



**SA SHEQ**  
**CONSULTANTS**  
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**DRAFT ENVIRONMENTAL MANAGEMENT PROGRAM  
(DEMP<sub>r</sub>) FOR THE PROPOSED CONSTRUCTION OF  
THE EZINGADENI LOW LEVEL BRIDGE, ZULULAND  
DISTRICT MUNICIPALITY**

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## 1. INTRODUCTION

The Abaqulusi Local Municipality proposes to construct the Ezingadeni Low Level bridge, over Mvunyana river. This project is located within ward 20 of Mondlo settlement, governed by Zululand District municipality.

### 1.1 Project Description

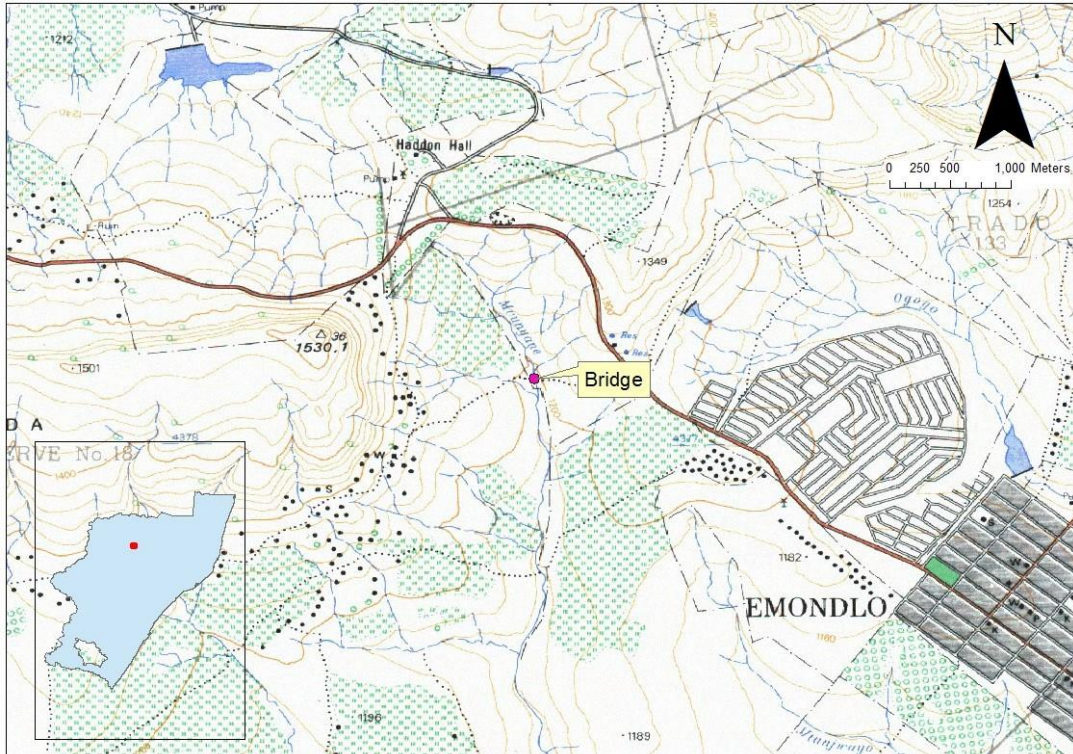
The proposed bridge is a new structure. Excavations for construction will be undertaken at the site and within the watercourse specifically. It is possible that a temporary crossing will be constructed at the site to allow for vehicular and pedestrian crossing. The bridge site is located roughly at: 27 58' 19.83" S; 30 41' 04.44" E.

Bridge dimensions: 8.20m (L) X 6.10m (W) X 2.20m (H)

#### Listed activities associated with the project activity as applied for:

<b>GN 327: Listing Notice 1</b> <b>Activity 12 (ii) Infrastructure or structures with a physical footprint of 100 square metres or more;</b> <b>(a) within a watercourse;</b> <b>(c) where such development occurs within a watercourse or within 32m of a watercourse.</b>	<b>The project comprises the construction of a low-level bridge within the Mvunyane river. It is possible that the section of track leading to the watercourse (bridge site) will be temporally improved to allow for movement of construction vehicles.</b>
<b>GN 327: Listing Notice 1 activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</b>	<b>To allow for construction and foundations, it will be necessary to excavate within the river bed and banks. This comprises removing and infilling material in the watercourse. There is a possibility for placement of temporary crossing to enable vehicular movement across the river. It is possible that the section of track leading to the watercourse (bridge site) will be temporally improved to allow for movement of construction vehicles.</b>
<b>GN324: Listing Notice 3 activity 19</b>	<b>The project site is listed as an ESA, due to its proximity to a CBA Optimal area which is located to the north east of the project area. It is possible that the section of track leading to the watercourse (bridge site) will be temporally improved to allow for movement of construction vehicles.</b>

In addition, a water use license is required in terms Section 21 (c) and (i) of the National Water Act, for alteration of the bed, banks, course and characteristics of a watercourse.



Locality: Bridge site



Image: Bridge site

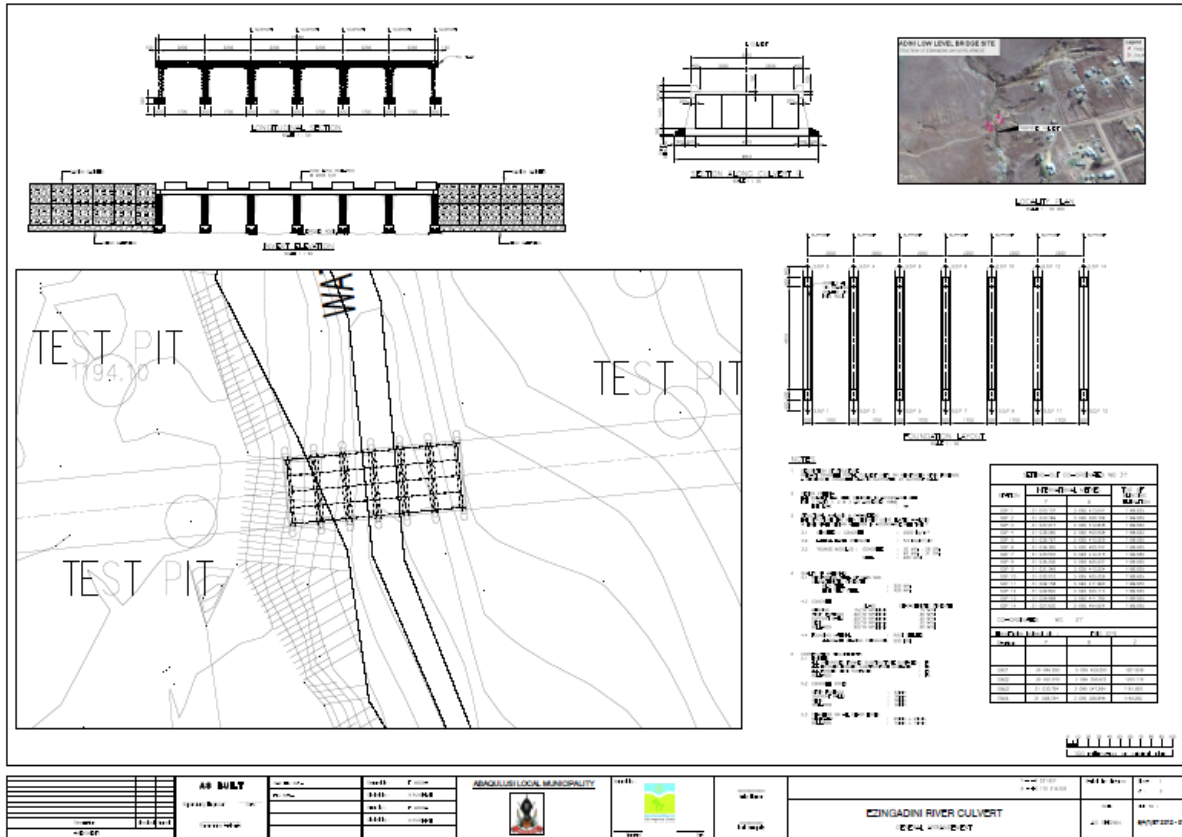


Image: layout/drawing

## 1.2 Summary of Specialist studies

### GEOTECHNICAL REPORT

According to the study, the site formation is within the Ecca Group of the Karoo Supergroup (Karoo Basin). Ecca shale is typically dark-coloured as they are carbon rich due to the high vegetation content of the original sediments. Fine bedding or laminations may also be noted, and the shales tend to easily crumble. Overlying the shale is a thick sequence dominated by light grey sandstones, called the Vryheid Formation.

