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JULY 2020
FINAL BASIC ASSESSMENT REPORT
CONSTRUCTION OF THE D59 BRIDGE
KZN DEPARTMENT OF TRANSPORT
EIA REF NO: DC22/0005/2020

EVP1243



KZN DOT

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

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Executive Summary

The KwaZulu-Natal Department of Transport (DOT) propose to construct a new bridge within Ward 6 of the Richmond Local Municipality, uMgungundlovu District Municipality. The D59 Bridge will be located in the Richmond area at the following point location, 29°58'8.84"S, 30°15'12.36"E. The bridge will be constructed across the Mkobeni River and the associated wetland. This is a popular road crossing for the community in this area. There is a crossing structure in place comprised of a single concrete pipe and a concrete slab placed within the river that vehicles use to drive across. The river overtops this structure when river levels rise which becomes dangerous for vehicles and pedestrians to cross. The proposed bridge will be located adjacent to the existing bridge and 360m of the D59 Road re-aligned for road safety reasons. The bridge will consist of a three (3) span concrete deck bridge with two (2) pillars and two abutments on either side of the river. Two pillars will be placed outside of the river channel and banks and will be anchored into the bedrock. 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 river and associated wetlands from the construction activities:** Caution must be exercised when working near and within the Mkobeni River and the associated wetland. The 'no-go' wetland area outside of the construction corridor must be clearly demarcated for the duration of construction. Construction materials must be stockpiled more than 32m from the wetland boundary. Heavy vehicles must be kept at least 32m away from the river except where needed for the construction process. The footprint of the bridge 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 river makes crossing on foot and by vehicle dangerous when the river levels are raised as the Mkobeni River is associated with regular flooding. The proposed bridge will ultimately allow pedestrians and vehicles to cross the Mkobeni River safely and efficiently.

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

Two site alternatives were considered. Site alternative 1 (the preferred alternative) was to construct the new bridge adjacent to the existing bridge and realign the first 360m of the D59 Road. Site alternative 2 was to construct the new bridge on the existing road alignment of the D59 Road. The current alignment of the D59 Road joins the R56 Main road on a corner, which is not a safe practice for road design. To comply with DoT road standards a new alignment (alternative 1) is required, thus the proposed new alignment and adjacent bridge structure.

The preferred technology alternative is to construct the three (3) span concrete deck bridge with two (2) pillars and two abutments, while the technology Alternative 2 is to construct a concrete box causeway in the river. The defining fact in deciding between Technology Alternative 1 and 2 relate to the suitability of the structure. A causeway structure would not be functional for such a large river.

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 D59 Bridge.

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Section 1: Scope of Work and Location of Activity

1.1 Project Title

Construction of the D59 Bridge.

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 bridge within Ward 6 of the Richmond Local Municipality, uMgungundlovu District Municipality. The D59 bridge will be located in the Richmond area at the following point location, 29°58'8.84"S, 30°15'12.36"E. The bridge will be constructed across the Mkobeni River and associated wetland. This is a popular crossing location for the community in this area. There is a crossing structure in place comprised of a single concrete pipe and a concrete slab placed within the river that vehicles use to drive across. The river overtops this structure when river levels rise which becomes dangerous for vehicles and pedestrians to cross. The proposed bridge will be located adjacent to the existing bridge and 360m of the D59 Road will be re-alignment. The bridge will consist of a three (3) span concrete deck bridge with two (2) pillars and two abutments on either side of the river. The two pillars will be placed outside of the river channel and banks and be anchored into the bedrock. This will therefore entail the infill and removal of more than 10m³ of material from a watercourse.

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

The proposed D59 Bridge will be a three (3) span concrete deck bridge with two (2) pillars and two abutments on either side of the river. The KwaZulu-Natal Department of Transport proposes to construct the D59 Bridge to the following specifications (Figure 1):

- The bridge will be 40m in length and 9.8m wide,
- The bridge will have 2 piers that will be placed outside of the stream channel,
- The deck will accommodate two 3.5m lanes with a 1m wide shoulder walkway on either side of the bridge,
- The deck will stand 5m above the river bed which will be above the 1:100 year floodline.
- The bridge will be spaced as per the following:
 - Abutment 1 - Pier 1 = 13.32m
 - Pier 1 - Pier 2 = 13.32m
 - Pier 2 – Abutment 2 = 13.32m

Large spans between the supporting piers have been incorporated into the design to try and avoid blocking the flow in the river and to accommodate flow in a 1:100 year flood event.

There will be no temporary structure required for crossing the river during construction. The existing crossing on the D59 Road will be used to cross the river during construction of the new bridge and road re-alignment. The bridge will be constructed in phases. Construction will remain on the southern side of the river for the first 2 thirds of construction before access to the northern bank is required. The piers will be constructed first, before the deck is placed on the piers. The existing crossing structure will be removed as soon as construction on the new bridge is completed.

The total construction corridor (construction footprint) for the bridge (including the current crossing structure that will be decommissioned) within the watercourse is as follows:

- Total area – **0.98ha (Figure 3)**

The total area of infrastructure (bridge and approach ramps) within the riparian area that will be constructed for the bridge is as follows:

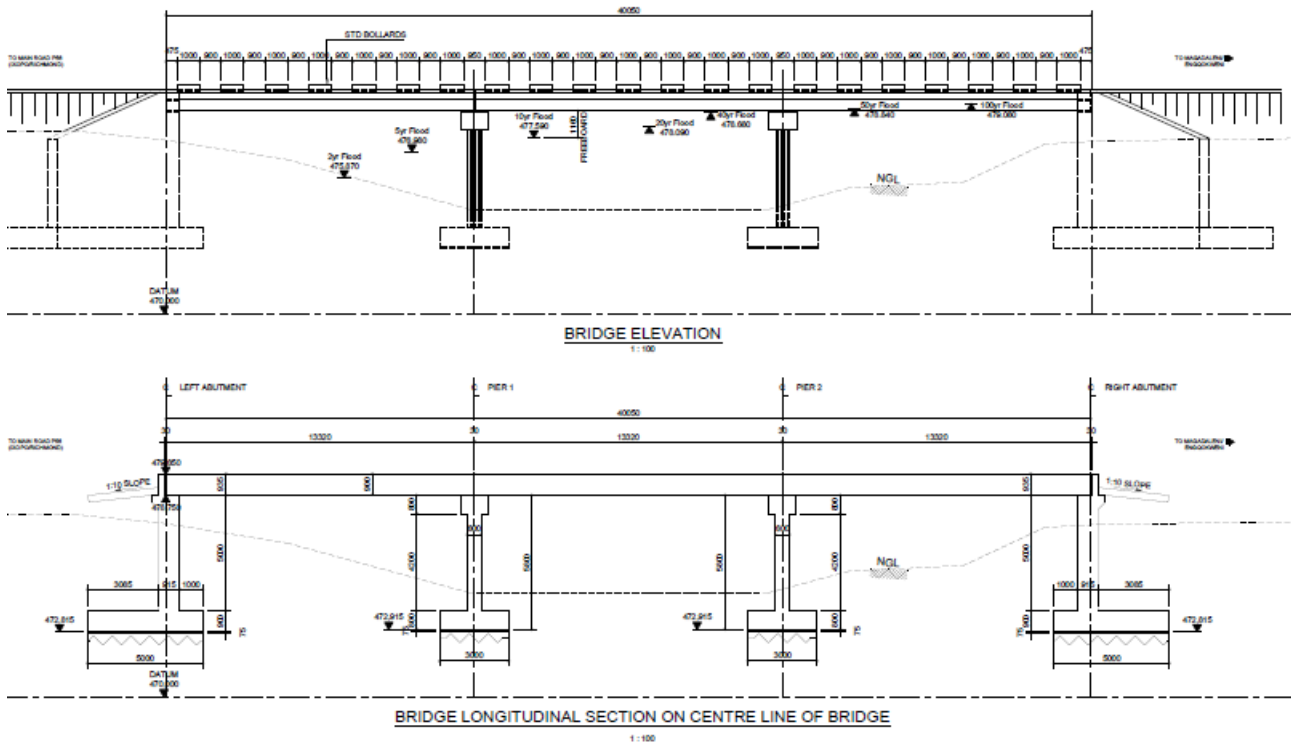
- Total area – **730m²**

The volumes of soil/sand that will be removed for the abutment and pier construction within the river and wetland itself is estimated to be as follows:

- Total volume – **85.22m³** (Bridge Piers 7.3m x 0.8m x 3m x 2 and Abutments 5m x 0.9m x 7.3m x 2)

The figures below illustrate the proposed design of the D59 Bridge (provided in Appendix A).

