ENVIROPRO

IN ASSOCIATION WITH INKANYEZI YETHU

JULY 2019
ENVIRONMENTAL MANAGEMENT PROGRAMME
CONSTRUCTION OF THE P303 PIPE CULVERTS AND BRIDGE
EDUMBE LOCAL MUNICIPALITY
THE KWAZULU-NATAL DEPARTMENT OF TRANSPORT

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SECTION 1 INTRODUCTION, PROJECT AND SITE DESCRIPTION

1.1. Background

The KwaZulu-Natal Department of Transport (DoT) propose to construct one (1) bridge (along a new alignment) and replace two (2) culverts along the P303 road, within Ward 1 of the eDumbe Local Municipality. The existing bridge structure at river crossing (RC) 3 will be repaired. The structures are located approximately 11.6km west of Paulpietersburg (as the crow flies) at the following RC locations, RC1: 27°24'43.15"S; 30°41'54.68"E, RC2: 27°24'42.61"S; 30°41'10.08"E, RC3: 27°24'45.30"S;30°40'38.64"E, and RC4: 27°24'33.93"S;30°40'0.48"E. RC1 crosses a tributary of the Mpipambi River whereas RC2-4 crosses tributaries of the Bazangoma River. Existing structures are severely damaged and will be replaced. Existing structures at RC1-2 are severely damaged and will each be upgraded to 1 x 1200mm pipe culverts whereas a bridge will be constructed along a new alignment at RC4. The bridge will consist of a three (3) span pre-stressed concrete been and reinforced concrete slab deck simply supported on reinforced concrete abutments and piers with piled foundations.

Please note to improve the usability of this document on site items related to the two 1x1200mm pipe culverts at RC1 and RC2 are written in **BLUE** and items related to the one bridge at RC4 are written in **RED**.

1.2. Scope of Work

Prepare a site specific EMPr for the construction of the two pipe culverts and one bridge along the P303 road in order to manage and mitigate potential environmental impacts during construction. The provisions of this EMPr are binding on the contractor throughout the life of the contract.

1.3. General Principles and Purpose of This EMPr

The purpose of this EMPr is to provide guidance to all contractors and site workers on how to operate in a responsible manner to achieve these goals and ensure that the requirements of the legislation are met. This EMPr is a working document to be used during construction and has been generated to ensure that:

- The protection of the environment during the construction period.
- All emissions to air water and soil are controlled and managed to mitigate their impacts on the environment and surrounding communities.
- Nuisance factors associated with construction are controlled as far as is reasonably possible.
- The correct principles are followed from the very beginning during site set up thereby reducing frustrations on the part of the contractor when asked to comply with the strictures of the EMPr and relevant environmental legislation.
- The post construction clean-up is carried out correctly so as to avoid environmental impacts and meet the legislated requirements.

This EMPr is subject to change as brought about by variations in the project specification and any changes must be approved by the relevant authorities.

1.4. Responsibilities

The Project Applicant (Department of Transport) is responsible for:

- Ensuring that the engineer and contractors comply with the approved EMPr.
- Ensuring compliance with the provisions for duty of care and remediation of damage in accordance with section 28 of the National Environmental

Management Act (NEMA), (No. 107 of 1998) and its obligations regarding the control of emergency incidents in terms of Section 30 of NEMA.
- Notifying the relevant authorities (EDTEA) of any incident as defined in subsection 30(1) (a) of NEMA.
- Ensuring that the mitigation measures to address environmental impacts identified are carried out by the contractor.

The Project Manager or Engineer (Rupee Consulting) is responsible for:
- Appointing a qualified contractor and ensuring that they have read and understood the EMPr.
- Ensuring all work undertaken is in accordance with the EMPr.
- Ensuring adherence to safety, health and environment (SHE) standards and ensuring the construction activities comply with the EMPr.
- Arranging for the site to be monitored on a daily basis to ensure compliance with the EMPr.
- Overall responsibility and accountability for the site during the construction phase.
- Mitigating impact on the environment through responsible operation and adherence to the EMPr.
- Ensuring transparency in their operation and environmental management of the site.
- Managing the contractor to ensure that they adhere to the EMPr and ensuring that all necessary documentation is maintained on site.
- Ensuring that the contractor has a copy of the EMPr and Method Statements.

The Site Contractor(s) is/are responsible for:
- Providing a suitable person to operate as Environmental Officer (EO) to undertake the monitoring of the day to day requirements of the EMPr.
- Operating in accordance with the EMPr and carrying out construction activities with due care and diligence.
- Ensuring that any communications from stakeholders are reported to the Environmental Control Officer (ECO).
- Maintaining relevant documentation for review by the ECO.
- Undertaking the mitigation measures to address environmental impacts identified.

The Environmental Officer (EO) or designated Safety Health Environment (SHE) officer is responsible for:
- Daily compliance monitoring of construction against the requirements set out in this EMPr, and the environmental authorization.
- Undertaking the mitigation measures to address environmental impacts identified.
- Ensuring that all site staff are adequately trained in environmental matters.
- Liaising with site staff and I&APs through the Community Liaison Officer (CLO), if required.
- Must be conversant with the applicable legislation pertaining to the environment.
- Liaise directly with the ECO on the monthly audit findings.
- Identification of possible areas of improvement during construction.
- Monitoring the construction site on a regular basis and recording key findings.
- Advising the Project Manager and the contractors on environmental matters.
- Provide recommendations to address and rectify these matters.
- Monitoring implementation of the EMPr by the contractor.
- Work hand in hand with the health and safety officer.
- Maintain records pertinent to the requirements of the EMPr.

The Environmental Control Officer (ECO or Independent environment practitioner) is responsible for:

- Conducting regular auditing against the requirements of the EMPr and Environmental Authorization.
- Liaising directly with the EDTEA and supplying them with copies of the audit reports.
- Liaising directly with the contractor and EO and supplying them with a copy of the audit reports.

1.5. Monitoring

The key to a successful EMPr is effective monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. The EO must be responsible for day-to-day monitoring and reporting while the ECO must undertake to monitor the site on a monthly basis. The day-to-day monitoring must be conducted by the EO in conjunction with the contractor and the engineer. The monthly audit report by the ECO can then be used to provide external monitoring and reporting to EDTEA Compliance and Enforcement. Paramount to the reporting of non-conformances or incidents is that corrective and preventive action plans are developed and adhered to. Photographic records of all incidents and/ or non-conformances must be retained. Non-compliances identified by the ECO must be resolved within fourteen days of being noted, incidents that are deemed by the ECO to have a large environmental impact must be resolved immediately.

1.6. Applicable Legislation

The site engineer must be aware of any compliance issues raised by the EO and ECO and must ensure that the necessary corrective measures are implemented. As per the National Environmental Management Act No 107 of 1998 (Section 28), offending parties may be held financially accountable for any pollution or environmental damage.