Three Trial pits were excavated on the existing grass surfaced area to an average final depth of 2,2m before reaching hard surface. The side walls of the trial pits 1 & 2 were excavated vertically and there was evidence of potential collapse within these sidewalls during the logging process of concern, only

trial pit 3 showed no evidence of potential collapse. This indicated that the material encountered on trial pit 3 was of finer stable material.

In terms of SANS 1200DA:

“Soft Excavation” shall be excavation in material that can be efficiently removed and loaded without prior ripping.

“Intermediate Excavation” shall be excavation (excluding soft excavation) in material that can be efficiently ripped.

“Hard Rock” excavation shall be in material that cannot be efficiently removed without blasting or without wedging and splitting before removal.

Trial Pit No.1 indicated that Soft excavations can be expected from the depth of 0mm – 2550mm (Soft to Intermediate material as DCP results).

Trial Pit No.2 indicated that Soft excavations can be expected from the depth of 0mm – 1300mm (Soft to hard material as per DCP results).

Trial Pit No. 3 indicated that Intermediate excavations can be expected from the depth of 0mm- 2900 (Intermediate material to hard).

There is a shallow river stream characterised by slow movement of water. At the time of the investigation, groundwater seepage was encountered in Trial Pits 1 and 2.

Two trial pits were excavated on the left-hand side and one trial pit on the right hand side of the stream. The site consists of a solid dark greyish dolerite rock bed at an average depth 2m.

Having investigated the Trail Pits and classified the material according to the TRH14 Manual through laboratory testing, the site class ranges on Site Class C1. This is due to the clayey, sandy soils encountered that showed to have a low to moderate plasticity reading of the founding layers. The founding material can be characterised as compressible and potentially collapsible soil.

The proposed site rest on a rock bed situated at an average depth of 2.0m depth and thus founding level can be found at 2.0m depth.

## HERITAGE AND PALAEOLOGICAL REPORTS

No heritage sites were found during the site inspection including no surface evidence of archaeological sites or artefacts. The area is also not part of any known cultural landscape.

The shales of the Vryheid Formation could contain impression fossils of plants of the *Glossopteris* flora, however, they have yet to be recorded from the proposed site for the low level bridge at Mondlo.

It is unlikely that any well-preserved fossils occur in the proposed infrastructure site in the shales and mudstones. Furthermore, no fossils have been recorded from this area. Nonetheless rocks of this type

and age are potentially fossiliferous, as indicated in the SAHRIS palaeo-sensitivity map. As there is a chance find, a monitoring protocol is recommended.

As far as the paleontology is concerned the proposed development can go ahead. Any further paleontological assessment would only be required after excavations and building have commenced and if fossils are found by the geologist or environmental personnel.

## ECOLOGICAL, WETLAND AND AQUATIC STUDY

The proposed bridge site is situated on the upper reaches of the Mvunyane River, a minor tributary of the White Mfolozi River. The affected section of the watercourse is narrow, with an active channel of 1 to 2 m in width and a depth of less than 0.5 m. Flow is expected to be seasonal, with some water remaining in deeper pools but with no flow – i.e. stagnant. The watercourse is classified as a Type B stream.

The associated riparian zone was narrow and identifiable by a change in vegetation and an obvious macro bank. The non-marginal zone was characterised by tall tufted grasses favouring disturbed soils (eroded soils) such as *Hyparrhenia hirta*, *Cymbopogon* species and *Imperata cylindrica*. The marginal zone consisted of a narrow band of sedges, grasses and herbs, associated with the active channel.

Species associated with the marginal zone include the following; *Imperata cylindrica*, *Berula repanda*, *Juncus effusus*, *Plantago major*\*, *Lipocarpa chinensis* and *Kyllinga melanosperma*. Much of the vegetation was short and appeared to have been heavily grazed. Substrate within the active channel was dominated by bedrock with fine clayey silts present in places. These areas of deposition supported the marginal zone vegetation.

The location of the site within grassland vegetation suggests that the reference state for the riparian habitat would have been dominated by graminoids with the occasional or clustered occurrence of small trees and shrubs. The current state, although dominated by graminoids, displayed indications of disturbance and habitat alteration. Erosion and channel scour were the prominent vectors of habitat change. These were likely to have been brought about by changes in catchment hydrology, livestock watering/crossing, overgrazing and a lack of veld management. Erosion has resulted in pioneer and secondary vegetation occurring in the disturbed areas particularly within the non-marginal zone.

Vegetation within the marginal zone is dominated by grasses, sedges and herbaceous species. Limited exotic invasion was noted. The VEGRAI model indicates the riparian habitat to be “moderately modified” (EC – C).





Map showing NFEPA wetlands on site; and KZN CBA Optimal/Ecological Support area

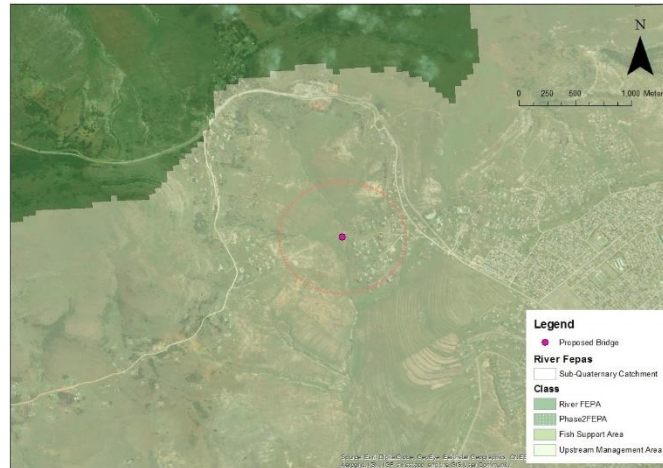


Image showing fish support area

An extensive wetland area was identified to the west of the proposed crossing point. The wetland was classified as an unchannelled valley bottom wetland. The wetland is fed by a small watercourse that drains a steep slope. The watercourse is ephemeral, fed by surface runoff. The variability associated with the flow of the watercourse is the primary reason for the temporary nature of the wetland. Flow appears to be spread over the HGM unit, with slight concentrations associated with depressions and gulleys within the HGM unit. The origin of these gulleys may be from livestock trampling leading to erosion and/or excavation of clayey substrate by residents. A artificial channel was noted near a foot path through the HGM unit. It is assumed that this channel was created to channel surface flow from the north-western slope away from the foot path, maintaining access across the system.

The system was dominated by grass cover, which was comparatively lush compared to adjacent slopes, despite clear evidence of heavy grazing. Due to the heavy grazing and possible recent burning of grass cover, grass identification was challenging. The soil within the temporary wetland area ranged from dry to wet and was generally clayey in nature. In contrast to the surrounding lightly coloured stony and sandy soils, the soil within the HGM unit was light to dark brown and fine textured. Some mottling was evident around root nodes within the soils. The weak hydromorphic indicators and dominance of grass species indicate a temporary wetland condition. The area of the HGM unit as delineated is 36086 m<sup>2</sup>.

The wetland unit identified is a functional wetland providing a number of biophysical ecoservices at a “moderately high” and “high level”. These included *Flood Attenuation, Sediment Trapping, Phosphate Removal, Nitrate Removal, Toxicant Removal* and *Erosion Control*.

A number of characteristics of the wetland were definitive in establishing the functional state of the wetland. These included the temporary nature of the system, the steepness of the catchment, clear indicators of sediment accumulation within the system and the gradient of the HM units itself. The system is driven by the supply of surface flow from the upstream watercourse, which drains a steep, erosion prone catchment. The water supplied to the system is thus expected to have a high sediment content. The comparatively flat gradient of the HGM unit facilitates dispersion the surface flow, promoting sediment deposition and percolation of surface water through the sediment layers, before reaching the Mvunyanne River channel. This mechanism promotes the ecoservices mentioned above.