Figure 1: The D59 Bridge Longitudinal Cross Section



The construction of the D59 Bridge will have a positive impact on local access and the community living in this area. The current informal structure crossing the Mkobeni River does not provide safe access across the river. Access across the river is not possible when water levels are high. The proposed bridge will ultimately allow vehicles and pedestrians to cross the Mkobeni River safely and efficiently, improving local access and road safety in this area. The new road alignment will provide a safer intersection between the R56 and D59 Roads than what exists with the current road alignment.

1.2.1 Construction Methodology

In terms of water levels, construction of the bridge should commence in the dry season as the water levels in the Mkobeni River will be lowest. If required for construction purposes the water within the Mkobeni River will be redirected around the active work zone (one pillar at a time), however the flow of the river will remain in the channel. Sand bags acting as impeding structures will be manually placed within the river to redirect the flow around the working area. 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.

The construction methodology for the D59 Bridge can be summarised as follows.

- Necessary clearing and grubbing of the site for construction access will be undertaken on the southern bank first. This will include the clearing and cleaning of vegetation only within the demarcated construction corridor/ site footprint. Clearing and grubbing will take place on the northern bank only when construction activity is required on the northern side of the river. See figure 3.
- 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 pier and abutments. Bedding material will then be compacted into this excavation, rebar and formwork will be placed on this bedding material in preparation for the concrete base slab to be cast.
- Ready-mixed concrete will be brought to site and used to cast the base slab.
- Formwork will then be used to form the shape of the abutments and the pier, ready-mixed concrete will be poured to form these abutments and the pier.
- Once the piers and abutments have been cast there will be no further major works within the watercourse.
- The contractor will then install staging for the deck and place the deck rebar.
- Ready-mixed concrete will be brought to site again and used to cast the bridge deck.

- Gabion wing walls will also be cast and selected material will then be used to backfill behind the wing walls as part of the approach ramp. This material will then also be used to form the shape of each approach.
- Once the bridge has been completed the disturbed area will be rehabilitated back to its original state and shape. This will include removing the concrete pipes and the ripping up of the compacted earth along the existing access road and contouring the watercourse banks if necessary.
- 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

Two site alternatives were considered.

Site Alternative 1 (Preferred Alternative)

Site alternative 1 (the preferred alternative) is to construct the new bridge adjacent to the existing bridge and realign the first 360m of the D59 Road (Figure 3). The current alignment of the D59 Road joins the R56 Main road on a corner, which is not a safe practice for road design and intersection function. To comply with DoT road standards a new alignment (alternative 1) is required, thus the proposed new alignment and adjacent bridge structure has been proposed.

Site alternative 2 is to construct the new bridge on the existing road alignment of the D59 Road with a temporary crossing and access road during construction. This alternative would have a smaller environmental impact to site alternative 1 however does not alleviate the intersection access concerns.

Technology Alternatives

Bridge Alternative 1 (Preferred Alternative)

The preferred technology alternative is to construct the D59 Bridge as a three span pier bridge with a concrete deck supported on two abutments on the northern and southern sides of the river. Please refer to Section 1.2 above for a detailed description of the bridge and Appendix A for design drawings.

Bridge Alternative 2

Alternative 2 would be to construct a 6 x 2m x 2m concrete box culvert across the river. 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 riparian area and river bed than that of a pier bridge. A causeway typically requires more on-going maintenance than that of a pier bridge.

The No Go Alternative

The proposed construction of D59 Bridge will not take place. The river 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 the Mkobeni River safely. The R56 Main Road and D56 Road intersection will remain a safety risk, joining on a corner of the R56 Road.

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)

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>The construction of the bridge will result in approximately 730m³ material being removed and deposited within the Mkobeni River system during construction.</p> <p>Approximately 85.22m³ of wetland will be excavated for the construction of the bridge.</p>

		<p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>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.</p>	See Figure 4 below.
Listing Notice 1; 4 th December 2017 as amended	31	<p>The decommissioning of existing facilities, structures or infrastructure for—</p> <p>(i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;</p> <p>(ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014;</p> <p>(iii)</p> <p>(iv) any phased activity or activities for development and related operation activity or expansion or related operation activities listed in this Notice or Listing Notice 3 of 2014; or</p> <p>(v) any activity regardless the time the activity was commenced with, where such activity:</p> <p>(a) is similarly listed to an activity in (i) or (ii) above; and</p> <p>(b) is still in operation or development is still in progress;</p> <p>excluding where—</p> <p>(aa) activity 22 of this notice applies; or</p> <p>(bb) the decommissioning is covered by part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies.</p>	The existing crossing structure over the river will be decommissioned after the construction of the D59 Bridge is complete. This will result in more than 10m ² of material being removed from a watercourse.
Listing Notice 3; 04 th December 2014 EIA Regulations, as amended.	14	<p>The development of:</p> <p>(ii) infrastructure / structures with a physical footprint of 10 square metres or more;</p> <p>where such development occurs –</p> <p>(c) if no development setback has been adopted, within 32metres of a watercourse, measured from the edge of a watercourse;</p> <p>(d) In KZN</p> <p>(viii) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p>	The site has been identified as “sensitive” in terms of the uMgungundlovu EMF. There will be approximately 0.21ha of infrastructure within 32m of the watercourse and wetland.

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

Municipality	Richmond Local Municipality																					
Wards	Ward 6																					
Area / Town / Village	Richmond																					
Co-ordinates:	Latitude									Longitude												
Bridge Start point:	29°58'9.45"S									30°15'12.69"E												
Bridge Mid-point:	29°58'8.87"S									30°15'12.39"E												
Bridge End point:	29°58'8.19"S									30°15'12.03"E												
Existing Crossing:	29°58'8.27"S									30°15'13.73"E												
Property Description:	Portion 7 of uMhlateen 1006 and Portion 13 uMhlateen 1006. The bridge and access road is a KZN DOT Road Servitude on a privately owned property.																					
21 Digit Surveyor General no.	N	0	F	T	0	0	0	0	0	0	0	0	0	1	0	0	6	0	0	0	7	
	N	0	F	T	0	0	0	0	0	0	0	0	0	1	0	0	6	0	0	0	1	3

Figure 2: 1:50 000 Map Indicating the location of the D59 Bridge.

