L2068 Box culvert will have a positive impact on local access for the community living in this area. The current lack of a crossing structure exposes the community who use this access road to hazardous conditions when water levels rise. Access across the watercourse is not possible when water levels are high. The proposed box culvert will ultimately allow vehicles and pedestrians to cross the watercourse safely and efficiently, improving local access and road safety in this area.

1.2.1 Construction Methodology

In terms of water levels, construction of the culvert should commence in the dry season as the water levels in this watercourse will be lowest. Sand bags acting as impeding structures will be manually placed within the watercourse to redirect the flow around the working area if required. Once work has been completed or there is no longer the need to redirect the flow, the sand bags will be removed allowing the water to continue to flow along its natural course.

¹ The Biodiversity Company, Water Resource Assessment, L2068 Causeway. April 2020.

The construction methodology for the L2068 Culvert can be summarised as follows.

- Necessary clearing and grubbing of the site for construction access will be undertaken in the project footprint. This will include the clearing and cleaning of vegetation only within the demarcated construction corridor/ site footprint.
- Clearing and grubbing of the site will be undertaken by heavy machinery i.e. a TLB. Bulk earthwork will take place once the site has been prepared.
- No vegetation of conservation importance will be removed. Vegetation clearing will be limited to the construction footprint only.
- Heavy machinery i.e. an excavator will be used to excavate soil for the culvert within the watercourse. Bedding material will then be compacted into this excavation, the pipes will be placed on this bedding material,
- Construction of a new 11m long reinforced concrete in-situ 1.8m x 1.8m box culvert with headwalls, wing walls and reno- mattresses.
- Once the culvert has been completed the disturbed area will be rehabilitated back to its original state and shape.
- Finally, rehabilitation / re-vegetation of all areas affected by the construction activities using intensive grass sod planting or hydro seeding with a suitable indigenous grass seed mix will be undertaken. The indigenous grass seed mix will be chosen in conjunction with the contractor chosen to undertake the rehabilitation.

1.3 Description of Feasible Alternatives as Per Section 3(h)(i)

Site Alternatives

“Alternatives” are defined as “different means of meeting the general purpose and requirements of the activity”². Alternatives considered must be feasible and reasonable³. Alternatives considered must aim to address key significant impacts of the proposed activity by “maximising benefits and avoiding or minimising the negative impacts”⁴. Two technology alternatives have therefore been assessed in this report and are attached under Appendix A.

Access Alternative 1 (Preferred Alternative)

Site alternative 1 (the preferred alternative) is to construct the new box culvert on a new road alignment, 20m downstream of the existing watercourse crossing. This alternative would require the clearing and re-routing the access road through a different part of the watercourse. The re-routing of the road alignment will provide a safer approach angle across the culvert. The current road alignment has a very sharp bend which does not adhere to DOT’s standard road design parameters.

Access alternative 2 is to construct the new box culvert on the existing road alignment in the current water course crossing location. This alternative does not involve any road re-alignment. Less vegetation would be cleared within the riparian area for this alternative. A culvert located on a sharp hair bend corner however does not constitute ‘acceptable’ approach angles according to DOT’s standard road parameters.

Design Alternatives

Design Alternative 1 (Preferred Alternative)

The preferred technology alternative is to construct a 1.8m x 1.8m in-situ concrete box culvert across the watercourse. The structure will be supported by concrete backfill and wing walls on either side of the structure. Please refer to Appendix A for design drawings. This alternative would entail greater disturbance to the watercourse bed than that of a pipe culvert. A box culvert however typically requires less on-going maintenance than that of a pipe culvert. A box culvert would take longer to construct, be a lot more expensive to construct and entail a larger environmental impact than that of a pipe culvert structure.

Design Alternative 2

Alternative 2 would be to construct the L2068 Culvert as a 3 x 900mm concrete pipe structure. This would have a smaller footprint to that of a box culvert however given the steep angle of the terrain/ crossing a pipe culvert would be prone to becoming blocked and damaged. More long term maintenance would be required on a pipe culvert than that of a box culvert.

² Environmental Impact Assessment Regulations, 2014 as amended published under Government Notice No. 326 in Gazette No. 40772 of 07 April 2017.

³ DEA & DP (2010) Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA & DP).

The No Go Alternative

The proposed construction of L2068 Culvert will not take place. The watercourse crossing access issues for pedestrian and vehicles in times of high flow will remain in this area. The community will not be able to cross this watercourse safely.

See Appendix A for Engineering Drawings.

1.4 All Listed and Specific Activities to Be Triggered and Being Applied For As Per Section 3(d) (i)

Table 1: All Listed and Specific Activities to be Triggered and Being Applied For.

GNR	Activity Number	Activity as per the legislation	Activity as it applies to the proposal
Listing Notice 1; 4 th December 2017 as amended	19	<p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</i></p> <p><i>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</i></p> <p><i>(a) will occur behind a development setback;</i></p> <p><i>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</i></p> <p><i>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</i></p> <p><i>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</i></p>	The construction of the box culvert will result in approximately 18m ³ of material being removed and deposited within the watercourse during construction.

1.5 Location of Activity as per Section 3 (b)(i)-(iii)

Table 2: Locality Information

Municipality	uMvoti Local Municipality																				
Wards	Ward 6																				
Area / Town / Village	Umvoti																				
Co-ordinates:	Latitude								Longitude												
Culvert Mid-point:	28°51'20.46"S								30°51'30.17"E												
Property Description:	Tugela Location 4674																				
21 Digit Surveyor General no.	N	0	G	T	0	0	0	0	0	0	0	0	0	4	6	7	4	0	0	0	0

Figure 1: 1:50 000 Map Indicating the Location of The L2068 Box Culvert.

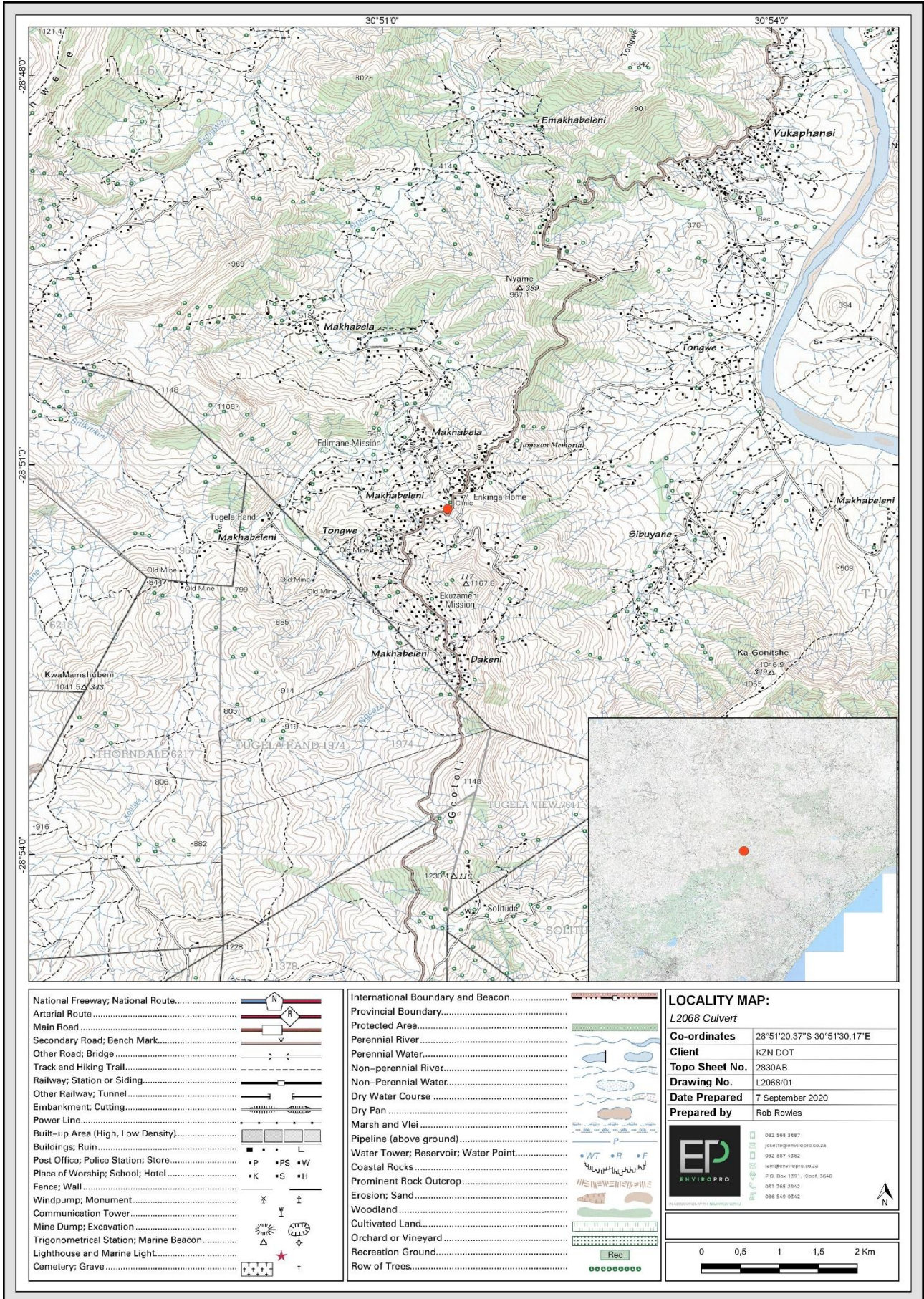


Figure 2: Aerial Photograph Showing an Overview of the L2068 Culvert and the Surrounding Topography (Source Google Earth Image, 2020).



Figure 3: Aerial Photograph Showing the L2068 Culvert. Google Earth Image, 2020.