The following environmental legislation must be adhered to:

- Constitution of South Africa (Act No. 108 of 1996)
- National Environmental Management Act (Act No 107 of 1998) – NEMA
- Environment Conservation Act (Act No 73 of 1989)
- National Heritage Resources Act (Act No 25 of 1999)
- National Water Act (Act No 36 of 1998)
- Hazardous Substances Act (Act No. 15 of 1973)
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
- Occupational Health and Safety Act (Act No 85 of 1993)
- National Environmental Management: Waste Management Act (Act No. 59 of 2008)
- National Building Regulations and Building Standards Act 103 of 1977
- Relevant local bylaws

This EMPr meets the requirements of the stipulations provided in Appendix 4 of NEMA, 1998 (Act No. 107 of 1998) Environmental Impact Assessment Regulations, 2014 with regards to the content of EMPr. This EMPr has been developed to specifically address the impacts related to this project in each phase of development.

1.7. Layout of the EMPr

The EMPr is divided into five sections dealing with an Introduction and description of the proposal and the site, Pre Construction and Site Set Up, Construction Activities and Post Construction, Rehabilitation and Operation Activities. Sections 4 and 5 provide definitions and records that can be used to record training, incidents, and complaints. Under the construction section, each section deals with a specific aspect of the development i.e. administration and records. Within these sections, the specific activity is described and the mitigation action required is provided. The tables have been set up to enable ease of auditing with a section for the EO/SHE officer or ECO to state whether mitigation measures have been put in place and to make comment about any problems noted.

1.8. Project Details

The KwaZulu-Natal Department of Transport (DoT) propose to construct one (1) bridge (along a new alignment) and replace two (2) culverts along the P303 road, within Ward 1 of the eDumbe Local Municipality. The existing bridge structure at river crossing (RC) 3 will be repaired. The structures are located approximately 11.6km west of Paulpietersburg (as the crow flies) at the following RC locations, RC1: 27°24'43.15"S; 30°41'54.68"E, RC2: 27°24'42.61"S; 30°41'10.08"E, RC3: 27°24'45.30"S;30°40'38.64"E, and RC4: 27°24'33.93"S;30°40'0.48"E. RC1 crosses a tributary of the Mpipambi River whereas RC2-4 crosses tributaries of the Bazangoma River. Existing structures are severely damaged and will be replaced. Existing structures at RC1-2 are severely damaged and will each be upgraded to 1 x 1200mm pipe culverts whereas a bridge will be constructed along a new alignment at RC4. The bridge will consist of a three (3) span pre-stressed concrete been and reinforced concrete slab deck simply supported on reinforced concrete abutments and piers with piled foundations.

The watercourse crossing structures at RC1 and RC2 will each comprise of 1x1200mm diameter concrete pipe culverts. The culverts will be supported by an inlet and headwall on either side of the road. Gabion Baskets may be constructed for additional protection at each of the crossing points if required. The existing structure at RC3 will be repaired. Please see the table below describing the structures to be constructed:

Crossing Structure	Culvert Type	Width	Length	Height	Area (m^2)	Volume (m^3)
RC1	1x1200mm (pipe)	4.96m	8m	1.8m	39.68	71.42
RC2	1x1200mm (pipe)	4.96m	8m	1.8m	39.68	71.42
TOTAL					79.36	142.84

The proposed 1x1200mm (RC1 and RC2) pipe culverts will comprise:

- Wing walls downstream and upstream on either side of the watercourses. Compacted backfill will be placed between the walls;
- The approaches will be backfilled with selected material; and
- Gabion Baskets will be constructed for additional protection at the crossing points where required.

The proposed Bridge (RC4) will be a three (3) span pre-stressed concrete beam and reinforced concrete slab deck simply supported on reinforced concrete abutments and piers with piled foundations. The Department of Transport proposes to construct the Bridge, along a new alignment, to the following specifications:

The proposed Bridge (RC4) will be a three (3) span pre-stressed concrete beam and reinforced concrete slab deck simply supported on reinforced concrete abutments and piers with piled foundations. The Department of Transport proposes to construct the Bridge, along a new alignment, to the following specifications:

- The bridge will be 72.65 m in length and 10.83 m wide:
  - The deck will be 3 m in height maximum above the natural ground level;
  - The bridge will have two piers and will be spaced as per the following:
    - Abutment 1 ↔ Pier 1 = 21.38 m
    - Pier 1 ↔ Pier 2 = 21.75 m (River channel)
    - Pier 2 ↔ Abutment 2 = 21.38 m
    - Large spans have been incorporated into the design to try and avoid blocking the macro-channel of the river.
- The total area of the construction footprint is as follows:
  - Total area – 559m^2 (abutments, piers and temporary crossing)
- The volumes of soil/sand this will be removed is as follows:
  - Total volume – 280m^3 (piers and temporary crossing – abutments are outside the watercourse).

The location of the site camps must be approved by the ECO and must be on land that is previously disturbed however the Figures 1 below provides recommended locations for the site camp associated with the culverts and bridge.

Figure 1: Recommended locations for both site camps associated with the proposed construction of the two pipe culverts and one bridge.

1.9. Construction Methodology

Please note construction of the culverts and bridge will commence in the dry season this will ensure there is little to no water within the watercourses. If required for construction purposes the water within the watercourses will be redirected around the active work zone, however the flow of the watercourse will still remain in the river channel. Sand bags acting as impeding structures will be manually placed within the watercourses to redirect the flow. 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 flow on it most desired course.

The proposed construction methodology for the two pipe culverts (1x1200mm) can be summarised as follows:

- Necessary clearing and grubbing of the site for access and construction of the works will be done. This will include the clearing and cleaning of vegetation within the construction footprint of the site which will also include a 5m construction servitude on either side of the culvert's footprint;
- Clearing and grubbing of the site will be undertaken by heavy machinery i.e. a TLB. Bulk earthwork will take place once the site has been prepared;
- Once the above has been completed the construction of the new culverts will commence;
- Bedding material will be compacted into the area excavated by a TLB;
- Once the pipes have been cast there will be no further major works within the watercourse;
- Once the culvert has been completed the area surrounding the culvert will be completely rehabilitated back to its original state;
- Finally, rehabilitation / re-vegetation of all areas affected by the upgrade and construction activities will be undertaken using intensive grass sod planting or hydro seeding with a suitable indigenous grass seed mix, characteristic of the Paulpietersburg Moist Grassland (Gm 15) (i.e. vegetation type pertinent to the proposed site). The indigenous grass seed mix will be chosen for the rehabilitation.

The proposed construction methodology for the bridge at RC4 can be summarised as follows:

- Necessary clearing and grubbing of the site for access and construction of the works will be done. This will include the clearing and cleaning of vegetation within the construction footprint of the site which will also include a 5m construction servitude on either side of the structures footprint.
- There is very limited vegetation within the watercourse that is to be cleared. The only vegetation that will be cleared from both sides of the river are heavily grazed veld and a few indigenous *Acacia* trees however, these trees are not of conservation importance. Numerous alien invasive vegetation will also be cleared.
- 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.
- The existing bridge and approach road will not be demolished. The existing bridge will be used as a diversion while the proposed bridge is being constructed.
- Heavy machinery i.e. a TLB will be used to excavate soil this will be at the position of the two piers 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.
- A piling rig will be used to insert piles at theses excavated sites for the abutments and piers. Foundation rebar will be tied to these piles.
- Ready-mixed concrete will be brought to site and used to cast the base slab to attach to these piles.
- Formwork will then be used to form the shape of the abutments and piers and ready-mixed concrete will be poured to form these abutments and piers.
- 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.