The WET-Health assessment provides a PES rating of EC “C” or moderately modified. The hydrology of the HGM unit was affected by an increase in runoff as a result of settlement, informal road infrastructure and agricultural activities within the catchment. This has in turn facilitated scour of the watercourse feeding the HGM unit, delivering additional sediment to the HGM unit.

Sedimentation was evident in the upper reaches of the HGM unit, while gulleys, potentially formed by localised erosion we present within the lower portion of the unit and along the margins, near the interface with the adjacent slope. An artificial drainage channel and well used footpath were also present, potentially influencing the hydrology and geomorphology within the HGM unit. The vegetation within the HGM unit was dominated by graminoids and appeared to be heavily grazed and generally short in nature. Exotic invasion was low, however the sustained low intensity impact imposed by grazing and poor veld management is believed to have reduced the diversity of the vegetation within the wetland and reducing the effective surface runoff. Change scores were predicted to be negative, with low to moderate levels of degradation expected based on current land use conditions.

Only one fish species was captured *E. anoplus*. Spawning male and female fish were noted. Males were clearly identifiable by the distinct bright golden colouration. Females were larger and drab in colour.

This indicates that the upper reaches of the Mvunyane River supports suitable spawning habitat for *E. anoplus*. The lack of species diversity observed resulted in a low FRAI score and an EC of E suggesting a greatly modified system. This possibly underestimate the status of the ichthyofaunal community of the upper reaches of the Mvunyane River. Sampling was undertaken soon after a dry period and the presence of sustained flow is likely to facilitate the movement of other fish species into the upper reaches of the system. The reach is important as a spawning ground for *E. anoplus*, which is understated in the FRAI results

The affected section of the system was described as “largely natural” (EC – B). The DWS PES database (2014) indicates a PES of D, however this includes a much more extensive reach of river and considers additional impacts not observed at the crossing site.

At the proposed crossing site, the affected section of river was not affected by any flow regulation or attenuation structures. Slight changes in catchment runoff were noted due to low impact catchment activities – settlement, grazing of livestock and subsistence agriculture. Water quality, in the absence of obvious point source pollution sources, was considered moderate to good with turbidity and sediment load being identified as issues. The condition of the stream bed indicated some change (scour) as a result of the hydrological changes mentioned above. A range of substrate and instream habitat was present. With the exception of areas of erosion, the riparian habitat was generally intact, particularly the marginal zone. Disturbance was generally isolated to livestock crossings. No introduced instream biota was identified.

Identified impacts varied in terms of significance from LOW to HIGH before mitigation. After mitigation it was assumed that the majority of impacts would be reduced to a LOW level, with the exception of habitat loss and disturbance associated with the proposed bridge crossing.

In terms of mitigation, limit disturbance footprint, revegetation and rehabilitation of site, and alien plant control and removal post construction is required.

The site camp must not be situated within the open areas associated with the floodplain wetland (HGM 1 and 2) or any of the watercourses. The site camp must be positioned within the extent of the settled areas only.

All plant must be inspected for leaks prior to undertaking work within the riparian zone or active channel.

Erosion controls must be implemented to prevent the expansion of existing gulleys or the formation of new erosion points. Priority areas for erosion control are areas where there is an obvious gradient and the flow of water can be expected. Measures must include at least, the use of sand bags and silt curtains. Silt curtains must also be placed in the active channel during construction, immediately downstream of the construction activity, where work is being undertaken within or close to the watercourse. These will capture material washed into the watercourse during construction. Material can then be removed. The integrity of the silt curtains will need to be monitored on a daily basis and repaired or replaced when necessary.

Formal stormwater control measures must be implemented that allow stormwater to be collected, attenuated and disposed of in a manner that will not promote erosion or scour. The use of attenuators, such as chambers and gabion mattresses are recommended for installation at points of release of stormwater into the watercourse

Consider design of crossing to ensure the free flow of water beneath the crossing. Implement measures to aid drainage where the access and footing occurs within the adjacent wetland– dump rock, v drains and or culverts. It is recommended that consideration be taken of the following in the design of the structure:

- Allow for high flows (1:10 year flood or similar) to pass unimpeded beneath the crossing
- Columns/culverts must offer as little resistance to flow as possible. For example, the use of pylon supports rather than numerous box culverts or stacked pipe culverts.
- Given the width of the active channel, supports should be positioned outside of the active channel.
- Consideration of the direction of flow. The structure should not cause the flow of the river to deviate.

In order to reduce the localised hydrological impacts identified for the adjacent wetland, the access road through the wetland must allow for subsurface flow. The use of dump rock will facilitate the percolation of water and promote subsurface flow beneath the road. Surface “V” drains or culverts beneath the road should be integrated to allow for the movement of surface water and limit the attenuation of flow.

## **2. PURPOSE AND OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PROGRAM**

The objective of the EMPr is to manage the predicted impacts identified during the Environmental Impact Assessment (EIA) process, as well as during construction. This is a dynamic document and may be continuously updated to reflect current site conditions and address any additional issues that may arise during construction. The EMPr therefore serves as an action plan for the implementation of mitigation measures proposed during the EIA process to ensure that environmental impacts during construction are not significant.

The purpose of the EMP is to:

- To provide a clear indication of the environmental management requirements of each of the role players involved
- Outline the Contractors' environmental management commitments for the project construction;
- Ensure adherence to relevant environmental legislation;
- Act as a performance standard that construction activities can be audited against.
- To set out the environmental management or mitigation measures which are required to be implemented during various phases of the project, to minimize the extent and severity of environmental impacts
- To provide management objectives and measurable targets as well as timeframes and budget requirements

The EMPr provides mitigation and management measures for the following phases of the project

### ➤ Planning Phase

This section of the EMPr incorporates pro-active environmental management measures with the goal of attaining sustainable development which can be achieved during this phase. Pro-active environmental measures help minimize the chance of negative impacts occurring. Necessary corrective actions in terms of design or location are proposed to further limit potential impacts.

### ➤ Construction phase

This section of the EMPr provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required within the construction phase are specified. This specification will form part of the contract documentation and, therefore, the contractor

will be required to comply with the specifications in terms of the construction contract. Rehabilitation of site is included under the construction phase.

➤ Operation and maintenance phase

This section provides management for the operational and maintenance phase of the project. Environmental actions, procedures and responsibilities as required within these phases are specified. Through taking pro-active measures during the design and planning phases as well as the construction phase; potential environmental impacts originating during the operational phase can be minimized or even prevented.

➤ Decommissioning phase

Decommissioning takes place once the project (structure) is no longer serving the purpose for which it was constructed, or if it may have deteriorated over the duration of its operation thus making decommissioning a feasible option.

### **3. ROLES AND RESPONSIBILITIES**

The successful implementation of the EMPr requires co-operation between the Applicant, the appointed Contractor, the Engineer (Project Manager) and the Environmental Control Officer (ECO). The ECO is appointed to monitor the implementation of the specified mitigation measures contained in the EMPr/EA and report on findings to all parties. While the Contractor will be required to comply with all the conditions contained within the EMPr, it must be noted that Applicant is the legal entity responsible for ensuring compliance with the Environmental Authorization (EA) and is responsible for compliance with the provisions for duty of care and remediation of damage contained in section 28 of the National Environmental Management Act, No. 107 of 1998 (NEMA).

The specific responsibilities of the respective parties are outlined below:

#### **3.1 The Applicant:**

Abaqulusi Local Municipality, as the Applicant, remains ultimately responsible for ensuring that the project or activity is implemented according to the requirements of the EMPr and EA. Although the applicant will appoint specific role players to perform functions on their behalf, the Applicant is ultimately responsible for all non-compliances with the EA, EMPr and other permits.