Section 2: Site Description and Surrounding Land Use as per section 3(h)(iv) and (k)

2.1 DEFF Screening Report

A Screening Report was generated via the DEFF Screening Tool (please refer to Appendix B for the full DEFF report) which details potential specialist reports that may be required based on a desktop level assessment conducted by the screening tool. Table 2 below summarises the screening tool recommendations, indicating whether they are applicable to the specifics of the site and project in question and where they are applicable, indicates the sections of the BAR where these have been addressed. As per the Screening Tool Guidelines, it is the responsibility of the EAP to confirm this list and to motivate in the BAR, the reason for not including any of the identified specialist studies by providing photographic evidence of the site situation.

Table 3: DEFF Screening Report Recommendations for the L2068 Road Upgrade

Specialist Assessment	Conducted as part of this BAR	Section in BAR which addresses this aspect or motivation for exclusion from BAR
Agricultural Assessment -Medium Sensitivity	No	Due to the nature of the project it was agreed with EDTEA that there will be no significant impact on any agricultural areas and as such an agricultural Impact Assessment was not required. This aspect has been discussed in section 2.4 of this report.
Landscape/Visual Impact Assessment	No	This is an existing Road that is being upgraded. EDTEA agreed that no visual assessment would be necessary to inform this EIA. The landscape and topography has been discussed in section 2.2 of this report.
Animal Species Assessment -Medium Sensitivity	No	As the project is an existing road it was agreed with EDTEA that an Animal Species Assessment was not required. The sensitive species identified in the Screening report have been discussed in section 2.7 of this report.
Aquatic Biodiversity Assessment - Very High Sensitivity	YES	Please refer to the specialist report in Appendix B, Section 2 <i>Surface Water</i> . The findings of this assessment have been provided in Sections 2.5 of this report.
Archaeological and cultural Assessment -Medium Sensitivity	No	This road is existing and the slight diversion of the road is not anticipated to have any impact on any cultural or archaeological aspect. EDTEA agreed that this aspect would not require specialist input. See section 2.7 of this report.
Palaeontology Assessment	No	This site falls within a low sensitivity Paleontology area according to the SAHRIS Database. EDTEA agreed that no paleontology study was required.
Noise Assessment	No	The noise anticipated from both the construction activity and the operational activity did not warrant additional impact assessment.
Traffic assessment	No	EDTEA agreed that no traffic assessment would be required for this rural road upgrade.
Geotechnical Assessment	No	EDTEA agreed that a geotech assessment would be required for this assessment. See appendix B, for the Geotechnical assessment carried out by Gondwana Geo Solutions.
Socio Economic assessment	No	EDTEA agreed that there would not be any significant socio-economic impacts requiring specialist input for this assessment.
Ambient Air Quality Assessment	No	The ambient air quality is not anticipated to change from the upgrade of this road therefore no specialist assessment was required.
Plant Species Assessment -Medium Sensitivity	No	Given that so little vegetation will be cleared for this culvert construction and that the vegetation in this area is not under threat or endangered, no vegetation specialist assessment was deemed necessary as agreed upon by EDTEA. The sensitive species identified in the screening report have been discussed in Section 2.7 of this report.
Terrestrial Biodiversity Assessment -Very high sensitivity	YES	The Terrestrial Biodiversity component has been included and covered in the Water Resources Assessment (Appendix B) and in section 2.6 of this report. Aspects such as riparian area delineations, present ecological status of the aquatic systems and their habitat, Ecological Importance and state, ecosystem services, species of conservation concern, and buffer zone parameters for the water resources on site have been included in the riparian area assessment. An adequate assessment of the state of the ecosystems pertaining to this area and the affect the road upgrade will have on them has been provided to inform this assessment.

2.2 Topography and Physical Characteristics of Site

The site for the new L2068 Culvert can be accessed by taking the first cross street left off Main Road in Kranskop Town towards Vukaphansi. Stay on this road for 20km at which point the L2068 gravel road will be on the left. The culvert is 200m down this road. The site is best located using GPS coordinates, 28°51'20.46"S30°51'30.17"E.

The project area is rural in nature. The site is located on the head waters of a north facing slope in the Tongwe area. This area is characterised by rural households, sparsely populated in the surrounding area with two schools nearby, the Kwa Majola Primary school, on the L2068 Road itself and the Gcotoi High School 100m up the road from the L2068 Road (Figure 5). Although some subsistence informal grazing takes place in this area, there were no agricultural crops visible in this area. The sandy shallow soils in the hill tops of this area are probably to account for this. The figure below shows the topography of the area.

The following applies to the area surrounding the sites as per the Figures 1-3 above. The gradient of the site is as follows:

Table 4: The Gradient of the Site

Gradient	Description
Flat	N/A
1:50 – 1:20	N/A
1:20 – 1:15	The site associated with L2068 Culvert can be described as having a gentle gradient. The site is located at the top of a hillside in an open valley (Figure 4).
1:15 – 1:10	N/A
1:10 – 1:7,5	N/A
1:7,5 – 1:5	N/A
Steeper than 1:5	N/A

Table 5: The Topographical Features and Landforms of the Site

Gradient	Description
Ridgeline	N/A
Plateau	N/A
Side slope of hill/mountain	The site associated with L2068 Culvert can be described as having a gentle gradient. The site is located at the top of a hillside in an open valley (Figure 4).
Closed valley	N/A
Open valley	N/A
Plain	N/A
Undulating plain/low hills	N/A
Dune	N/A
Sea-front	N/A

Figure 5 below illustrates the topographical nature of this area.

Figure 4: The Gcotoi High School, 100m from the L2068 Road Culvert. Source: Google Earth, 2020



2.3 Soils and Geology

A wide variety of soils occur throughout this region, which include vetisols which develop over Karoo Supergroup sediments of the Ecca and Beaufort Groups. The Jurassic dolerite intrusions are covered in heavy soils with the Fa, Fb, Fc, Db, Dc and Ea soils commonly occurring¹ (Appendix B).

2.4 Climate

This area is predominantly characterised by summer rainfall, with little rain occurring during winter months. The mean annual precipitation is between 550 and 1 000 mm with frost occurring infrequently. The mean monthly minimum and maximum temperatures for Nagle Dam (nearby) is 4 °C and 36.9 °C during June and December respectively¹.

2.5 Surface Water and Ground Water

The project area was situated in the V40B quaternary catchment within the Phongola - Mtamvuna Water Management Area (WMA). The watercourses located within the 500m regulated area are tributaries of the V40B-03505 Sub Quaternary Reach (SQR; Matigulu River), in the North Eastern Coastal Belt¹.

The L2068 Culvert will be constructed in the head waters of a non-perennial drainage line which is a first order watercourse that drains into the non-perennial Ngcaza River 1.2km from the site. The Ngcaza River flows east for 7km before joining the Tugela River¹.

2.6 Riparian area¹ (Appendix B)

A specialist was commissioned to assess the site to assess the impact the new box culvert would have on the riparian area and watercourse. The specialist found that no wetland was present, and described the watercourse as a riparian zone (Appendix B). The area adjacent to the main watercourse in question has therefore been classified as a riparian zone rather than a wetland area due to the dominance of alluvial soils and riparian vegetation ¹(See Appendix B).

Riparian areas have high conservation value and can be considered an important aspect of a watershed for a wide range of values and resources. Riparian areas are crucial for riverbank stability and in preventing erosion within the channel. A narrow instream habitat in and surrounding the watercourse that crosses underneath the proposed causeway has been delineated. This section is roughly 2m in width in average and is characterised by hydrophilic vegetation as well as alluvial sediments that differ in depth. The instream habitat of this system is surrounded by a riparian vegetation that differs in width (depending on the topography). The riparian habitat is predominantly characterised by dense tree and shrub growth with two soil forms being dominant, namely a Dundee and Glenrosa soil form of which the former is characterised by alluvial soils¹ (Appendix B).

Figure 5: The In Stream Habitat of the Riparian Area As Described By the Biodiversity Company, 2020.



The *In situ* water quality for the Matigulu River tributary (a nearby tributary) indicates limited modifications in the system. The pH of the system has been measured at 8.2, which is regarded as alkaline. The increase in pH is unlikely to be as a result of contamination or modification, but rather inputs of natural carbonates from underlying/eroded geology. The conductivity, which has been measured at 603 $\mu\text{S}/\text{cm}$, has also been regarded as slightly elevated. This phenomenon is indicative of an increase in salts, which could have been caused by pollution via household chemicals used to wash clothes with within the watercourse. Overall, the *in situ* water quality does not appear to be a limiting factor for aquatic biota¹.


Significant modifications in the delineated instream and riparian habitats of the relevant watercourse include flow modifications, bed modifications, indigenous vegetation removal, encroachment of invasive plant species and bank erosion. The flow dynamics of the instream and riparian habitat has been modified by the main road and the secondary road on which the causeway is proposed that impede into these habitats to such an extent that sporadic overland flow is modified largely¹.

The stream bed and banks have been modified as a result of increased sediment inputs. Evidence that support this statement includes erosion within drainage lines upstream from the watercourse which enter this system directly, erosion within the channel itself (as well as high volumes of alluvial sediment). Overgrazing and artificial surfaces being created within riparian areas has resulted in the direct loss of indigenous riparian vegetation, which has ultimately also resulted in invasive species dominating some sections¹ (See Appendix B).

2.7 Fauna and Flora

The sensitive species identified in the Screening report included *Reptilia-Kinixys natalensis*. This is a species of conservation importance that has historically been identified in this area or surrounding areas. It was not observed on site, however provisions have been made in the EMPR for the management of this species should they be identified during construction within the culvert footprint.