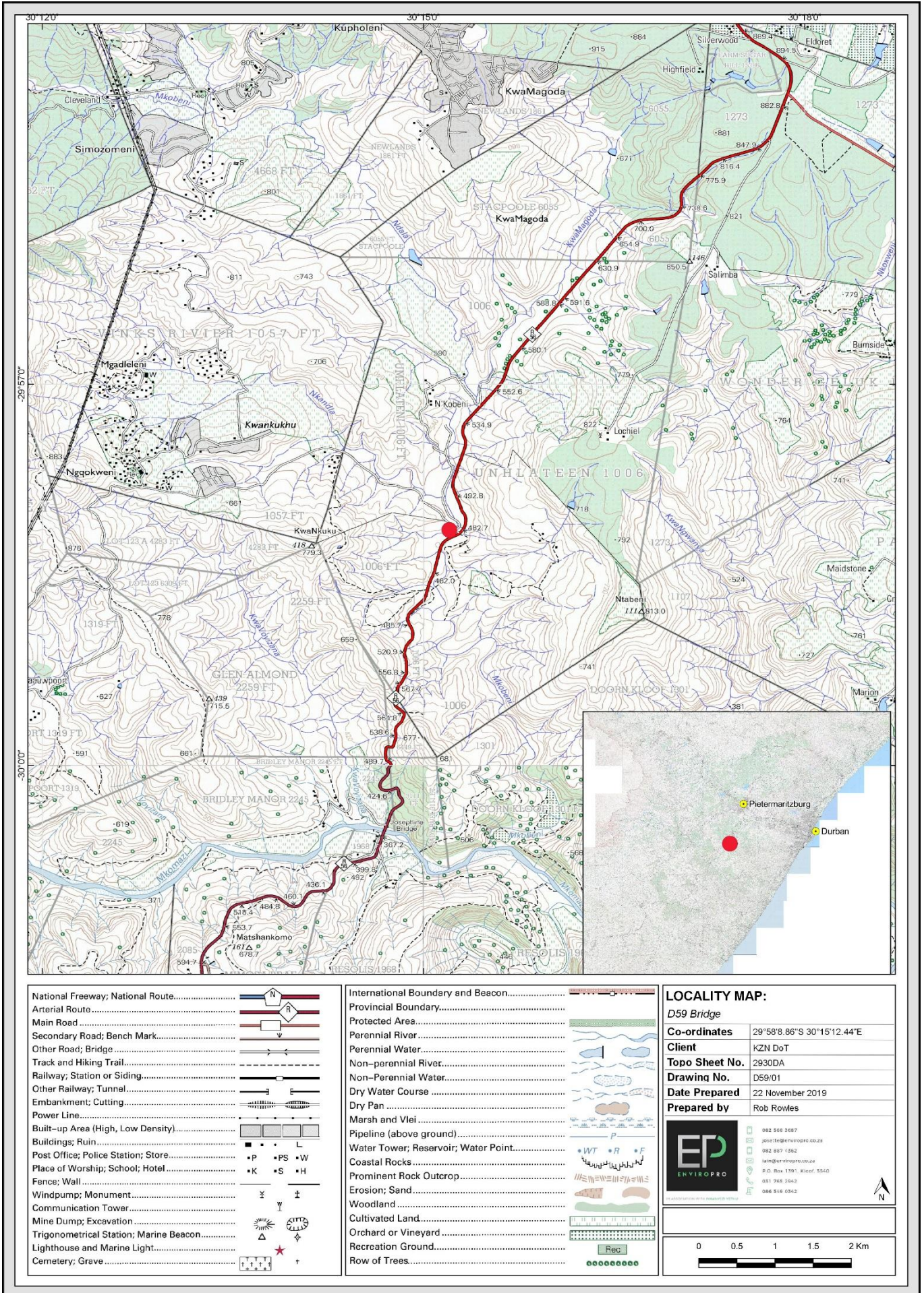
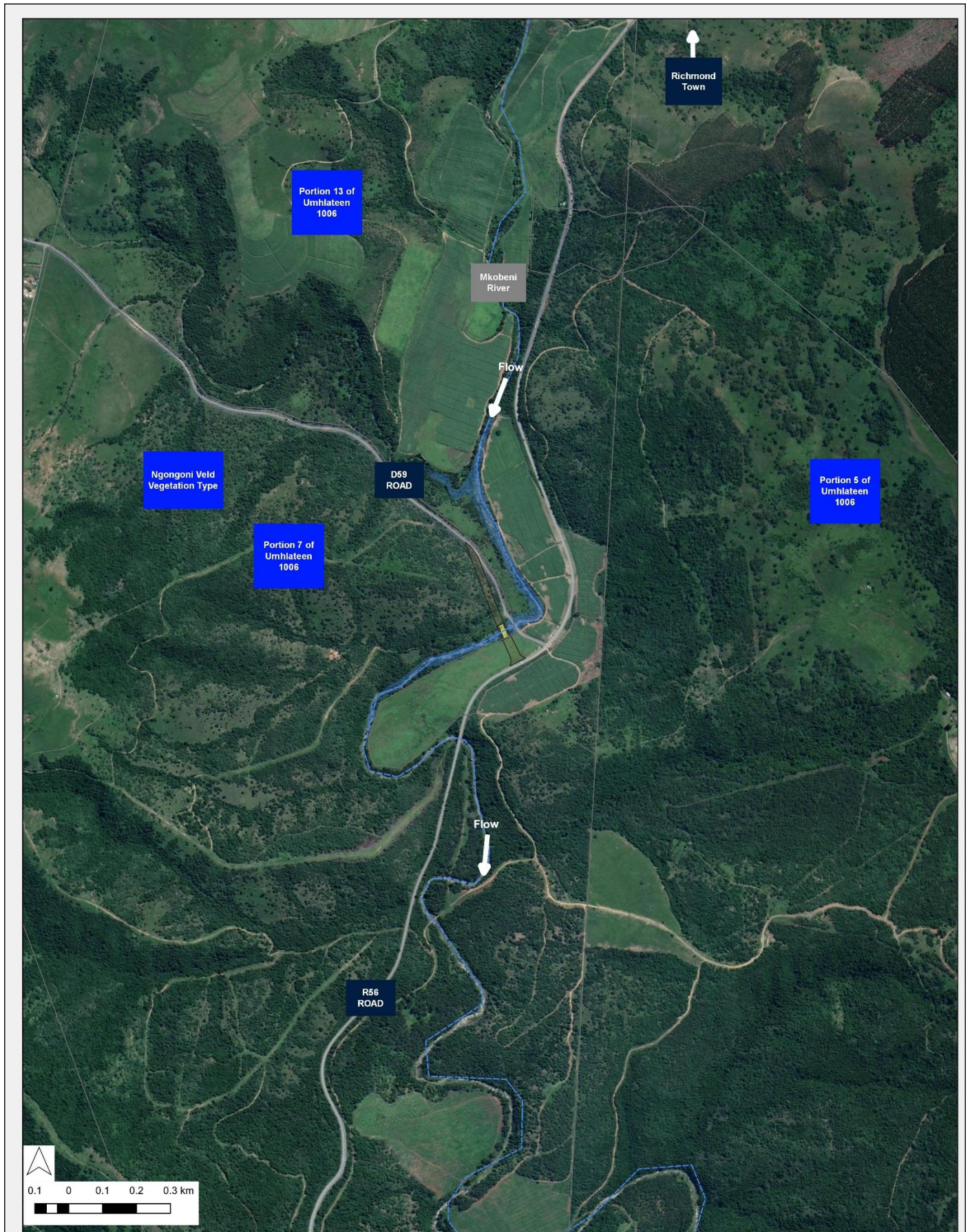


Figure 3: Aerial photograph showing an overview of the D59 Bridge and the surrounding topography. Google Earth Image, 2019.