- Wing walls will also be cast and selected material will then be used to backfill behind the wing walls. This material will then also be used to form the shape of each approach.
- Once the bridge has been completed the temporary crossing will be completely rehabilitated back to its original state. This will include removing the concrete pipes and the ripping up of the compacted earth along the detour and contouring the watercourse banks if necessary.
- Finally, rehabilitation / re-vegetation of all areas affected by the upgrade and construction activities will be undertaken using intensive grass sod planting or hydro seeding with a suitable indigenous grass seed mix, characteristic of the Paulpietersburg Moist Grassland (Gm 15) (i.e. vegetation type pertinent to the proposed site). The indigenous grass seed mix will be chosen for the rehabilitation.

Figure 2: Aerial photograph showing an overview of two pipe culverts (RC1 and 2), one bridge to be repaired (RC3), and one bridge to be constructed (RC4), respectively. QGIS, ver. 3.2.2.

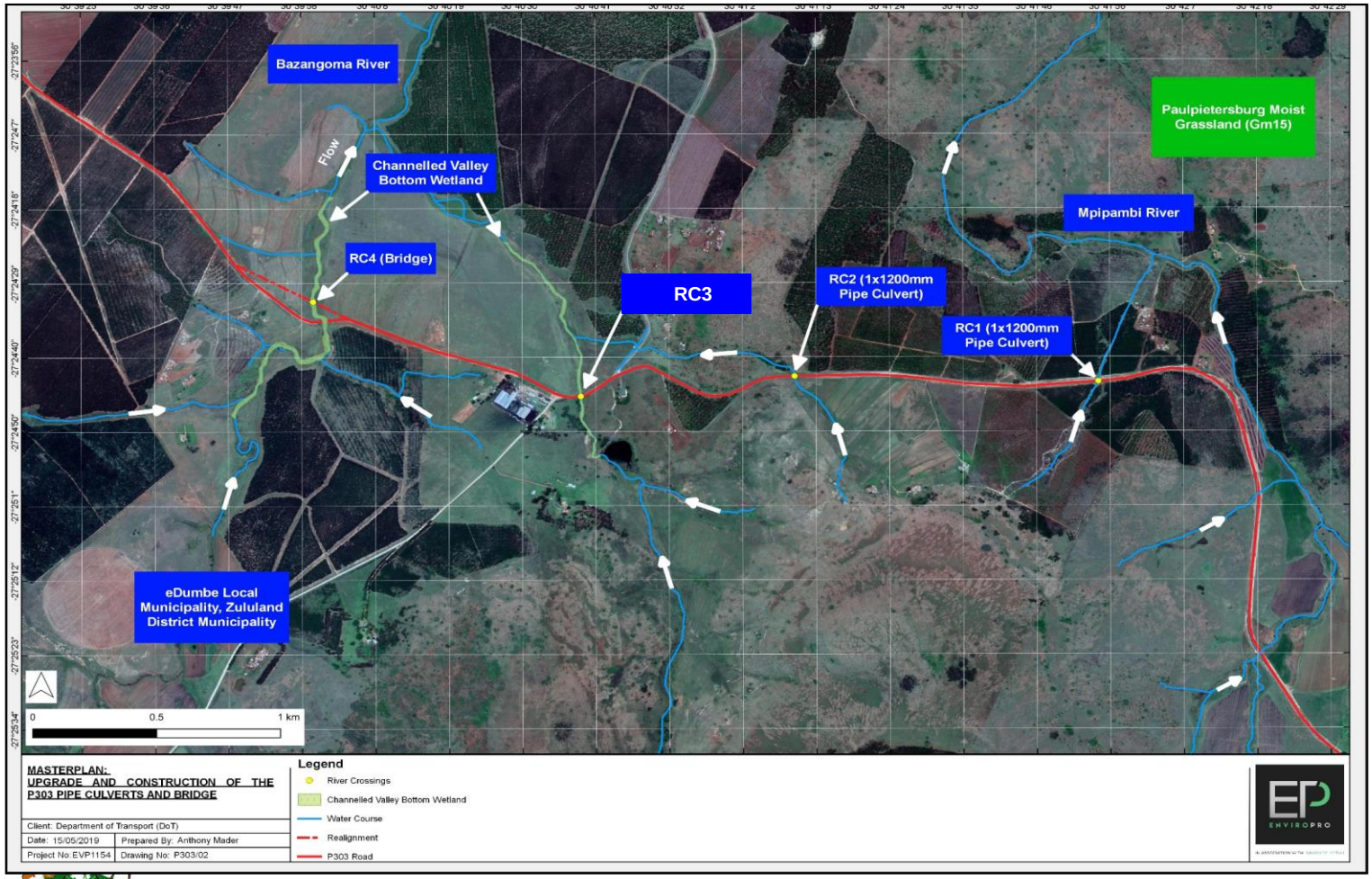


Figure 3: Aerial photograph showing an overview of the pipe culverts (RC1), located 27°24'43.15"S; 30°41'54.68"E. QGIS, ver. 3.2.2.

Figure 4: Aerial photograph showing RC2 located at 27°24'42.61"S; 30°41'10.08"E. QGIS, ver. 3.2.2.