Table 6: Sensitive Fauna as Identified in the EDTEA Screening Report and Site Assessment

SPECIES	IMAGE	INFORMATION
<p><i>Reptilia-Kinixys natalensis</i></p>		<p>Status: Vulnerable</p> <p>The range of <i>K. natalensis</i> covers a region where habitat destruction and degradation far exceeds national levels in South Africa (Source: SANBI, 2020).</p> <p>The range of <i>Kinixys natalensis</i> in South Africa extends from central KwaZulu-Natal Province near Scottsville northwards through the Weenen Nature Reserve and the Tugela and Pongolo River Basins along the Lebombo Mountains into Mpumalanga and Limpopo Province where observations have been made in the Manyeleti Game Reserve and Hoedpruit. It occurs in Swaziland (now eSwatini) throughout the Lebombo range and has been reported at Big Bend, Lonhlupeko, and Tshaneni in the eastern Lowveld. The range extends peripherally into southwestern Mozambique along the Lebombo Mountains.</p> <p><i>Kinixys natalensis</i> prefers dry rocky habitat in thornveld, valley bushveld, dry thicket or bushveld savanna at elevations between 50 and 1,200 m and is generally absent from coastal regions, deep sand and forest. It is sympatric with <i>K. zombensis</i> in northern KwaZulu-Natal and with <i>K. spekii</i> in eastern Limpopo and Mpumalanga Provinces, as well as Swaziland. Tortoises are active when conditions are humid, overcast, and after rain, but seek shelter under rocks and in the foothills of mountains when inactive.</p> <p>Site Observations: None observed on site. It is possible that this species is found in this area.</p>

Flora

The sensitive species identified in the Screening report included *Eugenia simii*, and Sensitive species 275 and 380. This species is of conservation importance that has historically been identified in this area or surrounding areas. This species was not observed on site however, provisions have been made in the EMPR for the management of this species should they be identified during construction within the road footprint.

Table 7: Sensitive Flora as Identified in the Screening Report and Site Assessment

SPECIES	IMAGE	INFORMATION
<p><i>Eugenia simii</i> River Myrtle</p>		<p>Status: Vulnerable. Extent of Occurrence is less than 4500 km², known from fewer than ten locations, there is continuing decline in habitat quality and the number of mature individuals due to dam construction and water extraction for crop irrigation that affect the hydromorphic characteristics of river banks. (Source: SANBI, 2020). This species is mainly found in southern KwaZulu-Natal and Pondoland. This species habitat includes Pondoland-Ugu Sandstone Coastal Sourveld, KwaZulu-Natal Coastal Belt Grassland, Ithala Quartzite Sourveld, Scarp Forest, Eastern Valley Bushveld, often on Rocky banks of rivers. Site Observations: None observed on site.</p>

The project area is located within the Eastern Valley Bushveld (SVs 6) vegetation type, which is distributed throughout the KwaZulu-Natal and Eastern Cape Province in deeply incised river valleys which includes the lower regions of the Mlazi, Mvoti, Thukela, Mgeni, Mzimkulu, Mtentu etc. This vegetation type is situated at an altitude of 100 to 1 000 meters above sea level and rarely extends to the coast⁵.

This vegetation type is characterised by semideciduous savanna woodlands which often is succulent and dominated by species of *Euphorbia* and *Aloe*. An unequal rainfall occurs throughout this vegetation type due to the fact that the river valleys runs along a northwest-southeast axis. The north-facing slopes are steep and are sheltered from rainfall⁵.

This vegetation type is least threatened with a target percentage of 25. Only 0.8% of this vegetation type is conserved mainly in the Luchaba Wildlife Reserve. Approximately 15% of this vegetation type has been transformed by cultivation with Alien plant invasion being a serious threat¹.

Lantana (an alien invasive species) was observed within the riparian area (Figure 7 in the Water Resources Assessment).

No species of conservation concern were observed during the assessment.

2.1 Ecological Risks and Recommendations¹

The risks associated with this culvert construction relate to the clearing of riparian vegetation, reshaping the watercourse banks, the construction of pipes within the watercourse, and the operation of heavy machinery within the water resource. Several of these impacts are considered low risks should the implementation of the prescribed mitigation measures be implemented. This applies to the operational phase where the implementation of best practice design can reduce erosion of banks and the deterioration of the watercourse over time, particularly during flooding events.

It is essential that the riparian zone be clearly demarcated and the footprint of the project area be limited to where access to the water course is required¹.

The following mitigation measures have been provided by the specialists pertaining to the ecological health of the site. These have been included in the site specific EMPR:

- The recommended buffer zones must be adhered to (where possible) during the construction phase of the project, with exception of the activities and structures required to traverse a watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone;
- It is critical to spread flows across the system, avoiding incisions in the landscape caused by concentrated flows. Temporary storm water channels should be filled with aggregate and/or logs (branches included) to dissipate flows;
- It is recommended that the material surrounding and holding the culvert in place include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability to accommodate flooding and very low flows;

⁵ Mucina & Rutherford, 2006. The Vegetation of South Africa, Lesotho and Swaziland.

- The culvert used in the design should be as large as possible, partially sunken and energy dissipating material must be placed at the discharge area of each culvert to prevent erosion of these areas.
- The use of larger culverts will prevent the build-up of debris by allowing the free movement of debris through the large culverts;
- Culverts should avoid inundation (damming) of upstream areas by facilitating streamflow and catering properly for both low flows and high flows;
- Surface run-off from the roads flowing down the embankments often scours the watercourse on the sides of the culvert causing sedimentation of the channel. This should be catered for with adequate concreted storm water drainage depressions and channels with energy dissipaters that channel these flows into the river in a controlled manner;
- The culvert installations should further take into account the scouring action of high flows and gabion structures or similar should be placed on both sides of the culvert on the embankments both upstream and downstream. This will serve as retention of the soils from scouring around and underneath the culvert structures aiding in the protection of the structure;
- Large aggregate outsourced or from the project area (if available) can be used for energy dissipation in the channel downstream of the culverts to reduce the likelihood of scouring the river bed and sedimentation of the catchment. It is preferable that larger aggregate be used to avoid flows removing material from the site;
- Signs of erosion must be addressed immediately to prevent further erosion; and
- Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse¹ (Appendix B).

The following general mitigations pertaining to the culvert have been provided by the ecologists. These have been included in the site specific EMPR:

- The watercourse areas outside of the specific project site area must be avoided where possible;
- The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access;
- Laydown yards, camps and storage areas must be beyond the watercourse areas. Where possible, the construction of the two causeways must take place from the existing road and not from within the watercourse;
- The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;
- It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;
- Temporary storm water channels and preferential flow paths should be filled with aggregate and logs (branches included) to dissipate and slow flows limiting erosion;
- Contamination of the watercourse system with unset cement or cement powder should be negated as it is detrimental to aquatic biota. Pre-cast causeways/culverts should be made use of (where possible) to avoid the mixing of these materials on site, reducing the likelihood of cement in the watercourse system;
- Prevent uncontrolled access of vehicles through the watercourse system that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;
- All chemicals and toxicants to be used for the construction must be stored outside the channel system and in a bunded area;
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping";
- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the watercourse;
- All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the riparian and instream areas. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Erosion and sedimentation into each channel must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed banks;

- Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching;
- Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;
- Large trees and other debris often collect upstream against the causeway pylons or culverts, damming up the channel with risk of flooding and damaging the watercourse crossing and its banks. This debris should be cleared routinely with appropriate disposal of the debris. Timber can be sold or donated to local communities;
- No dumping of construction material on-site may take place;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported;
- Bi-annual vegetation rehabilitation surveys need to be conducted of the vegetation within the project footprint for a period of at least a year after construction has been completed to assess vegetation regrowth and recovery; and
- An alien invasive plant management plan needs to be compiled and implemented post construction to control current invaded areas and prevent the growth of invasive plants on cleared areas.

It is the opinion of the specialists that the project has no fatal flaws and the project qualifies for authorisation under the provisions of the General Authorisation, provided mitigation measures and the recommendation are implemented. The project will improve the current flow dynamics of the crossing, and once operational, improve the health of this riparian system¹ (Appendix B).

2.2 Heritage and Cultural Aspects

The EDTEA screening report identified the site and surrounding area as having a medium sensitivity. The SAHRIS database indicated that this site is in an unknown sensitivity area and thus a desktop Palaeo assessment would be required. A query was lodged with AMAFA in this regard. No comment has been received to date.

No items of archaeological value were noted within the immediate area of the site associated with the L2068 Culvert. Construction workers will be cautioned to operate with care on the site and should any unidentified archaeologically or culturally sensitive aspects be discovered on site, construction activities are to stop immediately and the issue assessed and the authorities (AMAFA) notified if need be.

2.3 Socio Economic Environment

This is a rural area. The L2068 Road is the access road off of the main gravel road between Kranskop and Ekombe, leading to the KwaMajola Primary School and three local rural houses. The L2068 Culvert will provide safe access for both vehicles and pedestrians accessing the school as well as the residents who live off of this road. Providing an elevated culvert will keep pedestrians and vehicles out of the watercourse bed and banks, having a positive impact on both the socio-economic and natural environment in this area.

2.4 Surrounding Environment and Land Uses

The land uses surrounding the footprint of the new culvert is located on an existing dirt track access road in a rural residential area.

The surrounding environment and land use will not be negatively affected by the construction of the L2068 Culvert as the construction work is not likely to affect the area outside of the construction footprint. Access on this road will not be obstructed during construction as the existing culvert and road across the watercourse will be used during construction. The new culvert will improve pedestrian and vehicle safety by keeping access above the water level. Once built, the culvert will also have a positive impact on the ecological state of the system as the larger new culvert will improve flow through the system and illuminate the back blockage of water above the road as is currently being experienced. The culvert should have little negative impact or influence on the watercourses and riparian area or society provided the basic mitigation measures are adhered to in this report and EMPr.

The figures below provide photographs of the site taken on the 20th February 2020.



Figure 6: (a) The current access road is narrow and badly eroded. (b) An overview of where the current drainage line flows over the road and where the new culvert will be located in the watercourse. (c) A view of the upstream conditions in the riparian area above the proposed culvert location.