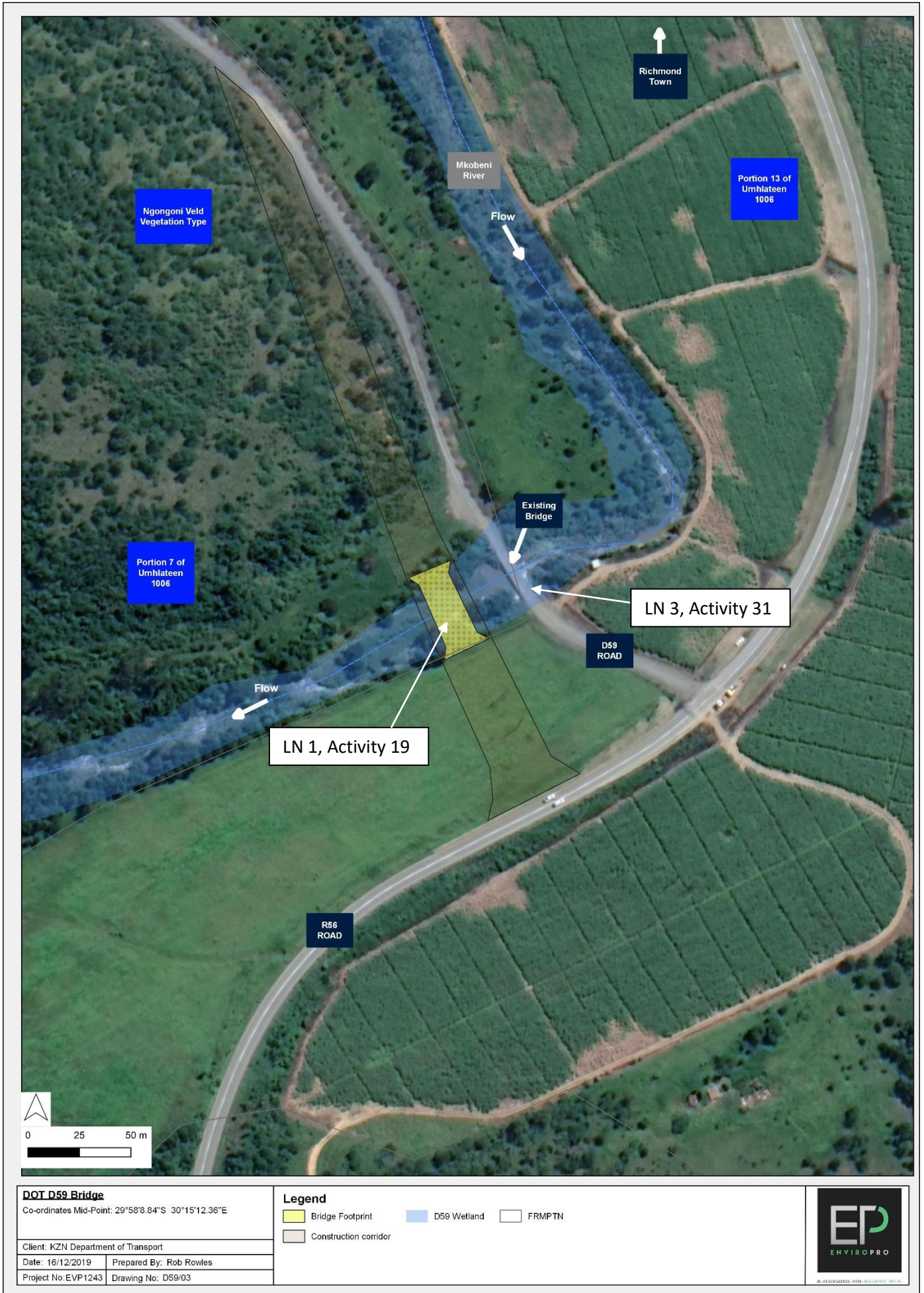
DOT D59 Bridge
 Co-ordinates Mid-Point: 29°58'8.84"S 30°15'12.36"E

Client: KZN Department of Transport	
Date: 16/12/2019	Prepared By: Rob Rowles
Project No: EVP1243	Drawing No: D59/02

Legend	
Bridge Footprint	D59 Wetland
Construction corridor	FRMPTN



Figure 4: Aerial photograph showing the D59 Bridge. Google Earth Image, 2019.



DOT D59 Bridge
 Co-ordinates Mid-Point: 29°58'8.84"S 30°15'12.36"E

Client: KZN Department of Transport

Date: 16/12/2019 Prepared By: Rob Rowles

Project No: EVP1243 Drawing No: D59/03

Legend

- Bridge Footprint
- D59 Wetland
- FRMPTN
- Construction corridor



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

2.1 Site Description and Location

The site for the new D59 Bridge can be accessed by taking the R56 road south bound from Richmond Town. After 17.4km from Richmond, the D59 Road joins the R56. The existing crossing structure is 100m along the D59 Road. The new D59 Bridge will be located approximately 27m west (downstream) of this bridge. The new D59 Road alignment will join the R56 Road approximately 70m south of the existing intersection and will join the existing D59 road approximately 200m north of the existing bridge, as shown in Figure 4.

The project area is surrounded by sugar cane agriculture to the south, north and east of the site. There is open wilderness to the west of the site. The proposed site is located on privately owned land. The project footprint in question will be registered as a DoT road servitude. The section of access road south of the Mkobeni River is located on land that historically was used for sugar cane plantations. No crop was planted in 2019 (the year of the assessment). The section of access road north of the river is located within open wilderness.

2.2 Topography and Physical Characteristics of Site

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 1: Topographical description

Gradient	Description
Flat	N/A
1:50 – 1:20	N/A
1:20 – 1:15	The site associated with D59 Bridge can be described as having a gentle gradient. The site is located 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

The following special features and characteristics of the site were informed by the specialist assessments. The 'project area' referred to below is that within 500m of the site.

Table 2: Desktop spatial features

Desktop Information Considered	Relevant/Not relevant
Ecosystem Threat Status	The site does not fall within a protected ecosystem type
Ecosystem Protection Level	None
Protected Areas	Irrelevant: Approximately 10.3 km to the closest classified protected area: Roselands Nature Reserve.
Rocky Ridges	Irrelevant: KZN has no regulation regarding ridges
NFEPA Wetlands and Rivers	No NFEPA wetlands identified in the project area
Deliniated Wetlands	A Channelled Valley Bottom wetland was identified in the project footprint.
Sub-quaternary reach	The project area is on the Mkobeni River SQR
Mining and Biodiversity Guidelines	Irrelevant: no mining component

2.3 Geology

The area is underlain by the Karoo Supergroup's sediments with lesser sandstones and mudstone of the Tarkastad and Adelaide Subgroups being dominant. Ecca Group shale also occurs with one of the dominant land types expected to be Fa. According to the land type database (Land Type Survey Staff, 1972 - 2006) the project falls within the Ab 141 land type. The Ab land type is characterised by freely drained red and yellow Apedal soils. Red, dystrophic and/or mesotrophic soils are abundant (The Biodiversity Company Water Resources Assessment, 2019. Appendix B).

2.4 Surface Water and Ground Water

The project area is located in the U10J quaternary catchment of the Phongola to Mtumvuna Water Management Area (WMA 4). The catchment is within the South Eastern Uplands aquatic ecoregion. The river of interest for the study is the U10J-4713 Sub-Quaternary Reach (SQR Mkobeni River) which flows south into the Mkomazi River. The reach is classified as a Transitional zone geoclass (geomorphological zone class C), with cobbles, bedrock and sand dominating the bed substrates (The Biodiversity Company Water Resources Assessment, 2019. Appendix B).