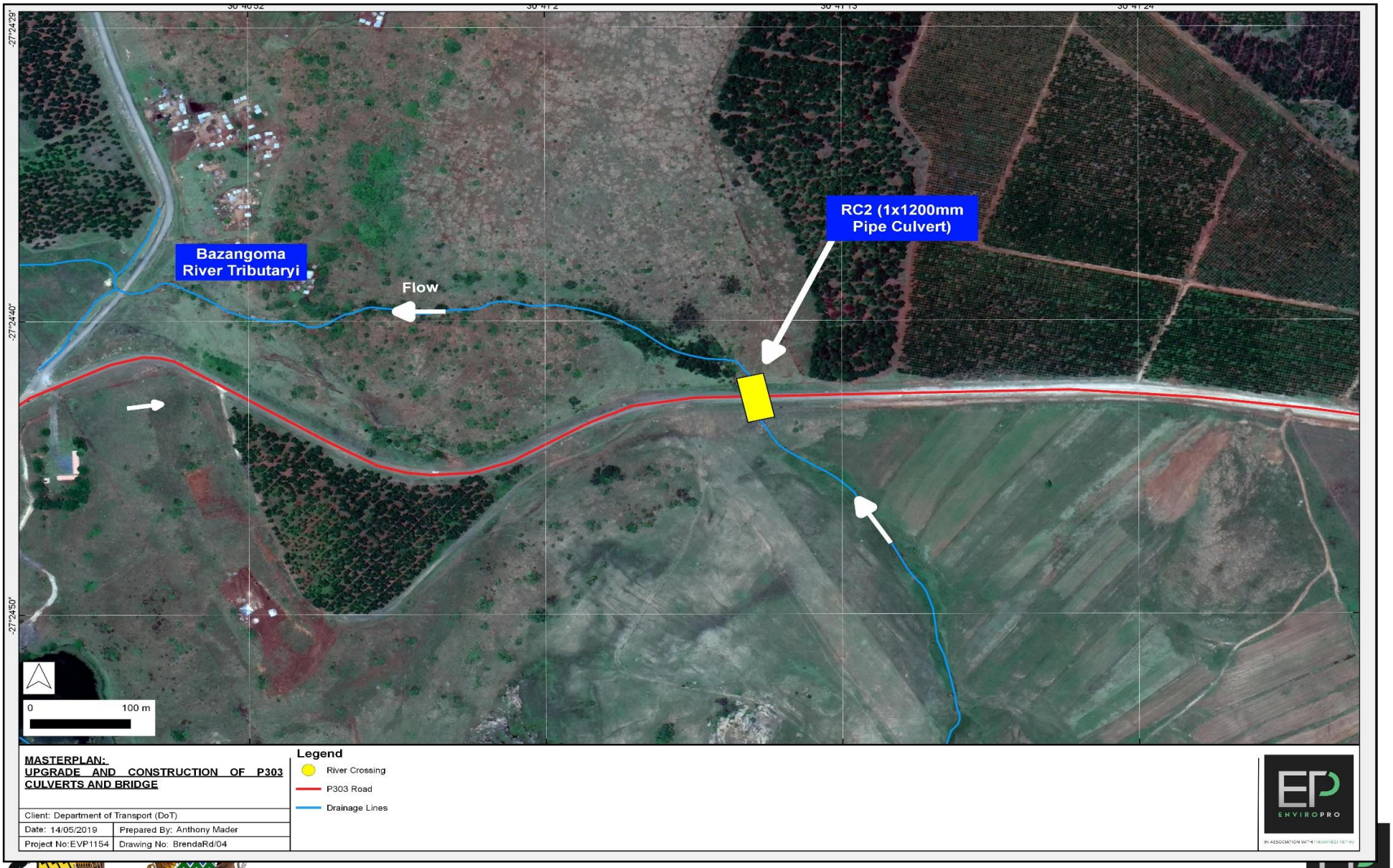
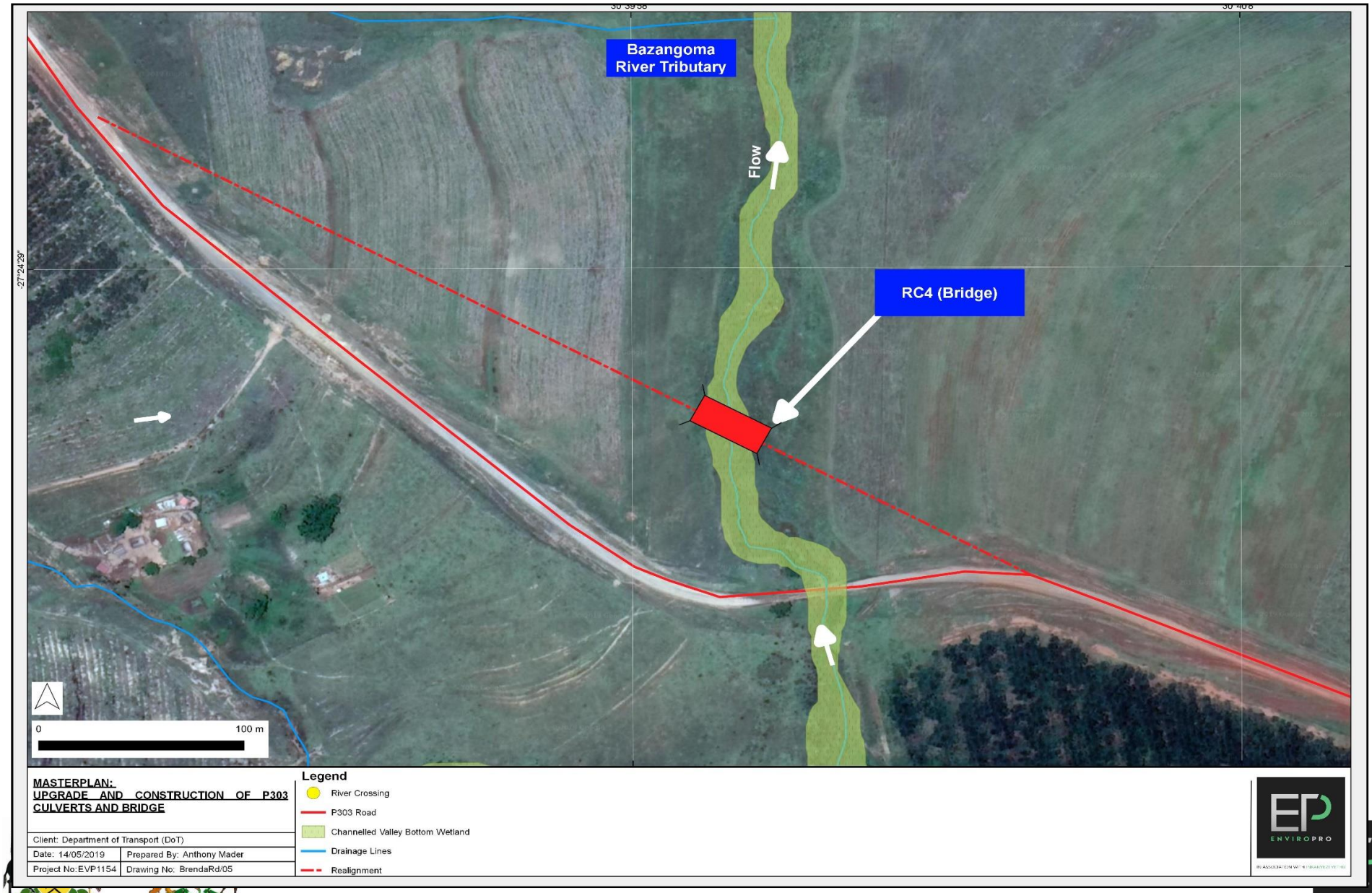


Figure 5: Aerial photograph showing RC3, located at 27°24'45.30"S; 30°40'38.64"E, to be repaired. QGIS, ver. 3.2.2.

Figure 6: Aerial photograph showing RC4 located at 27°24'33.93"S; 30°40'0.48"E. QGIS, ver. 3.2.2



1.10. Table of Responsibilities

This is to state that the undersigned have received a copy of the Environmental Management Plan (EMPr) developed for this site by *EnviroPro* dated August 2017. Any contravention of the EMPr must be recorded and corrective action must be carried out. Any changes to the EMPr must be approved by the *Environmental Control Officer (ECO)*, the consultant *EnviroPro* and the relevant authority. Such changes are to be made in writing and a record must be maintained.

The undersigned do hereby agree to abide by the structures of the Environmental Management Plan (EMPr) and accept responsibility for ensuring adherence to the Construction EMPr as it relates to the following areas:

Table of Responsibilities				
Job description / title	**Scope of work or area of responsibility i.e. camp drainage, construction camp , housekeeping etc.**	**Responsible person (Name)**	**Signature**	**Date**

1.11. Names and Telephone Numbers of Contact Persons

The following list of contacts must be printed and made clearly visible on the site.