Figure 7: (a) An overview of the crossing location showing the erosion that has taken place across the road. (b) *Chromolaena* present in the riparian area. These are a highly alien invasive species and must be removed during construction. (c) Peanut Cassia Trees in the riparian area, also a highly alien invasive species that must be removed and prevented from spreading further.



Figure 8: (a) Some indigenous vegetation in the riparian area. (b) The access road leading to the school. (c) The Kwa Majola Primary school at the end of the L2068 Road.

Section 3: Policy and Legislative Context

3.1 Identification of All Legislation, Policies, Plans, Guidelines, Spatial Tools, Municipal Development Planning Frameworks And Instruments As Per Section 3(e) (i) And Compliance Of Proposed Activity With Legislation And Policy 3(e) (ii)

Legislation	Compliance of Activity
The Constitution of South Africa (No. 108 of 1996)	The Constitution cannot manage environmental resources as a standalone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 24, the constitution gives every person the right to an environment that is not harmful to their health and wellbeing.
National Environmental Management Act 1998	The National Environmental Management Act (Act 107 of 1998) (NEMA) is South Africa's overarching environmental legislation. It includes a set of principles that govern environmental management and against which all Environmental Management Programmes (EMPr) and actions are measured. These principles include and relate to sustainable development, protection of the natural environment, waste minimisation, public consultation, the right to an environment that is not harmful to one's health or wellbeing, and a general duty of care. The Environmental Impact Assessment (EIA) Regulations, 2014: GNR.982, R.983, and R.985 under Section 24 of the NEMA define the activities that require Environmental Authorisation and the processes to be followed to assess environmental impacts and obtain Environmental Authorisation. Environmental authorisation is required for the infill and excavation of material within a watercourse associated with construction for the box culvert, therefore As per activity 19 of Listing Notice 1, a Basic assessment process must be followed.
National Water Act 1998	The site is located within 500m of wetland areas and there will be the alterations to the bed and banks of a watercourse. Therefore, a water use authorisation is required as per Section 21 (c) and (j) of the National Water Act. A water use application will be applied for through DWS for this activity.
National Waste Management Act 2008	Reforms the law regulating waste management to prevent pollution and ecological degradation. Section 19 allows the Minister to publish a list of activities, which require a Waste Management License. The most recent list is published in Government Gazette 37083 Notice No. 921 dated 29 November 2013. It is unlikely that any activities carried out by the development will trigger a Waste Management Activity.
National Environmental Management: Air Quality Act (Act 39 of 2004)	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. It is unlikely that any activities carried out by the development will impact on the local and regional air quality.
National Environmental Management: Protected Areas Act (Act 57 of 2003)	The National Environmental Management: Protected Areas intends to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, for the establishment of a national register of all national, provincial and local protected areas, for the management of those areas in accordance with national norms and standards, for intergovernmental co-operation and public consultation in matters concerning protected areas, and for matters in connection therewith. The nearest protected area to this site is the Qondeni Forrest Reserve, located 20km east of the L2068 Road. The proposed development will not have an impact on the protected area.
National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008)	The National Environmental Management: Integrated Coastal Management Act aims to establish a system of integrated coastal and estuarine management in the Republic, including norms, standards and policies, in order to promote the conservation of the coastal environment, and maintain the natural attributes of coastal landscapes and seascapes, and to ensure that development and the use of natural resources within the coastal zone is socially and economically justifiable and ecologically sustainable, to define rights and duties in relation to coastal areas, to determine the responsibilities of organs of state in relation to coastal areas, to prohibit incineration at sea, to control dumping at sea, pollution in the coastal zone, inappropriate development of the coastal environment and other adverse effects on

	<p>the coastal environment, to give effect to South Africa's international obligations in relation to coastal matters and to provide for matters connected therewith.</p> <p>The proposed development will not have an impact on any coastal areas.</p>
National Forest Act (Act 84 of 1998)	<p>To reform the law on forests as government recognises that everyone has the constitutional right to have the environment protected for the benefit of present and future generations, natural forests and woodlands form an important part of that environment and need to be conserved and developed according to the principles of sustainable management, plantation forests play an important role in the economy.</p> <p>Plantation forests have an impact on the environment and need to be managed appropriately, the State's role in forestry needs to change; and the economic, social and environmental benefits of forests have been distributed unfairly in the past.</p> <p>No forest or closed canopy will be impacted by the development.</p>
Environmental Conservation Act 1996	Makes provisions for the application of general environmental principles for the protection of ecological processes, promotion of sustainable development and the protection of the environment. This Act has mostly been repealed by NEMA.
National Environmental Management Biodiversity Act 2004	<p>To provide the framework, norms, and standards for the conservation, sustainable use and equitable benefit-sharing of South Africa's biological resources. Section 52 allows for the publication of a list of threatened ecosystems in need of protection. The list was published in Government Gazette No. 34809 Notice No. 1002, dated 9 November 2011.</p> <p>The site is not located within a threatened ecosystem type and will not require Environmental Authorisation for clearing more than 300m² of vegetation within this ecosystem type.</p>
National Heritage Resources Act 25 of 1999	For the protection of South African Heritage to nurture and conserve communities legacy. No archaeological significant artefacts will be disturbed during this project therefore; no permits will be required from the provincial heritage authority, AMAFA.
Mineral & Petroleum Resources Development 28 of 2002	To provide for the sustainable development of the nation's mineral and petroleum resources which includes activities carried out for the winning of any mineral on, in or under the earth (i.e. the use of borrow pits). The material used to construct the road must be obtained from a licensed source.
Occupational Health and Safety Act (Act 181 of 1993)	<p>These regulations provide for the health and safety of persons at work, including aspects which are hazardous to health and safety. In terms of major hazardous installation, the regulations shall apply to employers, self-employed persons and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a risk that could affect the health and safety of employees and the public.</p> <p>During both the construction phase of this development all the requirements of Occupational Health and Safety Act 1993 will need to be adhered to.</p>
Municipal Planning Framework	
Umzinyathi District Municipality IDP 2019/2020	The Umzinyathi District Municipality (DM) IDP 2019/2020 serves as a tool for giving effect to economic, social and environmental sustainability goals for 2019 and 2020. The development and upgrade of local infrastructure within the local municipalities is part of the IDP goals for 2019 and 2020. This IDP has been consulted to inform this Basic assessment Report.

Section 4: Motivation, Need and Desirability

4.1 Need and Desirability as Per Section 3(F)

The following table has been prepared as per the 2017 Integrated Environmental Management Guideline: Guideline on Need and Desirability compiled by the Department of Environmental Affairs.

Table 8: Need and Desirability as per the 2017 Guideline on Need and Desirability

“securing ecological sustainable development and use of natural resources”	
<i>How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?</i>	<p>The L2068 Culvert is existing public infrastructure. The majority of the impacts on the ecology will occur during the construction phase of the project. Post construction, the riparian area surrounding the road is expected to become healthier than at present with improved drainage across the road. The wetland specialists have rated the impacts on these natural resources as 'low' and therefore, there will be little long term impact on the local ecological integrity of the area.</p>
<i>How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</i>	<p>There will be loss of biological diversity in some of the road footprint in the riparian area. An estimated 85m² of vegetation will be cleared in the construction corridor within the riparian area for this culvert.</p> <p>Approximately 85m² of material will be infilled in the watercourse from the box culvert. The impact of this activity is considered 'low'.</p> <p>Improved functionality of the watercourse is expected post construction.</p>
<i>How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</i>	<p>The temporary impacts during construction may include:</p> <ul style="list-style-type: none"> • Clearing vegetation from the site footprint, • Impacts to the riparian area areas for the construction of the new box culverts, • Erosion of exposed material in the construction areas resulting in the siltation of the watercourse. • There will be more general waste in this area during construction, and potentially more pollution, and • Hazardous goods management and spill risks. <p>These temporary impacts are largely unavoidable and can be adequately mitigated with the application of the mitigation measures provided in the EMPR.</p> <p>The long term biophysical impacts may include:</p> <ul style="list-style-type: none"> • Improved riparian area functionality from the upgraded and improved drainage systems across the road. This is a positive impact. Reinforced erosion protection in the form of reno- mattresses will be placed at the outlets of the box culverts. The side cut and toe slopes adjacent to the riparian area will be vegetated to prevent soil erosion. <p>Measures explored to avoid these impacts included:</p> <ul style="list-style-type: none"> • The re-designing the alignment of the road to minimise riparian area encroachment. • Efforts to aid the free unobstructed flow of water will be encouraged by providing