The Applicant shall:

- Appoint an independent Environmental Control Officer
- Ensure sufficient funds are available for environmental management and rehabilitation
- Prevent negative impacts on the environment by enforcing compliance of the EMPr
- Maintain all approved infrastructure to effectively fulfil its intended purpose and to prevent negative environmental impacts
- Ensure that suitable arrangements be made to protect the environment (site) against long term negative impacts
- Ensure rehabilitation and maintenance of all disturbed areas

### 3.2 **Engineer (Project Manager)**

- Ensure that the specification for the work takes into consideration the location and existing environmental conditions at the site;
- Ensure all facets of environmental protection are properly addressed in the specification for the work;
- Ensure that the Contractor meets all his specific contractual responsibilities, adheres to environmental and occupational health and safety standards, and complies with the EMPr;
- Assist the ECO in enforcing compliance.
- Ensures that the contractor complies with the EA, EMPr and specialist studies through enforcement and site instructions

### 3.3 **The Contractor**

- Ensures adherence to conditions of authorization (including the EMPr and specialist studies) and any other laws and standards relevant to the activity at all times;
- Implements and complies with the conditions of the EA, EMPr and Specialist studies on site on a daily basis
- Avoid and/or limit any adverse impacts on the environment through proper planning, construction and rehabilitation;
- Prevents environmental pollution and degradation on site, and remedies environmental problems
- Immediately remedy any factors that contribute to negative environmental impacts
- Ensure waste disposal at a suitable, permitted waste disposal facility
- Minimize negative visual impacts

- Clean up contaminants of the environment (due to activity)
- Prevent erosion, weed infestation and degradation
- Control predicted impacts that may occur so as to meet acceptable standards, both as a legal and a moral responsibility to the environment within which construction is to take place;
- Apply for permits and procure specialists as required
- Ensure suitably qualified personnel are available for overseeing environmental management
- Ensure sufficient funds have been allocated for environmental management, rehabilitation and maintenance
- Ensure transparency in undertaking the work and in the environmental management of the site; and
- Ensure the construction activities comply with the EMPr.

### **3.3.1 Environmental Officer**

- The Environmental Officer (EO) is appointed internally by the Contractor (is an employee or agent of the contractor)
- This EO must be qualified (have a degree in environmental management/science/geology/natural science/geography)
- The EO is responsible for supervising daily environmental performance on site, ensuring corrective actions are taken and preventative measures are put in place as specified in the EA and EMP as well as recording compliance on a daily basis
- The EO must maintain a record of non-compliances and compliances, incidents, and complaints on site via a consolidated weekly audit report which must be sent to the ECO, and which must be filed in the environmental file
- Provide environmental induction on site for each new team/person

### **3.4 The Environmental Control Officer**

- Undertake site auditing and monitoring during construction, against the conditions of the authorized EMPr and EA (including specialist studies, other permit requirements and special requirements)
- Provide an audit report on environmental findings (non-compliances) and recommendations, for distribution to the Applicant, Contractor and DEDTEA (including any other regulatory body and IAP if required)

- Liaise with the DEDTEA and interested and affected parties (IAPs) if required; and
- Assess the suitability or effectiveness of the EMPr, identify possible areas of improvement and update the EMPr if necessary.
- The ECO may occasionally undertake audits unannounced and unaccompanied
- The ECO may, upon request from the Contractor and Applicant, apply for permits or assist in procuring specialists if required

## **4. MONITORING, COMMUNICATION AND REPORTING**

### **4.1 Responsibilities for Environmental Management**

The Applicant, Contractor and its agents will be responsible for environmental management on site during the construction period. A pre-construction meeting is recommended to reach agreement on specific roles of the various parties and penalties for non-compliances with the EMPr.

Environmental monitoring, auditing and reporting mechanism shall be via site visits. Findings will be documented and submitted to the Applicant and Contractor (and any other relevant party). Non-compliances/findings must be rectified within 1 day or less, or as agreed by the by the ECO and Engineer.

### **4.2 Complaints Register and Environmental Incident Book**

Any complaints received from the community must be registered and recorded by the Contractor on site. The complaint must be brought to the attention of the site manager and Contractor, who will respond accordingly. The following information must be recorded:

- Time, date and nature of the complaint;
- Response and investigation undertaken; and
- Actions taken, by whom, and closure

All complaints received must be investigated and a response (even if pending further investigation) is to be given to the complainant within 7 days. Records of proceedings are to be maintained in the environmental file and these must be made available to the ECO and Authorities on request.



### 4.3 Incidents

Within 24 hours the Contractor will report to the Engineer and ECO the occurrence or detection of any incident at the site, or incidental to the operation of the site which has the potential to cause, or has caused, water pollution, damage to the environment, health risks or nuisance conditions, or which is a contravention of the Environmental Management Program or any related law. Within a maximum of 7 days from the occurrence or detection of any incident, an action plan must be submitted with a detailed time schedule for implementation,

- To correct the impacts of the incident,
- To prevent the incident from causing any further impacts and
- To prevent the recurrence of a similar incident.

The non-compliance forms and complaints register, together with actions taken or to be taken, are to be kept on file by the EO and made available to the ECO and Authorities (and other external site auditors).

### 4.4 Site Instruction Entries

The Engineers site instruction book entries will be used for the recording of general site instructions as they relate to the works. It will also be used by the Engineer for the issuing of stop work orders for the purposes of immediately halting any particular activities of the contractor in lieu of the environmental risk that they may pose and any non-compliance with the EMP.

### 4.5 EO Diary Entries

The purpose of these entries will be to record the comments of the EO as they relate to activities on the site. Each of these books must be available in duplicate, with copies for the project manager and ECO. These books should be available to the authorities for inspection or on request. Minutes of all the meetings that reflect environmental queries, agreed actions and dates of eventual compliance must be available and form part of the official environmental record.

### 4.6 Method Statements

Method statements (from the Contractor) will be required for specific actions within sensitive areas on request of the Authorities or ECO. A method statement forms the base line information in which work

takes place and is a “live document”, modifications are negotiated between the Engineer and ECO as circumstances unfold. A method statement should clearly indicate the following at a minimum:

- What** - a brief description of the work to be undertaken;
- How** - a detailed description of the process of work, methods and materials;
- Where** - a description/sketch map of the locality of work (if applicable); and
- When** - the sequencing of actions with commencement dates and completion date estimates.

The contractor must submit the method statement at least 14 days before any construction activity is due to start. Work may not commence until the method statement has been approved by the ECO and Engineer.

#### 4.7 **Record Keeping**

The Contractor shall ensure that all records related to the implementation of this management plan (e.g. complaints register and incident book, site instruction book; EO diary; method statements) are kept together in an environmental file, in an office where it is safe and can be retrieved easily. These records should be available for scrutiny by the ECO and any relevant authorities at any time.

#### 4.8 **Photographs**

The Contractor must ensure that photographs are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be stored with other records related to this EMP. If captured in digital format, hard copies must be kept with all other records relevant to the implementation of this EMP.

#### 4.9 **Environmental Close Out Report**

An environmental close out report/completion statement is a report by the ECO to the relevant authorities stating completion of the project and compliance with the EMP and conditions of authorization.

#### 4.10 **Basic Rules of Conduct**

The following list represents the dos and don'ts towards environmental awareness that all participants in this project must consider whilst carrying out their tasks. These are not exhaustive and serve as a quick reference aid.

##### **DO:**

- Use the toilet facilities provided – report dirty or full facilities
- Clear your work areas from litter and building rubbish at the end of each working day – use the waste bins provided and ensure that the litter will not be wind blown
- Report all fuel or oil spills immediately and stop and / or contain the spillage
- Dispose of cigarettes and matches carefully
- Confine work and storage of equipment to within the immediate work area
- Use all safety equipment and comply with all safety procedures
- Ensure a working fire extinguisher is immediately at hand if any 'Hot Work' is undertaken e.g. welding, grinding, gas cutting etc.
- Prevent excessive dust and noise

##### **DO NOT:**

- Make any fires
- Enter any fenced-off or marked area
- Allow cement or cement bags to be wind blown
- Allow waste, litter, oils or foreign materials into the storm water channels
- Litter or leave food lying around
- Remove any artefacts from site

#### 4.11 **Environmental Monitoring**

Environmental monitoring will be undertaken by the ECO on the frequency as stipulated in the EA. Monitoring will be undertaken to ensure compliance with all aspects of the EMP. In order to facilitate communication between the ECO, Resident Engineer (RE) and Contractor, it is important that a suitable chain of command is structured that will ensure that the ECO's recommendations have the full backing of the project team before being conveyed to the Contractor. In this way, penalties as a result of non-compliances with the EMP may be justified as failure to comply with instruction from the highest authority.