Contact List			
Designation	**Organisation**	**Name**	**Contact number**
Applicant	Department of Transport	Siboniso Mbhele	031 700 2222
Consulting Engineer	Hatch	Gary Hooper	031 536 9400
Independent Environmental Practitioner and ECO	EnviroPro	Josette Oberholzer Iain Jourdan	031 765 2942
Environmental Authority (Enforcement & Compliance)	EDTEA	Compliance Officer	
Reporting for Incidents involving Watercourses	DWS	Compliance Officer	
Wildlife Related Incident	Ezemvelo KZN Wildlife	Dominic Wieners	033 845 1455
Heritage Resources	AMAFA	Bernadet Pawandiwa	033 394 6543
Fire Emergency	Fire Department	-	10111
Crime Emergency	Police	-	10111

SECTION 2 SITE SPECIFIC IMPACTS AND MITIGATIONS AS IDENTIFIED IN THE BAR

RC1

(a): Image showing existing structure at RC1 and P303 road. Note sedimentation of pipe; **(b):** Image showing upstream characteristics of the existing P303 structure **(c):** Additional image showing downstream of RC1.

RC2

(a): Image showing upstream characteristics of RC2; **(b):** Image showing downstream characteristics at RC2 **(c):** Additional image showing surrounding land use at RC2.

RC3

(a): Image showing P303 approaching RC3. **(b):** Photograph showing downstream characteristics at RC3 **(c):** Image showing upstream characteristics at RC3 and associated deteriorated infrastructure to be repaired. **Note, this existing structure, at RC3, will only be repaired and not upgraded.**

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
There is the potential for erosion to take place within the tributaries of the Bazangoma and Mpipambi Rivers resulting in downstream sedimentation of this eroded material. This is attributed to the clearing and the operation of the construction site within the tributaries of the Bazangoma and Mpipambi Rivers.	The following measures must be carried out to mitigate against erosion on the RC1-2 sites: • The areas of the tributaries of the Bazangoma and Mpipambi Rivers that are not within the direct project footprint must be demarcated as 'no-go' areas. • All construction activities occurring within the tributaries of the Bazangoma and Mpipambi Rivers 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.	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
	• 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 culverts in the dry season. • No excavated material or fill material may be stored within the tributaries of the Bazangoma and Mpipambi Rivers or within 32m of the tributaries of the Bazangoma and Mpipambi Rivers. • Bedding material that will be used must not be stored within 32m of the tributaries of the Bazangoma and Mpipambi Rivers before it is used.			
There is the potential for sedimentation to take place within the tributaries of the Bazangoma and Mpipambi Rivers due to the temporary crossing. The sedimentation may be minor to continual usage of the crossing or major due to a complete failure of crossing	llowing measures must be carried out to mitigate against sedimentation due to the usage of the temporary crossing: • The entire temporary crossing must be lined with sandbags to avoid sediment water interfaces. • Any damage to the temporary crossing must be immediately repaired by the contractor. • Any blockages of the concrete pipes must be removed as soon as possible. • The temporary crossing must be designed as to allow for the flow in the river to be maintained. i.e. the structure must not cause a damming effect within the river.	CON/EO		
The habitat for fauna living within the construction footprint will be modified due to the excavation and construction activities taking place within the tributaries of the Bazangoma and Mpipambi Rivers.	llowing measures must be carried out to mitigate against excessive habitat destruction on the pipe culvert sites: • 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 tributaries of the Bazangoma and Mpipambi Rivers and Channelled Valley Bottom wetland substrate/habitat outside the construction footprint must be avoided by ensuring the tributaries of the Bazangoma and Mpipambi Rivers and the Channelled Valley Bottom	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
	wetland 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; • Contamination of the river system with unset cement or tributaries of the Bazangoma and Mpipambi Rivers must be prevented as it is detrimental to aquatic biota.			
Clearing of the two pipe culvert sites (RC1 and RC2) resulting in the loss of vegetation within the Paulpietersburg Moist Grassland. There will be clearing of up to 79.36m2 of vegetation for the construction of the two pipe culverts.	The following measures must be carried out to mitigate against excessive vegetation clearing on the two pipe culvert sites: • This impact cannot be fully mitigated as it will result in the loss of 79.36m2 of indigenous vegetation found within the Paulpietersburg Moist Grassland (Gm 15) vegetation type. • The vegetation that will be cleared must be restricted to the construction footprint of the pipe culverts. No vegetation may be cleared within the tributaries of the Bazangoma and Mpipambi Rivers other than that required for access to the site or for the construction activities associated with the construction of the pipe culverts. • 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.	N/A		
Removal of alien invasive vegetation found within the pipe culvert construction sites.	• This is a positive impact.	CON/EO		
Careless operation by the contractor within the tributaries of the Bazangoma and Mpipambi Rivers resulting in damage to these River tributaries,	• The following measures must be carried out to mitigate against potential damage to the tributaries of the Bazangoma and Mpipambi Rivers wetland during construction activities: • Areas of the tributaries of the Bazangoma and Mpipambi Rivers not within the construction footprint must be demarcated as no-go areas;	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
i.e. the riverbed, banks and riparian zones within the construction footprint and adjacent areas	• Heavy vehicles must avoid working near the tributaries of the Bazangoma and Mpipambi Rivers and Channelled Valley Bottom wetland as far as possible; • A 32m buffer must be imposed on the rest of the tributaries of the Bazangoma and Mpipambi Rivers and Channelled Valley Bottom wetland with no traffic, vehicles or storage permitted within this buffer zone; • Vehicles may not cross the tributaries of the Bazangoma and Mpipambi Rivers at any other point than the construction footprint; • Non-essential equipment and vehicles are to remain at least 32m from the tributaries of the Bazangoma and Mpipambi Rivers at all times.			
Disturbance of the sites (RC1 and RC2) due to construction activities resulting in the encroachment of alien vegetation into disturbed areas i.e. Castor Oil.	There is currently alien vegetation located within the surrounding area. • Alien vegetation must not be allowed to encroach onto the site and must be continually removed during construction. • Construction must not promote further alien plant disturbances in the surrounding area	CON/EO		
Positive impacts for the community include potential for local employment.	• This is a positive impact.	N/A		
Flood events overtopping the pipe culvert structures (located at RC1 and RC2) damaging the structure integrity of the structures, and making the way impassable for vehicles and pedestrians.	• The dimensions of the pipe culvert structures have been designed according to the hydrological characteristics (e.g. flow rate). Therefore, overtopping of structures by rainfall events is highly unlikely. The following measures must be carried out to mitigate against damage to the structure: • The contractor must build the pipe culverts as per the approved design, as the pipe culverts have been designed to allow for flows associated with a flood greater the a 1:20 year flood to overtop the structure without causing damage. • Conduct regular inspections and maintenance must be conducted on the bridges when required.	CON/EO		
Potential alteration of flow dynamics within the tributaries of the Bazangoma and	• The following measures must be carried out to avoid potential alteration of flow dynamics within the tributaries of the Bazangoma and Mpipambi Rivers:	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
Mpipambi Rivers due to poor placement of the pipe culvert components.	• The contractor must construct the pipe culverts as per the approved design, as the bridge has been designed to ensure that the natural flow of the tributaries of the Bazangoma and Mpipambi Rivers is not interrupted; • Conduct regular inspections and maintenance must be conducted on the pipe culverts when required.			
Blockages of the proposed pipe culverts at RC1 and RC2 impeding flow of the tributaries of the Bazangoma and Mpipambi Rivers, resulting in flooding or drying out of tributaries of the Bazangoma and Mpipambi Rivers.	The pipe culverts must be constructed as per the approved designs • The pipe culverts that will be constructed in the tributaries of the Bazangoma and Mpipambi Rivers must promote the free flow of water and must not create blockages that would result in sedimentation of the watercourses of the watercourses. • Conduct regular inspections and maintenance must be conducted on the pipe culverts when required.	CON/EO		
An increase in hardened surfaces due to pipe culvert designs may increase stormwater runoff resulting in increased erosion of nearby areas and impacting on the tributaries of the Bazangoma and Mpipambi Rivers.	The following stormwater management measures must be implemented to prevent erosion: • Stone pitching stormwater drains must be constructed to direct stormwater flow away from the structure; • Gabion mattresses must be used for slope stabilization; • Kerb and channel drains may be required along steep sections of the approach roads.	CON/EO		
The new pipe culverts will improve the connectivity across the tributaries of the Bazangoma and Mpipambi Rivers.	This is a positive impact.	CON/EO		
Improved storm water management associated with the pipe culverts will prevent further scouring and erosion of the banks	This is a positive impact.	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
associated with the tributaries of the Bazangoma and Mpipambi Rivers.				
Maintenance will be required for the pipe culverts meaning pedestrians entering the tributaries of the Bazangoma and Mpipambi Rivers.	• Maintenance will be required for the pipe culverts meaning pedestrians entering the tributaries of the Bazangoma and Mpipambi Rivers.	CON/EO		