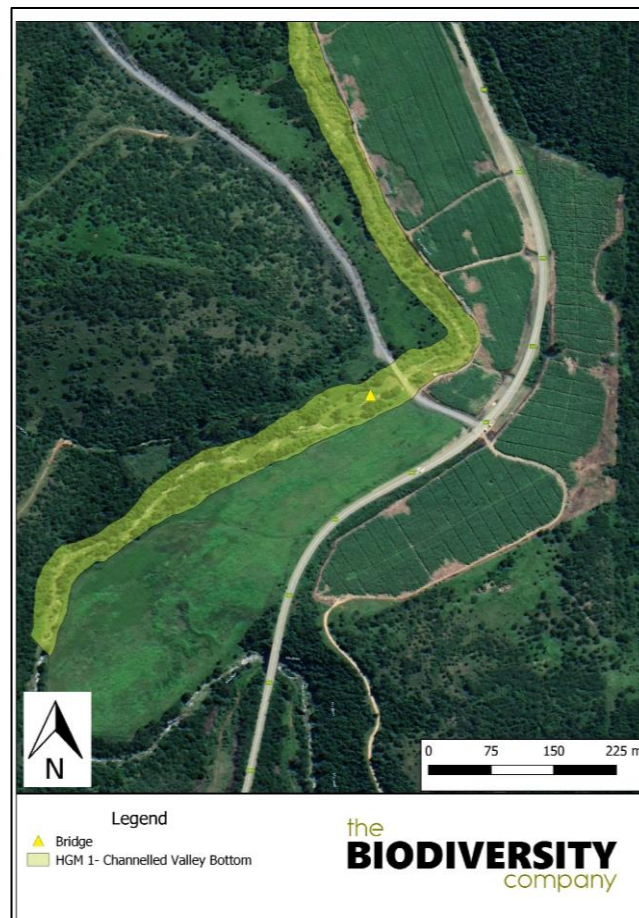
The reach is characterised by medium sized floodplains, however, much of the floodplains have been cleared and levelled for agriculture. The area surrounding the proposed project site consists of agriculture on the left bank, and dense vegetation on the right bank. These activities have affected the health of the watercourse. The D59 site was characterized by slow flowing waters over cobbles, stones, sand, gravel and mud. Good aquatic and marginal vegetation was present. The site consisted of a variety of riffles, runs and pools. Impacts observed included erosion and exotic vegetation encroachment (The Biodiversity Company Water Resources Assessment, 2019).

2.5 Wetlands (The Biodiversity Company, 2019. Appendix B)

A wetland study was conducted for the project area, with the focus being the wetland areas that are directly associated with proposed D59 Bridge upgrade. The study identified a channelled valley-bottom wetland associated with the Mkobeni River.

The status of the wetland was determined to be largely natural (present ecological state Class B) and unlikely to deteriorate. The wetland areas were marginally impacted upon by agricultural practices in the area. The average ecosystem services have been determined to be “Intermediate” with the ecological importance and sensitivity being Moderate (C). A buffer zone of 15m has been calculated for the delineated wetland and the proposed activities. The Channelled Valley Bottom wetland delineated on site has been presented below.

Figure 5: The delineated wetland areas (The Biodiversity Company Water Resources Assessment, 2019. Appendix B).



The PES of the wetland was determined to be largely natural (Class B). This indicated that the wetland area had suffered minor changes change in ecosystem processes and the loss of natural habitats is reversible and the natural habitat remains predominantly intact. This modification can be attributed chiefly to agricultural

practices within the local catchment. The vegetation of the wetland area was monospecific stands of *Typha capensis* and *Phragmites australis*. The current causeway allows water to flow through and over the low-level causeway; this may temporarily alter the wetland hydrology in peak flows; however, this can be likened to a natural hydrological pattern in the wet seasons (The Biodiversity Company Water Resources Assessment, 2019).

2.6 Fauna and Flora (The Biodiversity Company Water Resources Assessment, 2019). Appendix B

The current state of the Mkobeni River SQR, associated with the D59 Causeway construction is in a moderately to largely modified state. Riparian and instream habitat degradation have resulted in the modified state of physical habitat integrity, and further, exotic vegetation encroachment has reduced the riparian habitat integrity. Further impacts to the riparian habitat include indigenous vegetation clearing by farming and flow modification. Water quality according to *in situ* analysis was in good condition and reflected natural conditions. Local aquatic macroinvertebrates and fish communities within the reach were found to be modified according to reference conditions and expected species lists. However, the study was conducted after heavy rainfall and high flows have resulted in a likely underestimation of aquatic biota (The Biodiversity Company Water Resources Assessment, 2019).

Three species of fish were collected during the survey, *Anguilla mossambica* (Longfin eel), *Enteromius viviparus* (Bowstripe barb) and *Labeobarbus natalensis* (Natal Yellowfish). The fish species present at site during the survey were considered moderately tolerant to moderately intolerant.

Flora

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 coast (Mucina & Rutherford, 2006). 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 rainfall (Mucina & Rutherford, 2006). 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 threat (The Biodiversity Company, 2019).

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 Recommendations (The Biodiversity Company Water Resources Assessment, 2019).

The risks associated with this bridge construction relate to the clearing of riparian vegetation, reshaping the riverbanks, the construction of an instream pier 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.

The old causeway is to be used during the construction phase, however, it must be decommissioned once the new structure is finalised. The decommissioning of the old causeway will present the same risks as identified during the construction phase of the new causeway. Mitigation measures applied during the construction phase should be applied during the decommissioning of the old D59 causeway.

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 required (The Biodiversity Company Water Resources Assessment, 2019).

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 bridge 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 Bridge 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 river banks on the sides of the bridge causing sedimentation of the channel. This should be catered for with adequate concreted stormwater drainage depressions and channels with energy dissipaters that channel these flows into the river in a controlled manner ;
- The bridge installation 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; and
- Large aggregate outsourced or from the project area (if available) can be used for energy dissipation in the channel downstream of the bridge 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 aggregate material from the site. (The Biodiversity Company Water Resources Assessment, 2019) Appendix B.

The following general mitigations pertaining to the bridge 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 river 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 river system;
- Prevent uncontrolled access of vehicles through the river 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 river 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 (The Biodiversity Company Water Resources Assessment, 2019).

2.2 Heritage and Cultural Aspects

The EDTEA screening report identified the site and surrounding area as having a high sensitivity. The SARIS database indicated that this site is in a moderate sensitivity area and thus a desktop Palaeo assessment would be required.

No items of archaeological value were noted within the immediate area of the site associated with the D59 Bridge. 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.

See Appendix B for the desktop Paleo Assessment.

2.3 Socio Economic Environment

This is a rural area. The D59 Road is the main road and only access route from the R56 Road to the KwaNkukhu and Mgandleni rural areas accessed off of the R56 Main Road. The re-alignment of the D59 bridge and road alignment will provide safer road network access in this area for all vehicles traveling to and from these areas. The D59 Road also feeds a number of tourism establishments along the Umkomaas River. These businesses rely on the D59 Road for access. No roads/traffic or infrastructure is expected to be affected by this bridge. There are Eskom powerlines in close proximity to the new alignment that may need to be relocated outside of the road servitude. Should there be need for the relocation of any infrastructure, an agreement must be made with the contractor and the relevant stakeholder. Ultimately, society in general will have improved access and safer access across the river which historically has been a natural barrier in this area.

The bridge deck will be above the 1:100 year floodline as per the uMgungundlovu EMF flood line risk guideline. Providing an elevated bridge will keep pedestrians and vehicles out of the river bed and banks, having a positive impact on the socio-economic environment in this area.

2.4 Surrounding Environment and Land Uses

The land uses surrounding the site are as follows:

- The proposed footprint of the new bridge and road re-alignment is located in open wilderness and agricultural land.
- The agricultural land south of the river between the R56 Road and the bridge (0.3ha) has historically been used to farm sugar cane. No crops were planted in 2019 on this section of the farm however.
- The open wilderness areas surrounding the site appear to be unused land, most likely privately owned game grazing farm land.

The surrounding environment and land use will not be negatively affected by the construction of the D59 Bridge as the 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 bridge and road across the river will be used during construction. The new bridge will improve pedestrian and vehicle safety by keeping access above the water level. Once built the bridge will also have a positive impact on the ecological state of the system as it should remove the blocked access on this route associated with the current crossing during high flow periods. The bridge should have little negative impact or influence on the watercourses and wetlands or society provided the basic mitigation measures are adhered to in this report and EMPr.