#### 4.12 COMMUNICATIONS PROTOCOL

All communication should be via the Engineer, unless otherwise agreed upon by all parties.

### 5. LEGAL REQUIREMENTS

Various legislation and guidelines must be adhered to. Please note that this list is not exhaustive. All relevant parties must ensure that they are familiar with the content.

- The National Environmental Management Act (Act No. 107 of 1998);
- The Environment Conservation Act (Act No.73 of 1989);
- The National Water Act (Act No. 36 of 1998);
- Occupational Health and Safety Act (Act No.85 of 1993);
- Hazardous Substance Act (Act No.15 of 1973);
- Environmental Management: Air Quality Management Act (Act No. 39 of 2004);
- The Constitution of the Republic of South Africa (Act No. 108 of 1996):
- Disaster Management Act (Act No. 57 of 2002);
- National Heritage Act (Act No. 25 of 1999);
- The KwaZulu-Natal Heritage Act (Act No. 10 of 1997)

### 6. COMPLIANCE REQUIREMENTS

The contractor is required to comply with the conditions of the EA and the requirements of the EMP. Difficulties may be encountered with carrying out mitigation measures that could result in future non-compliance. The Contractor shall put in place procedures to motivate staff members to comply with the EMP, and to deal with acts of non-compliance, or malicious damage to the environment. Penalties for non-compliance need to be discussed with the Contractor at the earliest stage (during the Pre-Construction Meeting). The Contractor is deemed not to have complied with the Environmental Management Plan if:

- Within the boundaries of the site, site extensions and haul/access roads there is evidence of contravention of clauses;
- If environmental damage ensues due to negligence;
- The Contractor fails to comply with corrective or other instructions issued by the Project Manager or Engineer within a specified time;

- The Contractor fails to respond adequately to complaints from the public.
- Application of a penalty clause will apply for incidents of non-compliance. The penalty imposed will be per incident. Penalties imposed per incident or violation will be as per table below.

**Table: Penalties**

<b>Type of Non-Compliance</b>	<b>Fine</b>
Failure to demarcate working area	R30000
Working outside of the demarcated area	R30000
Failure to strip topsoil with intact vegetation	R20000
Failure to stockpile and maintain topsoil correctly	R50000
Failure to store materials/effects correctly/in designated areas	R50000
Failure to prevent and/fix erosion	R20000
Failure to provide adequate sanitation	R10000
Unauthorized removal of vegetation	R50000
Failure to provide and use drip trays and spill kits	R50000
Failure to provide adequate, separate waste disposal facilities and services	R30000
Failure to reinstate disturbed areas within the specified time-frame	R50000
Failure to rehabilitate disturbed areas within the specified time-frame	R50000
Failure to prevent and/clean hydrocarbon/chemical spills	R50000

## **7. TRAINING AND INDUCTION OF EMPLOYEES**

The Contractor/Environmental Control Officer (ECO) shall ensure that adequate environmental awareness training of site personnel takes place and that all construction workers receive an induction presentation on the importance and implications of the contents of the EA and EMPr. The presentation shall be conducted, as far as is possible, in the employees' language of choice. A register will be held of all staff trained by the ECO.

Thereafter, the contractor shall conduct weekly toolbox talks on the contents of the EMPr and EA. The contractor shall keep records of all environmental training sessions, including names, dates and the information presented.

As a minimum, training should include:

- Explanation of the importance of complying with the EA and EMPr.
- Discussion of the potential environmental impacts of construction activities.
- The benefits of conformance.
- Employees' roles and responsibilities in terms of onsite environmental management, including emergency preparedness.
- Explanation of the mitigation measures that must be implemented when carrying out their activities.
- Explanation of the management structure of individuals responsible for matters pertaining to the EMPr.
- Contents of the EMPr and EA
- Penalties and implications for not complying

## **8. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION PROGRAMME**

Mitigation/management measures are either to be implemented immediately or just prior to an aspect of work commencing, and in the event of an incident/non-compliance.

### **Financial provisioning:**

It is recommended that a lump sum be allocated for environmental management. Underquoting or under provisioning for environmental management will not be accepted as a basis for non-compliance.

### **8.1 Objectives**

The management of the project aims to achieve the following:

- Effectively minimize, reduce or eliminate negative impacts.
- Enhance the positive impacts of the project.
- Provide proper stakeholder engagement.
- Provide a healthy and sustainable environment to all parties involved.
- Prevent environmental degradation.

## 8.2 Management actions

Management actions must be feasible, practical and cost-effective ways to achieve the objectives. This can be achieved by:

- Avoidance: Avoiding activities that could result in adverse impacts; avoiding certain types of resources or areas considered to be environmentally sensitive.
- Prevention: Measures aimed at preventing the occurrence of negative environmental impacts and/or preventing such an occurrence having harmful environmental and social impacts.
- Preservation: Preventing any future actions that might adversely affect an environmental resource. This is typically achieved by extending legal protection to selected resources beyond the immediate needs of the project.
- Minimization: Limiting or reducing the degree, extent, magnitude or duration of adverse impacts. This can be achieved by scaling down, relocating, or redesigning elements of a project.
- Rehabilitation and restoration: Repairing or enhancing affected resources to their preconstruction state, or to an improved state, which precludes erosion and alien invasive species.

## 8.3 Measurable targets

Measurable targets for environmental management will include the following:

- No signs of environmental degradation (i.e. no erosion, waste mismanagement, pollution of surface and ground water resources, undue and uncontrolled destruction or disturbance to habitat, riparian and wetland areas, no uncontrolled fires); should any of the above effects occur, these must be effectively resolved and rehabilitated with documented evidence
- Method statements in place for various aspects of work and management measures
- Records available for environmental compliance and permits in place
- Proof of waste disposal
- Training records available for environmental training
- No damage to heritage, cultural and paleontological resources or evidence of having obtained permits and permissions to undertake disturbance
- No social complaints; or complaints closed out within specified time frames

All the proposed management actions are included in this EMPr.

## 9. ENVIRONMENTAL MANAGEMENT MEASURES

The following section outlines the environmental impacts associated with this activity/project, as well as any mitigation measures that may be implemented to better manage the effects imposed on the environment by this project.

Activity	Mitigation/Management	Responsibility	Frequency or Timing
<b>PRE-CONSTRUCTION PHASE</b>			
<b>Design of Structure</b>	<ul style="list-style-type: none"> <li>- In terms of ecological consideration, the structure should not significantly affect the flow of water, thereby minimising impacts brought about by attenuation and turbulence. It is recommended that consideration be taken of the following in the design:               <ul style="list-style-type: none"> <li>• Allow for high flows (1:10 year flood or similar) to pass unimpeded beneath the crossing</li> <li>• Columns/culverts must offer as little resistance to flow as possible. For example, the use of pylon supports rather than numerous box culverts or stacked pipe culverts.</li> <li>• Given the width of the active channel, supports should be positioned outside of the active channel.</li> <li>• Consideration of the direction of flow. The structure should not cause the flow of the river to deviate.</li> </ul> </li> <li>- Implement measures to aid drainage where the footing occurs within the adjacent wetland (western side)- use dump rock, v drains and/or culverts</li> <li>- The proposed site (structure) should rest on a rock bed situated at an average depth of 2.0m depth and thus founding level can be found at</li> </ul>	Engineer and Applicant	Prior to construction



	2.0m depth, as per Geotechnical recommendations.		
<b>Legislation and permits</b>	<ul style="list-style-type: none"> <li>- A copy of the EMPr, Specialist Reports and Environmental Authorization (when available), must be distributed and kept on site during construction. These documents must be made available to any authorized person or department, the ECO, employee or agent who undertakes work on the site.</li> <li>- Applicant is to appoint an Environmental Control Officer (ECO) to provide audits on compliance with the EMPr, specialist studies and Environmental Authorization</li> </ul>	Applicant / Contractor	Prior to construction
<b>Method statements</b>	<p>The following Construction Method Statements are required:</p> <ul style="list-style-type: none"> <li>- <i>Site layout</i> - A Method Statement describing the proposed location, layout and extent of the construction camp in the form of a site plan indicating camp site, offices, storage and stockpile areas, parking and turning areas, access points, equipment cleaning areas, and ablution facilities.</li> <li>- <i>Topsoil</i> - A Method Statement detailing the proposed locality and management of stockpiles and storage areas which may fall out of the construction camp. The Method Statement must include the management of topsoil stockpiles, alien plant and dust control measures to be implemented.</li> </ul>	Contractor	Prior to construction and ongoing