	<p>bigger pipes and the correct gradient of pipe placement (as per the design specs) to facilitate the flow of water from one side of the road to the other.</p>
<p><i>What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?</i></p>	<p>General waste and a small amount of hazardous waste will be generated through this development. An EMPr has been provided to ensure waste is sufficiently managed on-site. The site specific EMP also employs a strict waste protocol to ensure waste is minimised, reused and/or recycled.</p>
<p><i>How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</i></p>	<p>There are no negative or positive impacts on any cultural heritage sites anticipated from upgrading this road. There is a grave site in close proximity to the road, this will be managed as a sensitive area during construction.</p>
<p><i>How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</i></p>	<p>There may be water abstracted for dust suppression during construction. This will be a temporary impact on the natural water resources in this area. The abstraction point will be authorised through DWS, water volumes abstracted will be recorded and strict management criteria of the abstraction point will be monitored through the implementation of the EMPr, and ECO auditing.</p>
<p><i>How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?</i></p> <ul style="list-style-type: none"> • <i>Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)</i> • <i>Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)</i> • <i>Do the proposed location, type and scale of development promote a reduced dependency on resources</i> 	<p>The natural resources that will be used for the road upgrade may include:</p> <ul style="list-style-type: none"> • Sub base rock and sand material. This must be sourced from a licenced source. ie. No unpermitted local DOT Borrow pit may be used unless the site has been authorised through DMR. Should the material be sourced from a licenced facility and be excavated in a responsible manner (according to the authorised site EMPr) then the integrity of the rock and subbase material in this area will not be jeopardised. <p>Water abstraction for dust suppression and layer work dampening. Should abstraction take place from a licenced source and location according to the authorised quantities, this should have little to no impact on the natural water resources in this area.</p>
<p><i>How were a risk-averse and cautious approach applied in terms of ecological impacts?</i></p> <ul style="list-style-type: none"> • <i>What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)</i> • <i>What is the level of risk associated with the limits of current knowledge</i> • <i>Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</i> 	<p>The most significant impacts relating to riparian area loss were addressed firstly by trying to re design the road route to avoid as much riparian area as possible and still maintain adequate national road standards for a 40km/hr gravel road surface.</p> <p>The limits in terms of knowledge gaps:</p> <ul style="list-style-type: none"> • A wetland specialist has delineated the areas of concern on site. The assumption is that they were able to identify all wetland and riparian areas along the proposed project footprint. • The level of risk would be low. <p>A cautious approach was applied to these assessments. They were conducted by</p>

	independent specialists with no vested interest in this project and development whatsoever.
<p><i>How will the ecological impacts resulting from this development impact on people's environmental right in terms following</i></p> <ul style="list-style-type: none"> <i>Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</i> <i>Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</i> 	<p>On the whole, the upgrade of the road will enhance/ better the surrounding community's access to resources in the area. It will reduce noise levels associated with vehicles driving this route with providing a smoother driving surface, and the road will be wider offering safer pedestrian access. The improved access across the water courses along this road will benefit the local travellers both pedestrian and vehicular as the road cannot be crossed in times of high flow in its present state. The negative impacts associated with riparian area loss should not negatively impact the community in this area in any significant fashion.</p>
<p><i>Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?</i></p>	<p>The upgrade of this road will improve the link between people's livelihoods and good and services in this area. The amount of vegetation that will be lost for the clearing of the approach roads is negligible and will not impact peoples grazing areas in this area. This is not a significant impact. The economic and social benefits of having an upgraded gravel surface road in this area far outweigh any negative socio-economic factors.</p>
<p><i>Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?</i></p>	<p>The construction within the watercourse, during construction will have a negative short-term impact on biological integrity in this area however the long term impact will be positive due to the improved storm water systems and flow of water in this system.</p>
<p><i>Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?</i></p>	<p>The alternatives considered involved alternative pipe and box culvert sizes for this culvert upgrade.</p>
<p><i>Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?</i></p>	<p>The negative accumulative impacts:</p> <ul style="list-style-type: none"> The infill of the watercourse will have a negative environmental impact during construction in terms of potential siltation of the watercourse. <p>The positive accumulative impacts: By upgrading the gravel road surface surface and culvert, the risk to watercourse sedimentation and ongoing erosion of the watercourse banks is far less. The riparian and downstream systems in the area will accumulatively benefit from cleaner water runoff in the area.</p>
"promoting justifiable economic and social development"	
<p><i>What is the socio-economic context of the area, based on, amongst other considerations, the following considerations:</i></p> <ul style="list-style-type: none"> <i>The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,</i> <i>Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),</i> <i>Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and</i> <i>Municipal Economic Development Strategy ("LED Strategy").</i> 	<p>The area is rural in nature, used for homesteads and public facilities such as schools. This road is improving critical service delivery in the area in terms of access and transportation. The upgraded culvert and road will be in line with surrounding land use. This is an existing route that is being improved for the longevity of this area and the people living in this area.</p>
<p><i>Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</i></p>	<p>The short-term socio economics during construction may be hampered by obstructed road access around the road works. This may be outweighed however by the short-term</p>

	employment opportunities for local labour in this area during construction. The long term socio- economic benefit to this area will be significant with improved access and a safer road to travel and walk on.
<i>How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?</i>	The upgrade of the L2068 Road will be significant for surrounding communities as roads are vital in maintaining links between communities and services. Roads provide access for emergency vehicles including ambulances, fire trucks and police vehicles which cannot respond efficiently if they are unable to access an area or are forced to access it via poorly maintained gravel roads. Communities without road access become cut off from basic services and are unable to develop and grow.
<i>Will the development result inequitable (intra- and inter-generational) impact distribution, in the short- and long-term?</i>	The Socio-economic impacts associated with the L2068 Road upgrade will for the most part be distributed long term.
<i>Will the impact be socially and economically sustainable in the short- and long-term?</i>	Yes, the L2068 Road upgrade will be socially and economically sustainable both short and long term. Provided the road is built to appropriate national DOT standards, the reduced maintenance costs of a well-built gravel surface outweigh those of an informal gravel road over time which requires regular maintenance and repair.

The following motivation explains the need for the construction of the L2068 Culvert:

- The L2068 road was identified by the local community as a key route that required a culvert for safe access across the watercourse;
- The current crossing point through the watercourse acts as an important transport and access route which becomes un-navigable during and after high rainfall events.
- The new culvert will be a public facility and will improve the access in this area for community members, and emergency services in this area;
- The improved access will promote growth in the area; and
- There may be temporary employment opportunities during the construction period.

The environmental impact of the culvert will be felt during construction but once established the culvert will have a low impact on the surrounding environment and watercourse system. The aquatic environment in this section of watercourse will benefit from this structure as the lack of a formal crossing through the river is currently obstructing flow upstream within the watercourse. Once the box culvert is operational the watercourse will flow more naturally and be restored to a more natural state than at present.

4.2 Motivation for Preferred Site, Activity and Technology Alternative

4.2.1 Preferred Site Alternative

Two site alternatives were considered.

Site Alternative 1 (Preferred Alternative)

Site alternative 1 (the preferred alternative) is to construct the new box culvert on a new road alignment, 20m downstream of the existing watercourse crossing. This alternative would require the clearing and re-routing the access road through a different part of the watercourse. The re-routing of the road alignment will provide a safer approach angle across the culvert. The current road alignment has a very sharp bend which does not adhere to DOT's standard road design parameters.

Access alternative 2 is to construct the new box culvert on the existing road alignment in the current water course crossing location. This alternative does not involve any road re-alignment. Less vegetation would be cleared within the riparian area for this alternative. A culvert located on a sharp hair bend corner however does not constitute 'acceptable' approach angles according to DOT's standard road parameters.

Design Alternatives**Design Alternative 1** (Preferred Alternative)

The preferred technology alternative is to construct a 1.8m x 1.8m in-situ concrete box culvert across the watercourse. The structure will be supported by concrete backfill and wing walls on either side of the structure. Please refer to Appendix A for design drawings. This alternative would entail greater disturbance to the watercourse bed than that of a pipe culvert. A box culvert however typically requires less on-going maintenance than that of a pipe culvert. A box culvert would take longer to construct, be a lot more expensive to construct and entail a larger environmental impact than that of a pipe culvert structure.

Design Alternative 2

Alternative 2 would be to construct the L2068 Culvert as a 3 x 900mm concrete pipe structure. This would have a smaller footprint to that of a box culvert however given the steep angle of the terrain/ crossing a pipe culvert would be prone to becoming blocked and damaged. More long term maintenance would be required on a pipe culvert than that of a box culvert.

Ultimately the decision on selecting the Preferred Alternative is a measure of the risk. There will be a much higher risk of high flow damage and trapped debris associated with that of a pipe causeway when compared to a box culvert as they have much higher drainage potentials. In addition, due to the high safety and flood risk associated with box causeways, culvert structures will require less maintenance.

Section 5: Public Participation**5.1 Notification of Interested and Affected Parties**

- 1) *fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of-*
 - i. *the site where the activity to which the application or proposed application relates is or is to be undertaken; and*
 - ii. *any alternative site;*

A noticeboard (isiZulu and English) was placed adjacent to the proposed culvert site on the 20 February 2020. The noticeboard detailed the KwaZulu-Natal Department of Transport's plan to construct the culvert, subject to a basic assessment. See Appendix C – Proof of Placement of Notice Board.

- 2) *giving written notice, in any of the manners provided for in section 47D of the Act, to-*
 - i. *the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;*
 - ii. *the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;*
 - iii. *the municipality which has jurisdiction in the area;*
 - iv. *any organ of state having jurisdiction in respect of any aspect of the activity, and;*
 - v. *any other party as required by the competent authority;*

The following steps were followed during the public participation process.

- The ward councilor was notified and a meeting was held on the 20 February 2020 (Appendix D).
- A noticeboard detailing the proposed development was erected adjacent to the site on the 20 February 2020.
- The land owner and any other registered I&AP will be given opportunity to review and comment on complete copies of the Basic Assessment report.
- With regards to authority communications, all relevant authorities have been notified of the application and have been provided with copies of this BAR.

See Appendix D – Proof of Notification.

- i. *owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;*

Email notifications to all I&APs were sent out on the 10th September 2020. See Appendix D – Proof of Notification.

- 3) *placing an advertisement in-*
 - i. *one local newspaper; or*
 - ii. *any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*
- 4) *placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii);*

An English and IsiZulu advert was placed in the Ilanga newspaper on the 21 June 2020 detailing the proposed project, Basic Assessment and Water Use Licencing requirements and provided contact details of EnviroPro should anyone wish to register as an I&AP. See Appendix E – Proof of Advert Placement.

5.2 Registered Interested and Affected Parties

42. *A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of-*
- (a) *all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;*
 - (b) *all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and*
 - (c) *all organs of state which have jurisdiction in respect of the activity to which the application relates.*

The contact details of all I&APs that have registered have been provided in the Registered I&AP list in Appendix F.

5.3 Comments

Comments of interested and affected parties to be recorded in reports and plans 44.