2.5 Umgungundlovu EMF

The uMgungundlovu District Municipality (uMDM) commissioned the development of a Strategic Environmental Assessment and Management Plan (SEA & SEMP) to serve as a tool for giving effect to these environmental sustainability goals in 2013. The uMDM together with the KwaZulu-Natal Department of Economic Development and Tourism (EDTEA) subsequently drafted an Environmental Management

Framework (EMF). An EMF is a legislated tool developed in terms of the National Environmental Management Act, 107 of 1998 (NEMA) which supports sustainability and provides legal standing to the information and tools generated¹. The uMgungundlovu online EMF assessment tool was not operational at the time of the EDTEA pre-application meeting. The EMP screening tool was only accessible in February 2020. This EMF has been consulted to inform this Basic assessment Report and has been provided in Appendix B.

The figures below provide photographs of the site taken in 19 July 2019.



Figure 5: (a): The current crossing, facing east. (b): The vegetation on the western bank of the river. A mix of indigenous and alien species. (c): A view of the proposed bridge site from the existing crossing structure, facing south.



Figure 6: (a): The wetland upstream of the existing crossing structure. Sediment has built up within the wetland against the current structure. (b): The riparian area on the northern bank of the proposed crossing site. (c): The existing intersection where the D59 Road joins the R56 Main Road on a corner (See Figure 3 and 4).



Figure 7: (a): The southern access road portion of land was not planted with sugar cane in 2019, the year of the assessment. This area has been left bare. (b): Powerlines that may require relocation adjacent to the R56 Road. (c): The section of vegetation that will be cleared for the northern access road re-alignment.

¹ Former uMgungundlovu EMF Volume 111 DRAFT Planning Development Guidelines, July 2017.

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
National Environmental Management Act 1998	<p>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.</p> <p>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.</p> <p>Environmental authorisation is required for the construction of the bridge therefore this application is in line with the requirements of NEMA.</p>
National Water Act 1998	<p>The site is located within 500m of a wetland and there will be the alterations to the bed and banks of a watercourse and loss of wetland. Therefore, a water use authorisation will be required as per Section 21 (c) and (i) of the National Water Act.</p>
National Waste Management Act 2008	<p>Reforms the law regulating waste management to prevent pollution and ecological degradation.</p> <p>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.</p>
Environmental Conservation Act 1996	<p>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.</p>
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 so environmental authorisation will be not be required for clearing more than 300m² of indigenous vegetation.</p>
National Heritage Resources Act 25 of 1999	<p>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.</p>
Mineral & Petroleum Resources Development 28 of 2002	<p>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).</p> <p>The material used to construct the bridges must be obtained from a licensed source.</p>
Municipal Planning Framework	
uMgungundlovu Environmental Management Framework 2019	<p>The uMgungundlovu District Municipality (uMDM) commissioned the development of a Strategic Environmental Assessment and Management Plan (SEA & SEMP) to serve as a tool for giving effect to</p>

	these environmental sustainability goals in 2013. This screening tool has been used to inform the specialist assessment and input into the DBAR.
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Section 4: Motivation, Need and Desirability

4.1 Need and Desirability as Per Section 3(F)

The following motivation explains the need for the construction of the D59 Bridge:

- The D59 bridge was identified by the local community and tourism establishments as a key route that required a larger bridge for safe access across the D59 River;
- The current crossing point through the river acts as an important transport and access route which becomes un-navigable during and after high rainfall events. The current bridge is well under the 1:100year flood line level and is overtopped when the water levels of the river rise. The new bridge will be constructed above the 1: 100 year flood line as per the uMgongundlovu EMF guidelines;
- The new bridge will be a public facility and will improve the access in this area for community members, and emergency services in this area;
- The new road re-alignment will promote road safety at the D59 Road and R56 Main road intersection.
- 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 bridge will be felt during construction but once established the bridge and the piers will have a low impact on the surrounding environment and river system. The aquatic environment in this section of river will benefit from this structure as the existing crossing is currently obstructing flow upstream within the river. After the old structure is removed the river and wetland will flow 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 bridge adjacent to the existing bridge and realign the first 360m of the D59 Road (Figure 3). The current alignment of the D59 Road joins the R56 Main road on a corner of the R56 main road, which is not a safe practice for road design and intersection function. To comply with DoT road standards a new alignment (alternative 1) is required, thus the proposed new alignment and adjacent bridge structure has been proposed.

Site alternative 2 is to construct the new bridge on the existing road alignment of the D59 Road with a temporary crossing and access road during construction. This alternative would have a smaller environmental impact than site alternative two however does not alleviate the intersection access concerns.

The concern with keeping the D59/R56 intersection in the current location has to do with the sight distance and angle to the approaching traffic along the R56. The R56 has a 100km/hr speed limit and cars traveling south bound from Richmond would not have sufficient time/distance to stop or slow down when coming around the corner towards the D59 intersection in the current location. By moving the intersection 75m south of the current location the sight distance from the corner is further away which would provide vehicles greater time and distance and a straighter road angle to slow down should there be backed up traffic waiting to turn right onto the D59 road. The sight distance is reduced when sugar cane is growing tall along this corner as it further blocks driver's line of site.

A prescribed minimum line of sight distance for a main road intersection of a main road like the R56 is 250m. The new intersection location (site alternative 1) meets these parameters, alternative 2 does not.

Technology Alternatives

Bridge Alternative 1 (Preferred Alternative)

The preferred technology alternative is to construct the D59 Bridge as a three span pier bridge with a concrete deck supported on two abutments on the northern and southern sides of the river. Please refer to Section 1.2 above for a detailed description of the bridge and Appendix A for design drawings.

Bridge Alternative 2

Alternative 2 would be to construct a 6 x 2m x 2m concrete box culvert across the river. 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 riparian area and river bed than that of a pier bridge. A causeway typically requires more on-going maintenance than that of a pier bridge.

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 box causeway when compared to a bridge as they have much higher drainage potentials.

In addition, due to the high safety and flood risk associated with box causeways, bridge 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 bridge site on the 16th October 2019. The noticeboard detailed the KwaZulu-Natal Department of Transport's plan to construct the bridge, 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 private landowner was notified and a meeting was held on the 23 January 2020 (Appendix D).
- A noticeboard detailing the proposed development was erected adjacent to the site on the 16th October 2019.
- The land owner and any other registered I&AP were given opportunity to review and comment on complete copies of the Basic Assessment report. The DBAR was released for public comment on the 17 March 2020.
- With regards to authority communications, all relevant authorities have been notified of the application and have been provided with copies of this BAR.
- No public participation took place from the 27 March 2020 – 8 July 2020 due to the nation lockdown period.
- The FBAR was released to EDTEA on the 17 July 2020.

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 6th January 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 10th January 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 have 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

D59 Bridge (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.	Nature and Consequences of impact	Sig. rating of impacts ² :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
1.	There is potential for erosion to take place within the Mkobeni River resulting in downstream sedimentation due to clearing and construction near the River.	5 (Low)	The following measures must be carried out to mitigate against erosion on the D59 Bridge site: <ul style="list-style-type: none"> The areas of the Mkobeni River that are not within the direct project footprint must be demarcated as 'no-go' areas. All construction activities occurring within the Mkobeni River must be done so with extreme care to avoid any erosion taking place in the watercourse. All areas upstream and downstream of 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. Areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting 	1 (Low)

² See Appendix H for more details.