Bridge (RC4)

(a): Image showing existing infrastructure at RC4 **(b):** Image showing downstream characteristics at RC4 **(c):** Image showing upstream characteristics at RC4.

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
There is the potential for erosion to take place within the tributary of the Bazangoma River and associated Channelled Valley Bottom wetland resulting in downstream sedimentation of this eroded material due to clearing and the operation of the construction site within the tributary of the Bazangoma River.	The following measures must be carried out to mitigate against erosion on the RC4 Bridge site: • The areas of the tributary of the Bazangoma River and associated Channelled Valley Bottom wetland that are not within the direct project footprint must be demarcated as 'no-go' areas. • All construction activities occurring within the tributary of the Bazangoma 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 RC4 Bridge in the dry season. • No excavated material or fill material may be stored within the tributary of the Bazangoma River or within 32m of the tributary of the Bazangoma River. • Bedding material that will be used must not be stored within 32m of the tributary of the Bazangoma River before it is used.	CON/EO		
There is the potential for erosion to take place within the Channelled Valley Bottom wetland resulting in downstream sedimentation of this eroded material due to clearing and the operation of the construction site within the Channelled Valley Bottom wetland.	The following measures must be carried out to mitigate against erosion on the RC4 Bridge site: • The areas of the Channelled Valley Bottom wetland that are not within the direct project footprint must be demarcated as 'no-go' areas. • All construction activities occurring within the Channelled Valley Bottom wetland 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 RC4 Bridge in the dry season. • No excavated material or fill material may be stored within the Channelled Valley Bottom wetland or within 32m of the Channelled Valley Bottom wetland. • Bedding material that will be used must not be stored within 32m of the Channelled Valley Bottom wetland before it is used.	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
There is the potential for sedimentation to take place within the tributary of the Bazangoma River and the associated Channelled Valley Bottom wetland due to the temporary crossing. The sedimentation may be minor to continual usage of the crossing or major due to a complete failure of crossing	The following measures must be carried out to mitigate against sedimentation due to the usage of the temporary crossing: • The entire temporary crossing must be lined with sandbags to avoid sediment water interfaces. • Any damage to the temporary crossing must be immediately repaired by the contractor. • Any blockages of the concrete pipes must be removed as soon as possible. • The temporary crossing must be designed as to allow for the flow in the river to be maintained. i.e. the structure must not cause a damming effect within the river.	CON/EO		
The habitat for fauna living within the construction footprint will be modified due to the excavation and construction activities taking place within the tributary of the Bazangoma River and associated Channelled Valley Bottom wetland.	The following measures must be carried out to mitigate against excessive habitat destruction on the RC4 Bridge site: • 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 tributary of the Bazangoma River and associated Channelled Valley Bottom wetland substrate/habitat outside the construction footprint must be avoided by ensuring the tributary of the Bazangoma River and associated Channelled Valley Bottom wetland 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; • Contamination of the river system with unset cement or tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland must be prevented as it is detrimental to aquatic biota.	CON/EO		
Clearing of the realigned RC4 Bridge site resulting in the loss of vegetation within the Paulpietersburg Moist Grassland (Gm 15) vegetation type. There will be clearing of up to 559m^2 of vegetation for the construction of RC4 Bridge.	The following measures must be carried out to mitigate against excessive vegetation clearing on the Bridge site: • This impact cannot be fully mitigated as it will result in the loss of 559m2 of indigenous vegetation found within the Paulpietersburg Moist Grassland (Gm 15) vegetation type. • The vegetation that will be cleared must be restricted to the construction footprint of RC4 Bridge. No vegetation may be cleared within the tributary of the Bazangoma River and associated Channelled Valley Bottom wetland other than that required for access to the site or for the construction activities associated with the construction of the RC4 Bridge.	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
	• 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.			
Removal of alien invasive vegetation found within the Bridge construction site.	• This is a positive impact.	CON/EO		
Careless operation by the contractor within the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland resulting in damage to the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland i.e. the riverbed, banks and riparian zones within the construction footprint and adjacent areas	The following measures must be carried out to mitigate against potential damage to the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland during construction: • Areas of the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland not within the construction footprint must be demarcated as no-go areas; • Heavy vehicles must avoid working near the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland as far as possible; • A 32m buffer must be imposed on the rest of the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland with no traffic, vehicles or storage permitted within this buffer zone; • Vehicles may not cross the tributary of the Bazangoma River and associated Channelled Valley Bottom wetland at any other point than the construction footprint of the RC4 Bridge; • Non-essential equipment and vehicles are to remain at least 32m from the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland at all times.	CON/EO		
Disturbance of the RC4 Bridge site due to construction activities resulting in the encroachment of alien vegetation into disturbed areas i.e. Castor Oil.	• There is currently alien vegetation located within the surrounding area. • Alien vegetation must not be allowed to encroach onto the site and must be continually removed during construction. • Construction must not promote further alien plant disturbances in the surrounding area	CON/EO		
Positive impacts for the community include potential for local employment.	• This is a positive impact.	CON/EO		
Flood events overtopping the Bridge at RC4, damaging the structure integrity of the bridge, and making the way impassable for vehicles and pedestrians.	• The deck of the structure has been designed to 5m above the natural ground level and therefore the potential of the structure being overtopped is highly unlikely. The following measures must be carried out to mitigate against damage to the structure: • The contractor must build the bridge as per the approved design, as the bridge has been designed to allow for flows associated with a flood greater than a 1:20 year flood to overtop the structure without causing damage.	CON/EO		