- 1) *The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.*
- 2) *Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to-*
 - i. *a lack of skills to read or write;*
 - ii. *disability; or*
 - iii. *any other disadvantage;*
 - iv. *reasonable alternative methods of recording comments must be provided for.*

All comments received from I&APs have been recorded in the comments and response table. The original comments provided have been provided together with the C&R table. This report has been provided to the KwaZulu-Natal Department of Transport for comment. See Appendix G – Comments and Response table and Comments Received.

Section 6: Impact Assessment

6.1 Methodology to Determine and Rank Significance and Consequences of Impacts Associated With All Alternative as Per Section 3(h) (vi)

Impacts are assessed qualitatively and quantitatively, looking at the duration / frequency of the activity and likely impacts associated with that activity during both construction and operation. If the activity happens frequently, the risk of the associated impact occurring is much higher than if the activity happens less frequently. The geographical extent of the impact is assessed i.e. will the impact be restricted to the point of occurrence or will it have a local or regional effect. Impacts are also reviewed looking at severity levels and consequences should the impact occur i.e. will the severity be low, medium or high and then probability of the impact occurring is taken into account.

Whether or not the impact can be mitigated and the extent to which it can be avoided, managed, mitigated, or reversed is assessed i.e. the probability of occurrence after mitigation has been applied. This also takes into account likelihood of human error based on construction and operational auditing experience i.e. even though spills can be completely mitigated against and prevented, there is always a small chance that spills will still

occur (residual risk). Based on all of these factors, the impact is then rated to determine its significance. For example an impact can have a regional affect with severe environmental implications, however the probability of it occurring is very low, and the implementation of the proposed mitigation measures means that the ultimate rating is medium or low.

Please see below a description of the scoring. The full impact scoring tables detailing how the significance rating was calculated can be found in Appendix H.

Scoring of Impacts	
Duration / Frequency of activity likely to cause impact	0 = No impact 1 = short term / once off 2 = medium term / during operation 3 = long term / permanent
Geographical Extent	0 = No impact 1 = point of impact / restricted to site 2 = local / surrounding area 3 = regional
Severity (level of damage caused) if impact were to occur	0 = No impact 1 = minor 3 = medium 5 = major
Probability of impact without mitigation	1 - 5 = low. 6 -10 = medium. 11 -14 = high.
Significance before application of Mitigation Measures	A score of between 1 and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.
Will activity cause irreplaceable loss of resources?	10 = Yes 0 = No
Mitigation measures	0 = No impact - 5 = can be fully mitigated - 3 = can be partially mitigated -1 = unable to be mitigated
Probability of impact after mitigation	0 = No impact 1 = Low 2 = Medium 3 = High
Significance after application of Mitigation Measures	A score of between 1 and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.

6.2 Preferred Site and Technology Alternative

L2068 Culvert (Site specific)

See Appendix H for the full impacts scoring matrix, which assesses the impacts on the above system. The below impacts relate to the site specific preferred site and technology alternatives.

No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Direct Impacts in the Construction Phase					
1.	<p>Clearing and earthworks for construction of layer works in the watercourses along the road. Leading to erosion and loss of soil from the riparian area and sedimentation of the watercourse.</p>	<p>Direct Impact: Erosion and loss of soil from the riparian area leading to sedimentation of the watercourse.</p> <p>Cumulative Impacts: Erosion and loss of material leading to deposition of material downstream of the riparian area affecting the greater riparian area systems.</p>	8 (Medium)	<p>The following measures must be carried out to mitigate against erosion and siltation within the riparian area and watercourses on the L2068 upgrade site:</p> <ul style="list-style-type: none"> • The areas not within the direct project footprint must be demarcated as 'no-go' areas. The recommended buffer of 21m must be established prior to construction. • Earth berms or sand bag barriers must be used as storm water and soil barriers below the cut and toe slopes to prevent eroded material from entering the surrounding riparian area areas. • When erosion and siltation is observed within the watercourse and riparian area areas, effort must be made to prevent further erosion in that area. Sand bags and pack rock may be used within these areas to limit the duration period that areas are exposed. • All areas upstream and downstream of the construction footprint must be demarcated as a 'no-go' zone for the duration of the construction process. No site staff are permitted to enter these areas. The recommended buffer of 21m must be implemented. • No excavated material or fill material may be stored within 32m of the water course. Sandbags or pack rock must be placed below the soil stockpiles as berms should erosion start to occur from these areas. • Bedding material that will be used must not be stored within 32m of the watercourse before it is used. The recommended buffer of 21m must be implemented. • An approved storm water plan (by the ECO) must be adhered to during construction. 	4 (Low)

2.	<p>Clearing and earthworks for construction of layer works in the riparian area and watercourses along the road.</p>	<p>Direct Impact: The construction and excavation activity within the riparian area areas within the road footprint will result in the loss of riparian area.</p> <p>Cumulative Impact: Potential for reduced riparian area functionality for the wider riparian area systems.</p>	9 (Medium)	<p>Up to 189m² of riparian area will be lost for the expansion of the crossing structures along the road. This impact is unavoidable. This however should not result in long term riparian area degradation as the riparian area system will function with better flow rates once the culverts have been upgraded.</p> <ul style="list-style-type: none"> • Construction work within the riparian area areas must be strictly limited to the construction footprint only. • No areas may be excavated outside of the project footprint. • No stockpiling of soil or material may take place within 32m of the riparian area areas. • The areas outside of the riparian area must be demarcated as no go areas with snow netting. • The riparian area areas must be rehabilitated as soon as the box culvert structures have been completed. 	6 (Medium)
3.	<p>Construction activity in areas with no vegetated cover.</p>	<p>Direct Impact: Erosion on exposed banks and areas resulting in scouring, blocked storm water systems and the siltation of watercourses.</p>	7 (Medium)	<p>This impact is partially unavoidable as the construction activity will need to take place over cleared exposed areas. The following mitigation measures must however be applied:</p> <ul style="list-style-type: none"> • Exposed banks that are susceptible to erosion within 35m of the edge of any riparian area or watercourses must not be left exposed for more than 2 months at any time. • Erosion/ storm water protection measures must be implemented above and below the slope in the form of sand bag berms, pack rock berms or even vegetation berms to slow runoff down the slope. • Any accumulated siltation that enters a riparian area must be removed by spade and shovel (by hand). • Exposed cut and fill slopes near the riparian area areas must be top soiled, hydro seeded or have grass sods planted within 4 weeks of being cut. 	3 (Low)
4.	<p>Careless operation by the contractor within the riparian area during the construction of the road.</p>	<p>Direct Impact: This would result in direct and accumulative damage to the wider riparian area areas outside of the construction area.</p>	9 (Medium)	<p>The following measures must be carried out to mitigate against potential damage to the riparian area during construction of the road:</p> <ul style="list-style-type: none"> • There will be work within the riparian area as per the layout, however areas of the riparian area not within the construction footprint must be demarcated as no-go areas; 	5 (Low)

				<ul style="list-style-type: none">• Heavy vehicles must avoid working near the riparian area as far as possible. Where heavy vehicles are required to work in the riparian area during the construction of the road, these vehicles must remain in the authorised road footprint. There must be no haphazard entry into / exit from the riparian area along the route. i.e. construction plant and vehicles may only travel along the construction areas as per Figure 3 and may only use a single point of entry into and out of the riparian area.• The contractor must limit in-stream work to minimize streambank and bed disturbance.• Construct the pipe crossings in the dry season where possible when water levels will be lowest and the risk of erosion and downstream siltation is lowest.• Any disturbed area within the construction footprint must be rehabilitated within a month of occurrence to the satisfaction of the ECO and or EDTEA Compliance Authorities.• All activity within the riparian area and watercourses must be strictly according to the prescribed engineering designs and approved drawings.• All pipes must be constructed according to approved engineer gradients to allow for the free flow of water from one side of the road to the other.• Reno-mattresses or large aggregate must be used for pipe outlet energy dissipation in the channel downstream of the box culverts to reduce the likelihood of scouring the river/riparian area bed and prevent downstream sedimentation of the catchment. It is preferable that larger aggregate be used to avoid flows removing aggregate material from the site.• Erosion prevention and temporary sediment control measures must be implemented in areas prone to channelled flow and erosion. Temporary and permanent erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching.• No soil stockpiling may take place within 32m of any riparian area or watercourse.	
--	--	--	--	---	--

5.	Draining excavated areas during construction.	<p>Direct Impact: Draining the excavated areas can cause major siltation of downstream riparian area and watercourses.</p> <p>Direct Impact: Hydrocarbon spills can occur through careless management of fuel operated machinery such as pumps and generators.</p>	11 (High)	<p>The draining of the excavated areas during construction is essential in order for construction activity to take place for the foundations of structures within watercourses (such as pouring concrete). The following mitigation measures must be carried out:</p> <ul style="list-style-type: none"> • Where possible, all excavated areas must be drained into a temporary settling pond before releasing the water into the downstream riparian area area, • Where this is not possible or practical, the pumped water must be released onto reno-matresses or pack rock to prevent the scouring and resultant downstream erosion from the pumped pipe outflow, • Drip trays must be used under all fuel operated machinery at all times. 	9 (Medium)
6.	Construction of a wider road in the riparian areas along the road resulting in clearing of up to 189m² of vegetation within riparian areas.	<p>Direct Impact: Clearing of riparian area vegetation to accommodate the widening of the new road. There will be clearing of up to 189m² of vegetation within riparian area areas for the construction of the culvert.</p>	8 (Medium)	<p>This impact cannot be fully mitigated/avoided as the road construction will result in the loss of up to 189m² of indigenous vegetation within the riparian area areas along the road. However, unnecessary clearance of vegetation outside of the construction footprint can be avoided:</p> <ul style="list-style-type: none"> • This impact cannot be fully mitigated as it will result in the loss of up to 189m² of indigenous vegetation. • The vegetation that will be cleared must be restricted to the construction footprint of the access road. No vegetation must be cleared within the riparian area other than that required for the construction of the access road. • The existing road must be used to traverse the riparian area during construction to ensure there is no unnecessary driving of vehicles across the riparian area. • Contractors must not damage any vegetation that is not within the construction footprint by ensuring that the construction area and 21m riparian area buffer is clearly demarcated. During the environmental induction training, staff must be made aware of the restrictions associated with the riparian area. <p>The ECO must be consulted should any vegetation require clearing outside of the designated construction footprint area.</p>	4 (Low)