No.	Nature and Consequences of impact	Sig. rating of impacts ² :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			<p>the extent (footprint) and duration period that areas are exposed.</p> <ul style="list-style-type: none"> • The contractor must limit in-stream work to minimize streambank and bed disturbance. • Construct the bridge in the dry season. • No excavated material or fill material may be stored within the Mkobeni River or within 32m of the River. • Bedding material that will be used must not be stored within 32m of the Mkobeni River before it is used. 	
2.	Damage to the Wetland area during construction.	8 (Medium)	<p>The new bridge will be constructed in the channel valley bottom wetland. Approximately 85m³ will be excavated within the wetland. The following precautions must be implemented:</p> <ul style="list-style-type: none"> • The wetland areas 15m east and west of the bridge must be clearly demarcated as a no go areas with fencing or snow netting. • Topsoil from within the wetland 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. • The site camp (containing hazardous materials storage areas and chemical toilets) must be placed more than 32m away from any wetland boundary. 	6 (Low)
3.	The habitat for fauna living within the construction footprint will be modified due to the excavation and construction activities taking place within the Mkobeni River and associated wetland.	4 (Low)	<p>The following measures must be carried out to mitigate against excessive habitat destruction on the D59 Bridge site:</p> <ul style="list-style-type: none"> • Erosion prevention and sediment control measures must be implemented. Temporary and permanent erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching; • The project footprint must be kept as small as possible; • Direct impacts to Mkobeni River substrate/habitat outside the construction footprint must be avoided by ensuring the Mkobeni River that is outside the construction footprint is demarcated as a 'no go' zone during construction. • Heavy machinery must not be permitted to move beyond the demarcated footprint; • Sand and aggregate for concrete must not be obtained from within the riverbed or riparian zone but must be sourced from a permitted source; • A spill containment plan is required to be in place prior to construction to minimize the potential impacts of spills or leaks of hazardous substances; 	2 (Low)

No.	Nature and Consequences of impact	Sig. rating of impacts ² :	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"> Contamination of the river system with unset cement must be prevented as it is detrimental to aquatic biota. 	
4.	Clearing of the indigenous vegetation within the project footprint. There will be clearing of up to 0.58ha of vegetation for the construction of the Bridge and road re-alignment.	6 (Medium)	<p>This impact cannot be fully mitigated as it will result in the loss of up to 0.58ha of predominantly indigenous vegetation found within the project footprint. The following measures must be carried out to mitigate against excessive vegetation clearing on the Bridge site:</p> <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 bridge, the access road only. No vegetation may be cleared within the Mkobeni River riparian area other than that required for access to the site or for the construction activities associated with the construction of the Bridge. 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. 	4 (Low)
5.	Removal of alien invasive vegetation found within the D59 Bridge construction corridor.	0 (Positive)	<p>This is a positive impact. All alien vegetation must be cleared within the project footprint. Monthly alien vegetation clearing on site is mandatory.</p>	0 (Positive)
6.	Careless operation by the contractor within the Mkobeni River resulting in damage to the Mkobeni River i.e. the riverbed, banks and riparian zones within the construction footprint and adjacent areas	6 (Medium)	<p>The following measures must be carried out to mitigate against potential damage to the Mkobeni River during construction:</p> <ul style="list-style-type: none"> Areas of the Mkobeni River not within the construction footprint must be demarcated as no-go areas; Heavy vehicles must avoid working near the Mkobeni River as far as possible; A 32m buffer must be imposed on the rest of the Mkobeni River with no traffic, vehicles or storage permitted within this buffer zone; Vehicles may not cross the Mkobeni River at any other point than the construction footprint of D59 Bridge; Non-essential equipment and vehicles are to remain at least 32m from the Mkobeni River at all times. 	4 (low)
7.	The construction activities resulting in the encroachment of alien vegetation into disturbed areas.	6 (Medium)	<p>There is currently alien vegetation in the surrounding riparian area.</p> <ul style="list-style-type: none"> Alien vegetation must not be allowed to encroach onto the site and must be continually removed during construction. Alien vegetation clearing must take place on a monthly basis. Construction must not promote further alien plant disturbances in the surrounding area. 	4 (Low)
Indirect Impacts				

No.	Nature and Consequences of impact	Sig. rating of impacts ² :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
1.	Positive impacts for the community include potential for local employment.	0 (Positive)	This is a positive impact.	0 (Positive)
Operation				
Direct Impacts				
1.	Flood events overtopping D59 Bridge, damaging the structure integrity of the bridge, and making the way impassable for pedestrians.	10 (Medium)	The deck of the structure will be above the 1:100yr floodline and therefore the potential of the structure being overtopped is low. This is the intension of the bridge design. The following measures must be carried out to mitigate against damage to the structure: <ul style="list-style-type: none"> The contractor must build the bridge as per the approved design, as the bridge has been designed to allow for high flows to flow underneath the structure without causing structural damage. Conduct regular inspections and maintenance must be conducted on the bridge when required. 	5 (Low)
2.	Potential alteration of flow dynamics within the Mkobeni River due to poor placement of the piers.	9 (Medium)	The following measures must be carried out to avoid potential alteration of flow dynamics within the D59 River: <ul style="list-style-type: none"> The contractor must build the bridge as per the approved design, as the bridge has been designed to ensure that the natural flow of the Mkobeni River is not interrupted Conduct regular inspections and maintenance must be conducted on the bridge when required. 	4 (low)
3.	Damage to the channelled Valley Bottom Wetland during operation.	8 (Medium)	<ul style="list-style-type: none"> Topsoil from the excavated trenches must be used to rehabilitate the entire project footprint. No trenches may be left open. 	5 (Low)
4.	Access to the adjacent residential homesteads will be improved and maintained, having a direct positive impact on pedestrians and commuters.	0 (Positive)	This is a positive impact.	0 (Positive)
Indirect Impacts				
1.	The new D59 Bridge will improve the connectivity across the D59 River.	0 (Positive)	This is a positive impact.	0 (Positive)
Cumulative				
1.	Maintenance will be required for the D59 Bridge.	4 (Low)	The maintenance of the D59 Bridge must only be conducted when required and for short periods of time.	1 (Low)

D59 Bridge (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.	Nature and Consequences of impact	Sig. rating of impacts ³ :	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.	The increased risk to pedestrians due to construction activities.	6 (Medium)	The construction activity will pose an increased risk to pedestrians. <ul style="list-style-type: none"> Appropriate construction safety signage must be erected to notify of construction activities and potential hazards on site; 	1 (Low)

³ See Appendix H for more details.

No.	Nature and Consequences of impact	Sig. rating of impacts ³ :	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 existing bridge must remain open and not be blocked during construction. • 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. 	
2.	On site erosion due to improper management of stormwater by the contractor during construction.	5 (Low)	<p>Areas exposed to erosion must be protected. The following apply to erosion control on site:</p> <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 32m of the watercourses. • Bedding material that will be re-worked may not be stored within 32m of the watercourses before it is used. • Temporary stormwater measures should be implemented to ensure that material does not wash off the surface into any watercourse during construction. 	1 (Low)
3.	Dusty conditions generated during the construction of the bridge.	5 (Low)	<p>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:</p> <ul style="list-style-type: none"> • 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 on the R56 Main Road as construction vehicles travel to the site for construction activities, impacting existing traffic conditions and pedestrians.	6 (Medium)	<p>This cannot be avoided as traffic will increase during the construction phase temporarily (for a few months) until construction is completed.</p> <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. 	1 (Low)
5.	Impact on any unidentified existing services on site.	8 (Medium)	<p>Electrical lines were identified near the road re-alignment on the southern side of the river. Eskom and Tellkom will be notified about this activity and the construction footprint during the EIA process:</p> <ul style="list-style-type: none"> • As a standard construction practice the engineer and contractor must identify any potential existing services that 	4 (Low)