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
	• Conduct regular inspections and maintenance must be conducted on the bridge when required.			
Potential alteration of flow dynamics within the tributaries of the Bazangoma River and associated Channelled Valley Bottom wetland due to poor placement of the piers.	The following measures must be carried out to avoid potential alteration of flow dynamics within the tributary of the Bazangoma River and Channelled Valley Bottom wetland: • 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 tributary of the Bazangoma River and associated Channelled Valley Bottom wetland is not interrupted • Conduct regular inspections and maintenance must be conducted on the bridge when required.	CON/EO		
Blockages of the proposed Bridge at RC4 impeding flow of the tributary of the Bazangoma River, resulting in flooding or drying out of tributary of the Bazangoma River and the associated Channelled Valley Bottom wetland.	The bridge will be a three-span pier bridge: • The proposed construction of the Bridge at RC4 must be constructed as per the approved design • The piers will allow for the adequate flow of material and debris underneath; • The large span between piers will prevent any interruptions to the flow of the watercourses; • The bridge that will be constructed in the tributary of the Bazangoma River and the associated Channelled Valley Bottom wetland must promote the free flow of water and must not create blockages that would result in sedimentation of the watercourses. • Conduct regular inspections and maintenance must be conducted on the Bridge when required.	CON/EO		
An increase in hardened surfaces due to a larger bridge design may increase stormwater runoff resulting in increased erosion of nearby areas and impacting on the tributaries of the Bazangoma River and the associated Channelled Valley Bottom wetland.	The following stormwater management measures must be implemented to prevent erosion: • Stone pitching stormwater drains must be constructed to direct stormwater flow away from the structure; • Gabion mattresses must be used for slope stabilization; • Kerb and channel drains may be required along steep sections of the approach roads.	CON/EO		
The new Bridge at RC4 will improve the connectivity across the tributary of the Bazangoma River and the Channelled Valley Bottom wetland.	• This is a positive impact.			
Improved storm water management associated with the proposed Bridge at	• This is a positive impact.			

Nature and Consequences of impact	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Person	In place (Yes / No)	Comments
RC4 will prevent further scouring and erosion of the banks associated with the tributary of the Bazangoma River and the associated Channelled Valley Bottom wetland.				
Maintenance will be required for the proposed Bridge at RC4 meaning pedestrians entering the tributary of the Bazangoma River and the associated Channelled Valley Bottom wetland.	• The maintenance of the Bridge at RC4 must only be conducted when required and for short periods of time.	CON/EO		

SECTION 3 CONSTRUCTION MITIGATION MEASURES

3.0 Site Camp, Storage & Handling of Hazardous and Non Hazardous Materials & Stockpiling

Activity	Required Action / remediation to control environmental impact	Person	In place (Yes / No)	Comments
Location & Establishment of the construction camp	• The construction camps must be marked out with the approval of the ECO.	CON		
	• The site camps must be located on a flat portion of land as depicted in Figure 1 above. • Do not set up the construction camps within 32m of the Bazangoma and Mpipambi Rivers or within an area that will be flooded should water levels rise. • Do not set up construction camps within 32m of any other watercourse.	CON		
	• The site camps must be clearly demarcated and fenced off to prevent illegal entry.	CON		
	• The following areas must be demarcated and clearly marked within the construction camps: ○ **A waste storage area** ○ **A materials storage area** ○ **Areas for fuel and hazardous chemical / flammable goods** ○ **Stockpile areas** ○ **Vehicle servicing and wash bay areas (if required)** ○ **Parking area**	CON		
Establishing storage areas & Stockpiles	• **A waste storage area** must be demarcated and suitable and sufficient waste bins must be provided within the camps. Storage of waste must be on a hard surface, and under cover. Liquid waste must be situated within a bunded area. ○ Liquid waste and accumulated waste must be removed from site monthly by a recognized Waste Contractor.	CON		

	• **A materials storage area** must be identified and designated within the construction camps which must be located more than 32m from any watercourse. Materials, specifically liquid and potentially environmentally hazardous materials must be stored within a bunded area (110% capacity of largest container) and on a hard surface. The storage area must be under cover.	CON		
	• **Areas for fuel and hazardous chemical / flammable goods** must be identified and clearly signposted within the construction camps. An inventory of the materials and volumes stored must be maintained and updated once a week. These areas must be located within a bunded, hard surfaced impermeable area.	CON		
	• **Bulk fuel storage:** No bulk fuel storage to occur on any of the sites.	CON		
	• **Designated areas for stockpiling of raw materials** must be demarcated within the construction camps. No stockpiling is to occur on or near slopes where they could be washed into the surrounding properties or into the rivers. All stockpiling areas must be approved by ECO and must be located more than 32m from the edge of any watercourse.	CON		
	• **Parking:** The contractor must designate parking areas on the sites and ensure that only these parking areas are used. • Vehicles must not park within 32m of any watercourse.	CON		
	• **Vehicle servicing and washing:** only emergency (breakdown where equipment is no longer mobile) and minor maintenance (e.g. greasing) may be done on the sites. ○ A designated area must be set aside for this, which must be hard surfaced and bunded. ○ If emergency repairs are required, this must not be conducted within 32m of any watercourse, riparian zone or wet area. ○ Drip trays must be used. ○ Any other planned or required maintenance must be done off site at a suitable location. ○ Vehicle washing must also be conducted off site at a designated vehicle wash bay, the washbay must be lined with impermeable material and must drain to a sump to ensure hydrocarbons, and	CON		

	other contaminants are separated out of the effluent prior to remaining runoff being discharged into municipal sewer. ○ No cement vehicles may be washed on site.			
Handling of liquids on site	• Decanting of any liquids / chemicals paints etc. must be done within the confines of a drip tray or on a hardened surface within a bunded area. • This must not be carried out within 32m of any watercourse.	CON		
	• Decanting from large containers (e.g. 210L drums) must be done using a hand pump, where possible. If no hand pump is available, liquids must be decanted on a drip tray using a funnel. • This must not be carried out within 32m of any watercourse.	CON		
	• All handling of hazardous materials including cement must take place on a hardened surface or within a drip tray or cement mixing tray. • This must not be carried out within 32m of any watercourse.	CON		
	• Decanting of hazardous materials must take place within the site camp above drip trays or containers to prevent the potential spillage into these areas.	CON		
Inventory and record of substances stored on site	• A full inventory of hazardous substances and Material Safety Data Sheet (MSDS) for each substance stored on site must be maintained and each substance must be stored and managed in accordance with the MSDS.	CON		
Storage of hazardous materials	• Hazardous materials and liquids to be stored in the assigned storage area as per Section 3.0 of this EMPr.	CON		

3.1 Administration & Records

Activity / Document	Required Action	Person	In place (Yes / No)	Comments
Site Specific EMPr	• Keep a hard copy of the Site Specific EMPr on site and ensure that it has been signed and received by the contractor and engineer.	CON		
	• All contractors, the engineers and the ECO must have a copy of the EMPr before coming on to site.	ECO/ ENG		