7.	Clearing vegetation for the widening of the L2068 Road.	Direct Impact: This will result in the loss of indigenous vegetation within the ecosystem type.	6 (Medium)	<p>The following measures must be carried out to mitigate against excessive vegetation clearing on the L2068 site:</p> <ul style="list-style-type: none"> • This impact cannot be fully mitigated as it will result in the loss of up to 672m² of indigenous vegetation over the 168m length of road for the widening of the road. • The vegetation that will be cleared must be restricted to the construction footprint of the road. No vegetation may be cleared other than that is required for access to the site or for the construction activities associated with the construction of the L2068 upgrade. The recommended buffer of 21m from each riparian area must be implemented. • Contractors must avoid damaging any vegetation that is not within the construction footprint; • The ECO must be consulted should a tree or any vegetation require clearing outside of the designated construction footprint area. 	2 (Low)
8.	Clearance of vegetation (general)	Direct Impact: Encroachment of alien vegetation into cleared areas i.e. Castor Oil . Proliferation of weeds was identified as an impact in the specialist assessments.	6 (Medium)	<p>There is currently a significant amount of alien vegetation located on the site and within the surrounding area.</p> <ul style="list-style-type: none"> • Alien vegetation must not be allowed to encroach onto the site and must be continually (monthly) removed during construction. <p>Construction must not promote further alien plant disturbances in the surrounding area.</p>	3 (Low)
9.	Sourcing of layer work material	Direct Impact: Sourcing material from unlicensed borrow pits in an illegal and unplanned manner can be dangerous to the surrounding community and detrimental to the local environment.	12 (High)	<p>Layer work material is often sourced from local borrow pits. The following criteria must be adhered to:</p> <ul style="list-style-type: none"> • Any local borrow pit used must be a permitted source through DMR. • The contractor excavating the material must do so within the parameters of the mining permit, adhering to the EMP conditions for that particular site. • The borrow pit must be shaped post excavation. 	10 (Medium)
10.	Constructing the road through areas of natural habitat/ previously uncleared areas.	Direct Impact: The habitat for fauna living within the construction footprint will be modified due to the excavation and construction activities taking place within the construction footprint of the additional lanes.	5 (Low)	<p>The following measures must be carried out to mitigate against excessive habitat destruction on the L2068 site:</p> <ul style="list-style-type: none"> • The areas outside of the project footprint must be managed as no go areas for the duration of construction. • Any animal found within the project construction area must be removed unharmed from the site. • Erosion prevention and sediment control measures must be implemented. Temporary and permanent 	3 (Low)

				<p>erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching;</p> <ul style="list-style-type: none"> • The project footprint must be kept as small as possible; • Heavy machinery must not be permitted to move beyond the demarcated footprint. The recommended buffer of 21m must be implemented. • Sand and aggregate for concrete must not be obtained from within the riverbed or riparian zone but must be sourced from a permitted source; • Contamination of the river system with unset cement must be prevented as it is detrimental to aquatic biota. 	
11.	Clearing and excavation to widen the road.	Direct Impact: Impact on existing services i.e. powerlines, water pipes etc.	9 (Medium)	All existing services must be identified and be relocated prior to construction.	5 (Low)
Indirect Impacts					
No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
1.	The Upgrading Construction period of the L2068 Culvert.	Positive impacts for the community include potential for local employment.	0 (Positive)	This is a positive impact.	0 (Positive)
Operation					
Direct Impacts					
No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
1.	Placement of the new box culverts.	Direct Impact: Incorrect placement of the pipes within the riparian area and watercourse has the potential to alter the flow dynamics within the watercourse systems due to poor placement of the culvert.	8 (Medium)	<p>The following measures must be carried out to avoid potential alteration of flow dynamics within the watercourse:</p> <ul style="list-style-type: none"> • The contractor must build the culvert as per the approved designs, as it has been designed to ensure that the natural flow of the system is not interrupted. • Conduct bi-annular inspections on the culvert to ensure no blockages have occurred. • During maintenance the working area must be cordoned off to prevent unnecessary intrusion into the riparian area and spill contingency measures applied. 	4 (Low)
2.	Having an upgraded L2068 Road.	Direct Impact: Improved regional access along a major transportation route within the uMvoti Municipality.	0 (Positive)	This is a positive impact.	0 (Positive)

Cumulative					
1.	Having a formalised gravel road surface along the L2068.	Cumulative Impact: The gravel road upgrade will be a positive operational impact. The broader community will benefit to easier access to schools, tribal councils and clinics along this stretch of road.	0 (Positive)	This is a positive impact.	0 (Positive)

L2068 Culvert (Standard Construction Impacts)

See Appendix H for the full impacts scoring matrix, which assesses the impacts on the above system. The below impacts relate to the preferred site and technology alternatives – Generic Impacts.

No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction					
Direct Impacts					
No generic direct impacts					
Indirect Impacts					
1.	Increase daily presence of heavy vehicle and plant traffic along the L2068.	Direct Impact: The increased risk to pedestrians and traffic.	6 (Medium)	The construction activity will pose an increased risk to pedestrians and traffic. <ul style="list-style-type: none"> • Appropriate construction safety signage must be erected to notify of construction activities and potential hazards on site; • Appropriate barriers must be used to cordon off construction excavations, hazardous areas, and areas undergoing construction. • Flagmen must be in attendance to direct traffic where required. 	1 (Low)
2.	Cleared exposed surfaces from the construction activity.	Direct Impact: On site erosion due to improper management of storm water by the contractor during construction.	5 (Low)	Areas exposed to erosion must be protected. The following apply to erosion control on site: <ul style="list-style-type: none"> • Sand bags, berms, stone pitching must be used to control erosion from forming during construction. • No excavated material or fill material may be stored within the watercourses or within 24m of the watercourses. • Bedding material that will be re-worked may not be stored within 21m of the watercourses before it is used. • Temporary stormwater measures should be implemented to ensure that material does not 	1 (Low)

No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
				wash off the surface into any watercourse during construction.	
3.	An increase in heavy vehicles and plant.	Direct Impact: Dusty conditions generated during the construction of the L2068 upgrade.	5 (Low)	There will be increased dust generated during the construction phase; however, this will be on a temporary basis i.e. the site will be worked continuously for a few months until construction is completed. Further to this: <ul style="list-style-type: none"> • Vehicle speed limits within the construction areas must be reduced to 40km/hr to reduce the amount of dust raised along the gravel roads to and from the site. • The material being transported to the site in the back of the trucks must be covered. • Water carts must be used on site should dust levels elevate to a nuisance level. • Shade cloth is must be utilised for stockpiled materials where required. • The applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site. 	1 (Low)
4.	Increase in heavy truck traffic along the L2068 as construction vehicles travel to the site for construction activities.	Direct Impact: Impacting existing traffic conditions and pedestrians.	7 (Medium)	This cannot be avoided as traffic will increase during the construction phase temporarily (for a few months) until construction is completed. <ul style="list-style-type: none"> • All drivers associated with the construction must operate within the speed limits and due caution must be exercised especially when pedestrians are on the road. • All drivers must be appropriately licenced and trained. 	5 (Low)
5.	An increase in heavy vehicles and plant.	Direct Impact: Emissions from construction vehicles associated with the L2068 upgrade.	7 (Medium)	The construction phase of the project will see the increase in vehicles moving through the area which will result in the increase of emissions into the atmosphere. <ul style="list-style-type: none"> • All construction vehicles operating on the site must be fitted with the appropriate silencers and exhausts in order to reduce the emissions and noise into the atmosphere. 	5 (Low)
6.	Construction Staff producing daily waste on site.	Direct Impact: Temporary increase in waste and litter due to the construction process associated with the upgrade of the L2068.	7 (Medium)	The construction phase of the project will see an increase in construction staff on site and therefore an increase in waste on site. <ul style="list-style-type: none"> • Littering will not be permitted on site; 	2 (Low)

No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
				<ul style="list-style-type: none"> Designated waste storage areas with appropriate waste receptacles must be set up within the construction site camp; Waste must be removed from site and disposed of at a registered waste disposal site; Safe disposal slips for the disposal of all waste must be obtained and kept on site as proof of safe disposal. 	
7.	Insufficient number of toilet facilities on site	Direct Impact: Construction staff having to use the surrounding environment as ablutions.	9 (Medium)	<p>The increase in construction personnel during the construction phase will require an appropriate number of toilet facilities for the site.</p> <ul style="list-style-type: none"> Appropriate and sufficient toilet facilities (1 toilet per 15 employees) must be provided by the contractor; All toilet facilities must be checked on a daily basis; All toilet facilities must be emptied and cleaned on a weekly basis. 	4 (Low)
8.	Inappropriate disposal of toilet waste.	Direct Impact: Resulting in the contamination of the environment.	6 (Medium)	<p>The following mitigation measures must be adhered to:</p> <ul style="list-style-type: none"> All toilet facilities on site utilised by the construction personnel must be checked on a daily basis and emptied on a weekly basis by the contractor. A registered waste removal contractor must remove sewage waste from site or sewage waste must be disposed of at a permitted Waste Water Treatment Site; Safe disposal slips for the disposal of effluent waste must be obtained and kept on site as proof of safe disposal. 	1 (Low)
9.	Generation of noise associated with the construction plant and activity.	Direct Impact: Excessive noise pollution on site.	6 (Medium)	<p>The construction phase of the project will see the increase in vehicles moving through the area which will result in the increase of noise.</p> <ul style="list-style-type: none"> All construction vehicles operating on site must be fitted with standard silencers to reduce the noise levels produced. 	1 (Low)
10.	Construction work taking place outside of the construction footprint.	Direct Impact: Damage to adjacent properties during construction.	7 (Medium)	<p>The following mitigation measures must be adhered to:</p> <ul style="list-style-type: none"> All services must be identified prior to construction through notifying surrounding stakeholders prior to any potential traffic congestion; 	3 (Low)

No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
				<ul style="list-style-type: none"> The contractor must create alternative access routes to the properties where required; The contractor must be aware of the stakeholders' movements and where possible, disruptive activities must be scheduled outside of peak traffic hours; Surrounding land owners and stakeholders must be notified prior to disruptive activities during construction; Any infrastructure that gets removed must be replaced and any damage caused from construction must be repaired. 	
Operation					
Direct Impacts					
No generic direct impacts					
Indirect Impacts					
No generic indirect impacts					
Cumulative Impacts					
No generic cumulative impacts					

6.3 Site and Technology Alternative 2

Site Alternative 2 – Constructing a pipe culvert

See Appendix H for the full impacts scoring matrix, which assesses the impacts on the above system. The impacts relating to the Alternative 1 and Alternative 2 are very similar, therefore the impacts below include the impacts which differentiate the most between the two alternatives.