No.	Nature and Consequences of impact	Sig. rating of impacts ³ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
			<p>may be affected prior to construction.</p> <ul style="list-style-type: none"> Any infrastructure that is removed must be replaced and any damage caused from construction must be repaired. Should any new power lines be placed on site prior to construction, a 10m buffer must be placed between the existing power lines and the road. 	
6.	Emissions from construction vehicles associated with the Bridge.	7 (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 emissions into the atmosphere.</p> <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)
7.	Temporary increase in waste and litter due to the construction process associated with the construction of the D59 Bridge.	7 (Medium)	<p>The construction phase of the project will see an increase in construction staff on site and therefore an increase in waste on site.</p> <ul style="list-style-type: none"> Littering will not be permitted on site; 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. 	2 (Low)
8.	Insufficient number of toilet facilities on site.	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)
9.	Inappropriate disposal of toilet waste 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)
10.	Generation of noise associated with the construction.	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>	1 (Low)

No.	Nature and Consequences of impact	Sig. rating of impacts ³ :	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"> All construction vehicles operating on site must be fitted with standard silencers to reduce the noise levels produced. 	
11.	Damage to property, fences, or cultivated land 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; The contractor must create alternative access routes to the adjacent properties at all times. No private access roads may be blocked during construction; 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. 	3 (Low)
12.	Unsustainable sourcing of raw materials such as gravel, sand, water etc. which could result in the promotion of illegal mining operations which can cause significant damage to the environment.	10 (Medium)	<p>The construction of the bridges will require raw materials to be sourced and brought to site.</p> <ul style="list-style-type: none"> Contractors must provide proof of sustainable sourcing of materials i.e. permits for quarries and sand winning operations from which stone and sand have been obtained. 	5 (Low)
13.	Positive impacts due to potential for local employment.	0 (Positive)	This is a positive impact.	0 (Positive)
Operation				
Direct Impacts				
No generic direct impacts				
Indirect Impacts				
1.	Positive impacts for the community include potential for local employment and safer access over the D59 River.	0 (Positive)	This is a positive impact.	0 (Positive)
Cumulative				
1.	Improved safety along this area.	0 (Positive)	This is a positive impact.	0 (Positive)

6.3 Site and Technology Alternative 2

Site Alternative 2 – Upgrading the bridge and road on the same existing alignment.

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.	Nature and Consequences of impact	Sig. rating of impacts ⁴ :	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				

⁴ See Appendix H for more details.

No.	Nature and Consequences of impact	Sig. rating of impacts ⁴ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation :
1	<p>Clearing of the indigenous vegetation within the project footprint. There will be clearing of up to 0.36ha of vegetation for the construction of the Bridge and road upgrade.</p> <p>The vegetation requiring clearing would be less than that required for the preferred alternative (0.58ha).</p>	6 (Medium)	<p>This impact cannot be fully mitigated as it will result in the loss of up to 0.36ha of predominantly indigenous vegetation along the road edges and riparian area within the project footprint.</p> <p>The following measures must be carried out to mitigate against excessive vegetation clearing on the Bridge site:</p> <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 bridge, the access road only. No vegetation may be cleared within the Mkobeni River riparian area other than that required for access to the site or for the construction activities associated with the construction of the Bridge. • 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. 	4 (Low)
2	<p>Damage to the Wetland area during construction.</p> <p>The area that would be damaged and disturbed within the wetland would be larger than that of the preferred alternative as a temporary crossing would still be required to be constructed across the river and wetland during construction for this alternative.</p>	8 (Medium)	<p>The new bridge will be constructed in the channel valley bottom wetland. A temporary crossing will need to be constructed during construction and be removed post construction. The following precautions must be implemented:</p> <ul style="list-style-type: none"> • The wetland areas 15m east and west of the bridge must be clearly demarcated as a no go areas with fencing or snow netting. • Topsoil from within the wetland 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 wetland boundary.</p>	7 (Medium)
3	Removing the temporary crossing structure.	7 (Medium)	<p>The temporary crossing structure must be removed as soon as the new bridge has been built and is operational.</p> <ul style="list-style-type: none"> • All pipes and infrastructure must be removed from the river and wetland. • All exposed areas on the access roads, beds and banks must be top soiled and hydro seeded. • No plant may enter the riparian area other than within the existing construction footprint. • The downstream siltation of the river must be avoided as far as possible. 	6 (Medium)

Technology Alternative 2 for the D59 Bridge (Site specific) – for a box culvert structure

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.	Nature and Consequences of impact	Sig. rating of impacts ⁵ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
Construction				
Direct Impacts				
1.	There is a greater potential for erosion to take place within the Mkobeni River as the entire box culvert structure will need to be excavated and placed within the river bed and banks for the concrete slab.	7 (Medium)	<p>The following measures must be carried out to mitigate against erosion on the site:</p> <ul style="list-style-type: none"> The areas of the Mkobeni River that are not within the direct project footprint must be demarcated as 'no-go' areas. All construction activities occurring within the Mkobeni River must be done so with extreme care to avoid any erosion taking place in the watercourse. All areas upstream and downstream of 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. 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 limit in-stream work to minimize streambank and bed disturbance. Construct the causeway in the dry season. No excavated material or fill material may be stored within the Mkobeni River or within 32m of the D59 River. Bedding material that will be used must not be stored within 32m of the Mkobeni River before it is used. 	6 (Medium)
Indirect Impacts				
Indirect Impacts will remain as per Alternative 1				
Operation				
Direct Impacts				
1.	Flood events overtopping the causeway, damaging the structure integrity of the causeway, and making the way impassable for vehicles and pedestrians.	9 (Medium)	<p>The use of concrete boxes must take into account the size of the catchment and flow rates within the channel to avoid the structure from being overtopped.</p> <ul style="list-style-type: none"> Construct the causeway as per the approved designs. Regular inspections and maintenance must be conducted on the causeway. 	7 (Medium)
2.	Blockages of causeway boxes impeding flow of the D59 River, resulting in flooding or drying out of D59 River.	9 (Medium)	<p>The following measures must be carried out to avoid potential impacts associated with blockages:</p> <ul style="list-style-type: none"> The causeway must be constructed as per the approved design, as to allow for the adequate flow of water and debris under the causeway, which will result in less blockages occurring. Conduct regular inspections and maintenance must be conducted on the causeway when required. 	7 (Medium)
Indirect Impacts				

⁵ See Appendix H for more details.

No.	Nature and Consequences of impact	Sig. rating of impacts ⁵ :	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Sig. rating of impacts after mitigation:
	Indirect Impacts will remain as per Alternative 1			
Cumulative				
	Indirect Impacts will remain as per Alternative 1			

D59 Bridge (Standard Construction Impacts) for technology alternative 2 (culvert structure)

The generic impacts for the D59 Bridge 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 D59 Bridge over the Mkobeni River relate to those during the construction period. Impacts such as damaging the D59 River, the associated wetland, 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 Mkobeni River 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 bridge. Improve public safety and improved health and functionality of the aquatic environment may result from this bridge being erected over the Mkobeni River. 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 bridge.

Taking into consideration the above impacts and mitigation measures, it is the EAP's opinion that the construction of D59 Bridge 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 River.
 - 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)

A paleo desktop study has been conducted on this site to inform this assessment of the archaeological and paleo-logical significance of this area and site. Given the deep water Karoo sediment rock types typically found in this area (Pietermaritzburg Formation), it is unlikely that fossils will be present in this area. Given the temporary nature and small-scale construction planned within the Mkobeni River, 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 D59 Bridge either within the 2020 to 2023 business plan for eThekweni, 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 bridges is considered 'low'.

6.10 Summary of Recommendations for the construction of the D59 Bridge: 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 wetland 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 wetland 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 bridge 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 River unless required for construction purposes;
- No storage may occur within 32m of the D59 River; and
- Stormwater outlets must be fitted with erosion protection features to diffuse flow.

Appendix A: Drawings and Maps

Appendix B: Specialist Reports

No.	Specialist Report
1	Geotechnical Assessment
2	The Biodiversity Company Water Resources and Biodiversity Assessment

Appendix C: Noticeboard

Appendix D: Notification

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