	<ul style="list-style-type: none"><li>- <i>Waste Management MS</i> - A Method Statement for the management of solid waste (refuse, rubble or spoil) generated during construction, including but not limited to: Methods for the control and removal of waste from the site; the number, type and locality of rubbish bins/skips; proposed locality and methods for the temporary storage of waste on site; methods for recycling of waste (if any); the proposed landfill site which will be utilized, and details of the waste removal company to be sub-contracted (if any); the frequency that refuse will be removed from the site. The above applies to both hazardous and non-hazardous wastes.</li> <li>- <i>Excavation and Spoil Management</i> - Method of undertaking excavations/earthworks, erosion remediation and stabilization, and dust and noise control measures to be implemented. The Method Statement must also include the equipment to be utilized during construction and the management thereof, transportation access routes and proposed traffic safety measures which will be implemented.</li> <li>- <i>Hazardous Storage</i> - A Method Statement detailing the location and structure of any fuel storage site, and or any other hazardous materials. The statement must include the type of material to be stored, the volume of storage, and the design and capacity of the bund.</li></ul>		
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	<ul style="list-style-type: none"> <li>- <i>Water Pollution</i> - A Method Statement for the management of potentially contaminated water, indicating potential sources and estimated volumes of contaminated water and how this will be disposed of.</li>   <li>- <i>Emergency Preparedness</i> - A Method Statement for mitigating and responding to emergency situations, including but not limited to: spillages of hazardous substances (Spill Contingency Plan), accidental leaks, personal injuries sustained to staff on site, emergency evacuation of the construction site, and emergency procedures in case of fire. Location, layout and preparation of the mixing of concrete and the management of runoff from such areas. An indication must be given of how any concrete spoil will be minimized, cleared, and disposed of.</li>   <li>- The abovementioned Method Statements must include the names of staff that are responsible for the implementation of these plans. The responsible staff members must be adequately trained according to their allocated responsibilities prior to construction commencing.</li> <li>- Method statements must be approved by the Engineer and ECO as required.</li> </ul>		
<b>Site survey</b>	<ul style="list-style-type: none"> <li>- Marking of survey points must be done with the Engineers approval.</li> </ul>	Engineer/Contractor	During surveys

	<ul style="list-style-type: none"> <li>- Vegetation clearing and disturbance must be kept to the bare minimum during the survey operations.</li> </ul>		
<b>Access and haulage</b>	<ul style="list-style-type: none"> <li>- All road improvement for construction access must be planned and approved by the Engineer and ECO ahead of construction activities.</li> <li>- No new roads shall be created for any purpose, unless discussed with the ECO prior. The Contractor will have to ascertain the existing condition of access roads and repair accordingly should damage occur due to construction activities</li> <li>- Improved section of road leading to the site must be constrained to the existing track alignment and must be very limited in extent.</li> <li>- A limited total working corridor must be determined and indicated (demarcated) to avoid driving outside of site boundaries. The total working corridor including construction area and site camp, must not exceed 300m<sup>2</sup></li> <li>- Turning points will be marked out on the site for easy identification by contract workers. No turning manoeuvres other than at designated places shall be permitted. Parking areas will be determined and indicated (demarcated).</li> <li>- All parking and turning areas must be located within the disturbed settlement area to the east of the site only or further than 32m from the watercourse on the east side, or as directed by the ECO.</li> </ul>	Contractor	Prior to full site establishment and ongoing

	<ul style="list-style-type: none"> <li>- Pedestrian activity surrounding the construction site must be controlled via signage and demarcation</li> </ul>		
<p><b>Setting up construction camp</b></p>	<ul style="list-style-type: none"> <li>- A site plan must be submitted to the ECO and Engineer for approval. This layout plan is to be submitted prior to site establishment for acceptance. Any changes to this plan require review by the Engineer in conjunction with the ECO.</li> <li>- The site camp must not be situated within the open areas associated with the floodplain wetlands (HGM 1 and 2) or any of the watercourses.</li> <li>- The site camp must be positioned within the extent of the settled areas only (to the east of the site).</li> <li>- The total size of the site camp, access, turning and parking areas, working corridor and all related aspects, must be very limited, and must not exceed more than 300m<sup>2</sup> in total.</li> <li>- The camp must not be located within 50m from the watercourse, unless agreed to by the Engineer and ECO.</li> <li>- Topsoil from the construction camp must be stripped and conserved.</li> <li>- Should private land be used for site set up, documented agreements must be in place.</li> <li>- The camp site must be secured, and equipped with signage and contact details. Lighting must be set out to provide security but not create a nuisance.</li> </ul>	Contractor	Prior to, during site setup and ongoing

	<ul style="list-style-type: none"> <li>- Accommodation on site is not permitted, unless agreed upon prior with conditions by the ECO and Engineer</li> <li>- Before the contractor fully moves onto site, the following basic requirements must be fulfilled: <ul style="list-style-type: none"> <li>· Erosion control measures must be implemented for the camp or access.</li> <li>· Separate waste receptacles must be provided</li> <li>· Portable sanitation must be present</li> <li>· A spill kit and metal drip trays must be sourced</li> <li>· Site must be demarcated and fenced</li> </ul> </li> </ul>		
<b>CONSTRUCTION PHASE</b>			
<b>Environmental awareness training/induction</b>	<ul style="list-style-type: none"> <li>- Awareness training must be undertaken by the ECO, based on the contents of the EMPr.</li> <li>- The contractor is then required to conduct daily toolbox talks for staff based on the contents of the EMPr.</li> <li>- Training registers must be obtained and filed after each training.</li> </ul>	Contractor and ECO	Site establishment and ongoing as required
<b>Habitat loss and disturbance- Vegetation / Groundcover</b>	<ul style="list-style-type: none"> <li>- Limit the extent of disturbance. The proposed project is to be limited and restricted to the existing track and bridge site only</li> <li>- The working area and site extent must be limited, and demarcated, using a fence or pegs; no movement outside of this area will be permitted.</li> <li>- No vegetation may be removed without the prior permission of the Engineer and the ECO.</li> <li>- Topsoil must be stripped from all temporary and permanent work areas, to a depth of 200-300mm, and stockpiled to a maximum height of 2m in a</li> </ul>	Contractor	From site establishment and ongoing during construction

	designated area and conserved till rehabilitation. Topsoil is considered to be the top 200-300 mm of the upper natural soil surface and includes grass, roots and organic matter.		
<b>Alien invasive species control</b>	<ul style="list-style-type: none"> <li>- Undertake control and eradication of alien vegetation from site (including subsoil and topsoil stockpiles) and all affected areas throughout construction</li> <li>- Control/eradication methods must be employed on a weekly basis at the least or as soon as weeds/invasive are detected, and preferably before seeds have formed</li> <li>- Control and eradication methods used should ideally be manually, with care being taken not to disperse seeds during removal</li> <li>- Topsoil must be seeded or covered with hessian to prevent loss and suppress weed establishment</li> </ul>	Contractor	From site establishment and ongoing during construction
<b>Instream fauna, terrestrial and avifauna</b>	<ul style="list-style-type: none"> <li>- Limit disturbance of active channel area.</li> <li>- The hunting, capturing, killing or intentionally harming of fauna of any kind is prohibited.</li> <li>- Residents must be informed that livestock and domestic animals must be prevented from entering the campsite/work area.</li> </ul>	Contractor	From site establishment and ongoing during construction
<b>Erosion, sedimentation and Storm water runoff</b>	<ul style="list-style-type: none"> <li>- Erosion controls must be implemented to prevent the expansion of existing gully or the formation of new erosion gully.</li> <li>- Priority areas for erosion control are areas where there is an obvious gradient and the flow of water can be expected.</li> <li>- Measures must include at least, the use of sand bags and silt curtains.</li> </ul>	Contractor	From site establishment and ongoing during construction