No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction Phase Impacts					
Direct Impacts					
1	Clearing and earthworks for construction of layer works in the watercourses along the road. Leading to erosion and loss of soil from the riparian area	<p>Direct Impact: Clearing of the indigenous vegetation within the project footprint. There will be clearing of up to 969m² of vegetation for the construction of the pipe culvert and road upgrade.</p> <p>The amount of vegetation requiring clearing for a new pipe culvert on the existing alignment would be less than that required for the preferred alternative (189m²).</p>	6 (Medium)	<p>This impact cannot be fully mitigated as it will result in the loss of up to 969m² of predominantly indigenous vegetation along the road edges and riparian area within the project footprint (same as alternative 1).</p> <p>The following measures must be carried out to mitigate against excessive vegetation clearing on the Culvert site:</p>	4 (Low)

No.	Aspect	Nature and Consequences of impact	Sig. rating of impacts:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
				<ul style="list-style-type: none"> • The construction corridor must be clearly demarcated pre-construction and all construction activity and clearing must take place within the authorised construction area. • The vegetation that will be cleared must be restricted to the construction footprint of the culvert, the access road only. No vegetation may be cleared within the riparian area other than that required for access to the site or for the construction activities associated with the construction of the Culvert. • Contractors must avoid damaging any vegetation that is not within the construction footprint; • The ECO must be consulted should a tree or any vegetation require clearing outside of the designated construction footprint area. 	
2	<p>Careless operation by the contractor within the riparian area during the construction of the road.</p>	<p>Direct Impact: This would result in direct and accumulative damage to the wider riparian area areas outside of the construction area.</p> <p>Damage to the Riparian area during construction.</p> <p>The area that would be damaged and disturbed within the riparian area would be smaller (351m²) than that of the preferred alternative (472m²) on the same road alignment.</p>	8 (Medium)	<p>The new culvert will be constructed undisturbed riparian area. An area on 351m² would be cleared in the riparian area. The following precautions must be implemented:</p> <ul style="list-style-type: none"> • Topsoil from within the riparian area must be stockpiled separately from subsoil from all excavations. • No trenches may be left open for an extended period of time. • No heavy vehicle access may be permitted outside of the construction corridor what so ever. <p>The site camp must be placed more than 32m away from any riparian area boundary.</p>	7 (Medium)

L2068 Culvert (Standard Construction Impacts) for technology alternative 2 (culvert structure)

The generic impacts for the L2068 Culvert will be the same for both alternatives.

6.4 Environmental Impact Statement as per section (l)

The key impacts associated with the construction of the L2068 Culvert over the watercourse and riparian area relate to those during the construction period. Impacts such as damaging the watercourse, the associated riparian area, the management of erosion, and clearing of vegetation need to be addressed. These can be best managed by minimising the clearing of vegetation to the construction corridor/footprint, treating the watercourse as a sensitive no-go area and by implementing effective stormwater management measures. A number of positive impacts may result from the construction of the culvert. Improve public safety and improved health and functionality of the aquatic environment may result from this culvert being erected over the watercourse. All construction activity must be confined to the proposed construction footprint area. Should a large tree or section of indigenous vegetation require clearing, the ECO must be consulted before clearing takes place. Once construction is complete there should be no significant impacts related to the operation of the culvert.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the construction of L2068 Culvert be authorised.

6.5 Impact Management Objectives and Outcomes for the Development for Inclusion in the EMPr as Per Section 3(m)

The following objectives and outcomes must be considered for this project:

- Objectives:
 - For there to be no lasting negative impacts on the environment once construction is complete, specifically within the watercourse.
 - To practice responsible construction, 'best practice' with regards to housekeeping on site during construction (outlined within the EMPr) and enforce the polluter pays principle. The applicant / contractor must be responsible for their actions on site during construction and the rehabilitation of the site post construction.
- Outcomes:
 - To promote sustainable development. Create infrastructure and an environment that is healthy and sustainable for future generations to come.

6.6 Assumptions, Uncertainties and Gaps in Knowledge Relating To the Assessment and Mitigation Measures Proposed As Per Section 3(o)

Given the temporary nature and small-scale construction planned along the L2068 Road (within the watercourse), further specialist input in this regard was not deemed necessary for this assessment.

6.7 Period for Which Authorization Is Required, Proposed Monitoring and Auditing and Post Construction Requirement's

Environmental authorisation is required for the construction of the L2068 Culvert either within the 2021 to 2024 business plan for KZN DOT, therefore the authorization would need to be valid for a period of five years, within which time construction would need to commence.

Given the nature of this project, it is recommended that **monthly** ECO audits be carried out for the duration of the construction phase of this project. One post construction audit should be conducted once construction is complete.

The EMPr details the post construction, rehabilitation, and closure objectives which will be monitored by the ECO and compliance authorities.

6.8 Financial Provisions as Per Section 3(s)

The contractor is responsible for and must ensure that the site has been rehabilitated in full before leaving the site. No upfront financial provision is required for this project.

6.9 EAP Opinion on Whether Or Not to Authorize Activity and Recommendations and Conditions for Authorisation as Per Section 3(n) and (p)

With respect to the site and technology alternatives, it is recommended that preferred alternatives 1 be authorised. The significance of the impacts associated with the construction of the culverts is considered 'low'.

6.10 Summary of Recommendations for the construction of the L2068 Culvert:

Stakeholders, Properties & Services

- As standard construction practices the engineer and contractor should identify all existing services that may be affected prior to construction.
- The contractor should liaise with local community members regarding restriction of access during construction.

Traffic & Construction Pedestrians

- The contractor must take into consideration the potential movements of surrounding stakeholders.
- Appropriate signage and barriers must be used to cordon off construction areas.
- All construction vehicles should be fitted with the appropriate silencers and exhausts.
- Speed limits must be obeyed.

Housekeeping, waste management, storage, and materials handling

- Littering must not be permitted on site.
- All hazardous materials and substances should be stored within a secured area in the construction camp. The storage area should be a hard surfaced, bunded, and covered area.
- Cement mixing must be done on a hard surface that is protected from storm water runoff.
- Contractors should be required to dispose of construction rubble at an appropriate landfill site. Delivery notes and safe disposal certificates to prove appropriate disposal should be available.
- Appropriate and sufficient toilet facilities must be provided by the contractor.
- Toilet facilities must be provided by a registered company and all sewage must be disposed of at an appropriate facility. Safe disposal certificates must be kept on record.
- Toilet facilities must not be located within 32m of any watercourse.

Dust and erosion control

- A water cart should be used to dampen dusty surfaces and suppress dust when dusty conditions occur.
- Exposed areas should be rehabilitated and re-vegetated as soon as possible during construction.
- Areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. The contractor must ensure that any blockages created during construction are resolved.

Stormwater management and protection of the watercourse and riparian area areas

- The engineer/contractor must ensure that only clean storm water runoff enters the environment. Any contaminated run off must be collected and disposed of.
- All watercourse and riparian area must be identified and demarcated at the start of construction.
- No excavated material or fill material may be stored within the drainage line or within 32m of any watercourse.
- Only the area directly in the path of construction may be cleared and excavated. The remainder of the watercourse must be demarcated as a 'no-go' area.
- Stormwater may not be channelled directly into any water body without the flow velocity being slowed. Channelled flows must be diffused.

Protection of Heritage Resources

- Attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

Specific conditions

- The construction footprint of the culvert and the temporary crossing must be demarcated;
- Ensure that the construction activities do not interrupt flow even during low flow periods;
- Vehicles must only use the designated crossing points;
- Heavy vehicles must remain at least 32m away from the Mkobeni Watercourse unless required for construction purposes;
- No storage may occur within 32m of the L2068 Watercourse; and
- Stormwater outlets must be fitted with erosion protection features to diffuse flow.

Appendix A: Drawings and Maps

Appendix B: DEFF Screening Report and Specialist Reports

No.	Specialist Report
1	DEFF Screening report
2	The Biodiversity Company Water Resources Assessment

Appendix C: Noticeboard

Appendix D: Notification

- Notification register
- Proof of notification to adjacent landowners / tenants
- Meetings Minutes and Registers
- Notification to I &APS and Authorities
- Notification and proof of delivery of Draft Report

Notification Register

Proof of notification to adjacent landowners / tenants - NA

Meetings Minutes and Registers

Notification to I &APS and Authorities

Notification and proof of delivery of Draft Report

Appendix E: Adverts

Appendix F: Registered I &Aps

Appendix G: Comments and Responses

Appendix H: Impacts Scoring Matrix

Appendix I: EAP Declaration

Appendix J: Environmental Management Programme