	<ul style="list-style-type: none"><li>- Silt curtains must also be placed in the active channel during construction, immediately downstream of the construction activity, where work is being undertaken within or close to the watercourse. These will capture material washed into the watercourse during construction. Material can then be removed. The integrity of the silt curtains will need to be monitored on a daily basis and repaired or replaced when necessary</li><li>- Gabions or reno mattresses may be placed on embankments as erosion control measures.</li><li>- Topsoil stripped from the construction camp and rest of the site areas must be stockpiled away from any potential disturbances, and runoff pathways, on the edge or base of slopes.</li><li>- Topsoil must be seeded or covered with hessian to prevent loss and suppress weed establishment.</li><li>- Store topsoil separately from subsoil/spoil.</li><li>- Do not place materials or construction effects on topsoil, and do not drive on the topsoil.</li><li>- Topsoil should be handled twice only, during stripping and stockpiling and during reinstatement.</li><li>- Temporary cut off drains and berms may be required to capture runoff and promote infiltration.</li><li>- Where surface runoff is concentrated (e.g. along exposed track), flow must be slowed by contouring</li><li>- Earth, stone and construction material/rubble is to be properly stored/disposed of so as not to obstruct natural pathways over the site</li></ul>		
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	<ul style="list-style-type: none"> <li>- De-watering water must be released onto a rocky outcrop or on dense vegetation.</li> <li>- Additionally, the use of silt traps fencing, haybales, channelling of runoff, sedimentation ponds, riprap, stone pitching and vetiver, as well as retention of vegetation, must be used by the contractor during construction and rehabilitation, as directed by the Engineer.</li> <li>- All areas which are showing signs of erosion must be immediately stabilized/repared</li> </ul>		
<p><b>Sanitation</b></p>	<ul style="list-style-type: none"> <li>- Temporary/portable, serviceable, gender specific chemical toilets must be provided by a company approved by the Engineer and must be compliant with relevant standards.</li> <li>- Portable toilets must be positioned within the site camp, further than 50m from the watercourse but not further than 100m from the workforce.</li> <li>- Toilets and sanitation systems must be serviced on a weekly basis.</li> <li>- Certificates for servicing of portable toilets must be available on site during construction for review by the ECO and DEDTEA.</li> <li>- The use of portable toilets must be strictly enforced.</li> <li>- The use of pit latrines, long drop toilets or any informal toilet, or toilets which do not feed directly into a formal piped municipal sewage system or serviceable septic tank, is prohibited.</li> <li>- The use of the surrounding/natural environment for sanitation/ablution facilities is prohibited.</li> </ul>	<p>Contractor</p>	<p>From site establishment and ongoing during construction</p>

<p><b>Hydrological, Watercourse</b></p>	<ul style="list-style-type: none"> <li>- Plan construction to commence during the winter season</li> <li>- Bridge design must ensure that the water flow regime of the watercourse is not negatively affected. Where applicable, the flow of the channel after construction of the bridge should equate to the flow of water prior to construction activities, with no constricting of flow.</li> <li>- The area of the river that will be unavoidably affected by construction activities must be limited. These areas must be marked with netting to keep movement within the defined area.</li> <li>- The contractor shall ensure that the watercourse is adequately protected to prevent downstream siltation due to erosion on site.</li> <li>- No equipment shall be used which may cause irreparable damage to rivers.</li> <li>- Waste material, including concrete and rubble, from the construction process must not be allowed to be washed (or dumped) into the watercourse.</li> <li>- An oil spill kit is required on site and must be used.</li> <li>- Cement, bitumen and other potential environmental pollutants must be mixed on an impermeable surface/receptacle with special provisions for runoff. Ensure that all implements used in hazardous material handling are placed on the bund area, a drip tray or similar impermeable surface, and ensure that the outlet nozzle from concrete mixing trucks are placed on similar impermeable surfaces.</li> </ul>	<p>Contractor/Applicant</p>	<p>From site establishment and ongoing during construction</p>
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	<ul style="list-style-type: none"> <li>- Ensure that metal drip trays are available for all vehicles and machinery standing on site and must be used during parking, refuelling and decanting and during emergency breakdown situations. Warped drip trays or drip trays with openings at any end will not be accepted.</li> <li>- All hazardous/chemical products to be dispensed from drums/container will be done so with appropriate equipment and preferably not dispensed by tipping the drum/container.</li> <li>- No machinery and vehicles must be washed on site.</li> <li>- No servicing of machinery and vehicles on site is permitted.</li> </ul>		
<p><b>Waste management and pollution control</b></p>	<ul style="list-style-type: none"> <li>- Waste receptacles (bins or skips, or sealable drums) are required on site for waste management.</li> <li>- These receptacles must be covered and secured from the elements and rodents, and stored in a designated area.</li> <li>- Separate receptacles must be used for general waste, hazardous waste and recycling. These must be labelled according to waste stream, and there must be no mixing of waste.</li> <li>- Littering must be prevented, and in any case litter and other waste must be collected at the end of each working day and deposited in the appropriate waste receptacles.</li> <li>- A litter collection program is required. All waste material that has scattered across the site or is noted in the watercourse must be immediately</li> </ul>	<p>Contractor</p>	<p>From site establishment and ongoing during construction</p>

	<p>removed and discarded in the receptacles. Waste receptacles must not be allowed to overflow, and must be covered.</p> <ul style="list-style-type: none"><li>- All rubble, concrete chunks and board offcuts must be recycled (re-used if possible), or stored on one designated area pending disposal.</li><li>- Waste (including rubble etc) must be removed from site on a weekly basis, unless otherwise agreed upon by the Engineer and ECO, and disposed of in a licenced waste disposal site authorised to accept that waste stream. Disposal slips/receipts are required from the licenced waste disposal site, which must be filed and made available to the ECO and DEDTEA.</li> <li>- All hazardous substances, including hydrocarbons (fuels, oils, chemicals), herbicides, oily rags, empty cement bags and battery acid, must be stored in suitable, separate, signed receptacles which can be properly closed and secured, on adequately paved, to prevent accidental contamination of the soil, surface and groundwater.</li><li>- Alternatively, an impermeable liner must be placed beneath above-ground storage tanks. The integrity of the liner is to remain intact for the duration of the contract, until removal.</li><li>- All storage areas must be bunded, have a peripheral collection/outlet drain which can be sealed, with oil interceptors (if required). The bunded area must be sufficiently large to contain</li></ul>		
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	<p>a spillage equivalent to the volume of one and a half container of the substances stored. A register shall be kept of all substances and be available for inspection at all times.</p> <ul style="list-style-type: none"><li>- A lined/impermeable sump must be created, where directed by the Engineer or ECO, for concrete waste. This must be de-sludged regularly and the cement waste is to be removed to a tip site as approved by the local authority, but preferably this waste should be recycled (re-used) on site if possible.</li><li>- Contaminated water associated with construction activities must be contained in separate bunded areas and must not be allowed to enter into natural drainage.</li><li>- Chemical waste must be stored in appropriate containers and disposed of at licensed hazardous waste disposal facilities. Spent absorbent material to be regarded as a hazardous waste. Empty chemical packaging associated with the storage of hazardous materials to be returned to supplier, if possible, sent to a drum reconditioning company or disposed of as a hazardous waste as a last resort.</li><li>- Hazardous waste, including contaminated rubble and soil, must be disposed of at a licenced hazardous waste site. Once disposal of hazardous waste has occurred, receipts/waybills must be sourced from the waste disposal site and filed by the contractor, for review by the ECO and DEDTEA.</li></ul>		
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	<ul style="list-style-type: none"><li>- Transporting, handling or moving of hazardous waste/chemicals must be done carefully to avoid spillage.</li><li>- Burning of waste of any nature, and burying of waste of any nature, is prohibited.</li> <li>- The Contractor must to provide a method statement for the dealing of accidents / spillages of hazardous materials. This statement must be handed to the Engineer / Project Manager and ECO.</li> <li>- The following basic steps for spill response must be undertaken or considered:<ul style="list-style-type: none"><li>· Stop the source of the spill</li><li>· Contain the spill</li><li>· Report the spill to the Engineer immediately</li><li>· Use spill absorbent and spill kit</li><li>· Determine if there is any soil, groundwater or other environmental impact</li><li>· Additional remedial action must be taken if required by DWS, DEDTEA, Engineer or ECO</li><li>· All significant spills must be reported to DWS and relevant departments including the ECO and Engineer.</li><li>· In the event of a minor spillage, clean the affected area and remove all the contaminated soil at depth. Store the contaminated soil in designated receptacle and dispose of a registered hazardous landfill site.</li></ul></li></ul>		
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	<ul style="list-style-type: none"> <li>· Cement/concrete from pouring activity near the watercourse must be removed immediately.</li> <li>· The incident (minor or significant) must be documented</li> </ul>		
<b>Noise</b>	<ul style="list-style-type: none"> <li>- Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise nuisance to residents and fauna in the vicinity.</li> <li>- Equip machinery with noise mufflers if required.</li> <li>- Notice of particularly noisy activities must be given to residents adjacent to the construction site. Examples of these include: noise generated by jackhammers; blasting; drilling; dewatering pumps</li> <li>- Noisy activities must be restricted to normal weekday working hours</li> </ul>	Contractor	From site establishment and ongoing during construction
<b>Dust</b>	<ul style="list-style-type: none"> <li>- Ensure that dust levels are kept to a minimum by retaining groundcover, dampening of surfaces as required without over wetting, and rehabilitating exposed areas as soon possible.</li> <li>- Machinery travelling to site and on site must keep to speed limits and must not speed</li> </ul>	Contractor	From site establishment and ongoing during construction
<b>Visual</b>	<ul style="list-style-type: none"> <li>- The site should be screened via shade cloth if possible</li> <li>- Ensure that work areas are tidy</li> <li>- Store material, implements and effects in designated areas within the site camp, or demarcated areas near the construction site. Do not leave material lying around haphazardly</li> <li>- Implement a daily litter collection</li> </ul>	Contractor	From site establishment and ongoing during construction

	<ul style="list-style-type: none"> <li>- Ensure that lighting is directed downward so as not cause spillage</li> </ul>		
<p><b>Safety, security and socio-economic</b></p>	<ul style="list-style-type: none"> <li>- The work area must be made off limits to the public via fencing and demarcation. All visitors must sign into the camp site</li> <li>- Warning/no entry signage is required for construction area and no-go areas for livestock/cattle grazing herding and public access</li> <li>- Firefighting equipment must be held on site</li> <li>- An emergency response plan and an emergency assembly point are required. Smoking areas must be within the camp site on a paved surface.</li> <li>- No open and uncontained fires are allowed on site, other than at a designated area within the camp site. This area must be paved, and fires must be made within a drum or similar with no potential for spreading. Burning of waste for warmth is prohibited.</li> <li>- All complaints received from the public must be documented in a register, with the date and time, name of complainant, complaint and close out status and persons involved in close out. The public must be made aware of this register via signage or the PLC. This register must be available for review by the ECO and DEDTEA.</li> <li>- Community members/those residing in the community must be given first preference for employment and procurement opportunities.</li> <li>- All agreements made between the residents with the contractor, or applicant, must be documented and held on site for land usage/leasing, leasing of toilets or other facilities, instances where</li> </ul>	Contractor	From site establishment and ongoing during construction



	<p>community has requested acquisition of material etc.</p> <ul style="list-style-type: none"> <li>- Ensure that all materials/stockpiles are stored in such a way that they may not cause harm to both social and natural environment</li> <li>- Employment opportunities must be given to community members, and women in particular, in line with contract specifications and skills level.</li> </ul>		
<p><b>Palaeontological and Cultural</b></p>	<ul style="list-style-type: none"> <li>- The following procedure must be undertaken if fossils are seen on the surface and when excavations commence: <ul style="list-style-type: none"> <li>· When excavations begin the rocks and soil must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, plants, insects, bone, and coal) should be put aside in a suitably protected place. This way the construction activities will not be interrupted.</li> <li>· Photographs of similar fossil plants are provided in the EMP and will be included in the training program to help staff recognize the fossil plants in the shales and mudstones.</li> <li>· Photographs of the putative fossils if observed can be sent to the paleontologist for a preliminary assessment.</li> <li>· A qualified paleontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible. The frequency of inspections should be dependent on the finding of any potentially important fossil material.</li> </ul> </li> </ul>	Contractor	From site establishment and ongoing during construction

	<ul style="list-style-type: none"><li>· Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the paleontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.</li><li>· If no good fossil material is recovered, then no site inspections would be necessary and a final report by the paleontologist can be sent to SAHRA.</li><li>· If no fossils are found and the excavations have finished, then no further monitoring is required</li></ul> <p>– For heritage/cultural resources, the following procedure is required:</p> <ul style="list-style-type: none"><li>· For any chance finds of heritage resources, such as graves or archaeological residues, all work must cease in the area affected and the Contractor must immediately inform the Engineer and ECO. A registered heritage specialist must be called to site for inspection. The relevant heritage resource agency (Amafa) must also be informed about the finding.</li><li>· The heritage specialist will assess the significance of the resource and provide guidance on the way forward.</li><li>· Written permission must be obtained from Amafa if heritage resources are to be removed, destroyed or altered.</li></ul>		
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	<ul style="list-style-type: none"> <li>· All heritage resources found in close proximity to the construction area must be protected by a 5m buffer in which no construction can take place. The buffer material (danger tape, fencing, etc.) must be highly visible to construction crews.</li> <li>· Under no circumstances may any heritage material be destroyed or removed from site unless under direction of a heritage specialist.</li> <li>· Should any remains be found on site that is potentially human remains, the South African Police Service (SAPS) should also be contacted. No SAPS official may disturb or exhume such remains, whether of recent origin or not, without the necessary permission</li> </ul>		
<b>POST CONSTRUCTION/OPERATION</b>			
<b>Site de-establishment and rehabilitation</b>	<ul style="list-style-type: none"> <li>- Disassemble and remove all temporary structures, including all hardened surfaces, bund areas, sumps etc.</li> <li>- Demolish any structures no longer required and dispose the waste material, including other waste (concrete, litter, domestic waste) at a registered waste disposal site according to the waste stream and retain disposal slips.</li> <li>- Completely remove all residual stockpiles, materials and implements</li> </ul>	Contractor	After completion of construction

	<ul style="list-style-type: none"><li>- Disconnect and disassemble any power, water, and sanitation infrastructure on site and remove from the site.</li><li>- Repair all erosion</li><li>- Ensure that when final restoration is complete, all alien invasive plants/weeds have been removed and destroyed, and erosion has been repaired and no opportunities exists for instability, wash-away or erosion issues</li> <li>- Contour the site so that it is continuous with the surrounding topography or micro topography and ensure that no troughs are created during the backfilling process where water will accumulate.</li> <li>- Riparian and channel bank areas that are damaged as a result of the construction activities must be reshaped and revegetated.</li> <li>- The quickest and most suitable method is through the use of a grass mix that includes Eragrostis tef, a fast growing pioneer grass. Once the grass cover is established, a once off removal of all alien invasive plants from the construction footprint should be undertaken.</li> <li>- The use of attenuators, such as chambers and gabion mattresses are recommended for</li></ul>		
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	installation at points of release of storm-water into any of the watercourses		
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## 11. CONCLUSION

Management and mitigation measures are presented herein for the activity. It is the applicant's responsibility to ensure that this EMPr is made binding on the contractor by either including the EMPr in the contract documentation or allotting a blanket item for environmental management in the contract document. The contractor should thoroughly familiarise himself with the requirements of the EMPr and appoint an environmental site officer to oversee the implementation of the EMPr on a day-to-day basis. Non-compliance with the EMPr is a legal offence and the DEDTEA can take legal action against an individual, organisation or group.

The impacts of the activity and project as a whole can be mitigated or managed through implementation of this EMPr.

Annexure A: Specialist studies: Ecological, heritage and palaeontological, and geotechnical.