Records	• Keep records and proofs of all agreements, meetings etc. to demonstrate compliance with this EMPr.	CON		
Proof of raw material sourcing and resource use	• Proof of sustainable source of all materials used must be obtained and documented especially for raw material i.e. topsoil, sands, natural gravels, crushed stone, clay liners, timber etc. In other words, documented proof that materials have been sustainably sourced must be maintained on site for review by EDTEA. o E.g.: sand may only be obtained from an approved sand winning operation, which is licensed by the Department of Mineral Resources (DMR) and has an approved EMPr for operation. o Where materials are borrowed (mined), proof must be provided of authorization to utilise these materials from the landowner / mineral rights owner and the Department of Minerals and Energy.	CON/ EO		
Water abstraction for dust suppression	• Water used on site must be obtained from a municipal source. If this is not available and water needs to be obtained from a nearby water resource then the following will apply: o If water is to be extracted it must be from an approved source and permission from the land owner must be obtained. o If water is extracted no more than 50 000l per day may be extracted. All water use must be registered with DWS. o If water is extracted, a daily record of the volume of water extracted must be retained and: ▪ The driver must record each truck load that is removed and this will be used to determine the volume of water extracted. ▪ These records must be provided to the ECO for record and review. ▪ The ECO must monitor volumes to ensure that usage remains below 50 cubic metres per property per day or that abstracted amounts remain within those allowed by the permit that must then need to be applied for. o Water use must be controlled and reduced wherever possible.	CON/ EO		

Maintenance of the extraction point	• One point of entry must be established and approved by the ECO. Multiple entry points and pathways must not be permitted. • Multiple abstraction points are not permitted. • The abstraction point must not be established within wetland areas or in areas thickly vegetated by riparian vegetation. • The abstraction point must be easily accessible and where possible, located in close proximity to an established road to avoid creation of additional tracks. • The abstraction area must not be located on steep slopes where the point may be come eroded. • Vehicles approaching the extraction point must remain 32m away from the edge of the water resource except where required to pump directly from the stream/river. • No vehicle repairs or maintenance or refuelling may be conducted at the abstraction point. • Damage to the banks of any water resource must not take place. • Should the area become damaged or eroded, erosion protection measures such as sand bags or hessian sheeting must be put in place to allow the re-establishment of vegetation and stabilisation of the area. • Once an abstraction point is no longer being used, the area must be rehabilitated to its former state.	CON/ EO		
Proof of training	• Keep training attendance registers on file at all times.	EO		
Incident records & Photographs	• Keep records of incidents that have occurred and how they were remediated. It is a good idea to take photographs when incidents occur and then to take follow up pictures to demonstrate remediation and keep these on record. • These records must be kept on site for review by EDTEA.	EO		
Appointment of ECO / EO	• Appoint an ECO (Environmental Control Officer) prior to commencement of construction to monitor the entire construction phase.	ENG		
	• Keep proof of appointment and contact details as well as dates of audits.	APP		

Emergency response plan	• An emergency response plan must remain on site as must a copy of the EMPr and the Environmental Authorization.	ECO		
Audits	• A record of audits conducted on the site as well as findings must be kept on site.	CON/ EO		
Permits & Approvals	• Keep all necessary permits and approvals on file i.e. construction licences etc. • These must be kept on site for review by EDTEA.	CON		
MSDSs	• Material Safety data Sheets (MSDSs) are to be kept on site for all hazardous materials.	CON		

3.2 Training & Awareness

Activity	Required Action / remediation to control environmental impact	Person	In place (Yes / No)	Comments
Who should be trained & Frequency of training	• All construction staff must have basic environmental awareness training, which can be conducted at the same time as the required health & safety training.	EO		
	• Staff must be trained on their environmental responsibilities before commencing work and refresher sessions can be conducted during toolbox talks on specific areas causing problems.	EO		
	• Staff must sign training register and Records of training must be kept. • These records must be maintained on site for review by EDTEA.	EO		
Training Content and staff conduct	• Training must include 1. The definition of environment (people + air + soil + water +business); 2. Reasons for conserving and protecting the environment; 3. How the following activities can impact the environment: - Not using assigned ablutions, hazardous materials, uncleaned spills, mixing of cement or paint on soil or grass surfaces, waste management i.e. use of waste receptacles and waste separation for recycling, vehicle washing polluting soil & ground water; litter;	EO		

	4. What to do to prevent the above impacting the environment i.e. assign impermeable mixing areas, no vehicle washing on site, use of waste receptacles and separation of waste to allow for recycling, how to respond in an emergency and deal with a spill; 5. Consideration of neighbours. 6. Do not play music or create any other disturbance to neighbours. 7. Use only the chemical toilets provided. 8. No dumping to occur in sensitive areas on site. 9. Use waste bins provided. 10. Use drip trays provided. 11. Do not build fires for any purpose on the site. 12. Behave in socially acceptable manner and do not use drugs or alcohol on site. 13. There is to be no hunting of wildlife on the site and no setting of snares or traps. No animals are to be harmed or harassed.			
Neighbours & Working hours	• Local community members must be notified of the project through community leaders and must be notified of the existence of any hazardous storage areas as well as the type of chemicals being used on site. This can be achieved through placement of signboards.	CON		
	• Limit hours of operation to weekdays 7-5pm and Saturday mornings 7- 12pm. Neighbours to be notified before construction on weekends takes place.	CON		
	• Advise the adjoining neighbours of the work and hours of work at least one week prior to commencement. This can also be indicated on the signboards.	CON		
	• Neighbours to be advised prior to periods where work will be done outside normal working hours.	CON		

3.3 Sensitive Social Areas, Environmental Areas, Vegetation and Vegetation Clearing and Wildlife				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Community	• The surrounding stakeholders must be made aware of the commencement of construction 30 days prior to construction. Alternate temporary access routes must be determined prior to the commencement of the construction.	CON		
Water Resources Specialist Mitigation Measures	• Temporary storm water channels must be filled with aggregate and/or logs (branches included) to dissipate flows; • Material surrounding and holding the culverts and bridge in place must include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability to accommodate flooding and very low flows; • The pipe culverts and bridge must avoid inundation (damming) of upstream areas by facilitating streamflow and catering properly for both low flows and high flows; • Adequate stormwater drainage depressions and channels with energy dissipaters must be installed; • The culverts and bridge must take into account the scouring action of high flows and gabion structures or similar should be placed on both sides of the culverts and bridge; • Large aggregate outsourced or from the project area must be used for energy dissipation in the channel downstream of the culverts and bridge to reduce the likelihood of scouring the river bed and sedimentation of the catchment; • The removal and control of the alien plants species in the construction footprint; • The crossing level must be at least 0.5m over the river to prevent damming and facilitate crossing during the wet season; • Construction vehicles and machinery must make use of existing access routes; • Laydown yards, camps, and storage areas must be beyond the water resources;	CON/ EO		

	• The contractors used for the project must have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly; • Uncontrolled access of vehicles through the river system must not be permitted; • All chemicals and toxicants to be used for the culvert construction must be stored outside the channel system and in a bunded area; • All machinery and equipment must be inspected regularly for faults and possible leaks, these must be serviced off-site; • All contractors and employees must undergo induction which is to include a component of environmental awareness; • 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; • Action plans must be available on site; • All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the watercourse. 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 the channel must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed banks; • Any exposed earth must be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil; • Large debris must 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; and • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.			
Top soil	• Top soil removed during the excavations must be kept to one side (stored more than 32m from Bazangoma and Mpipambi Rivers). • This must then be re-used for rehabilitation purposes. Soil must be replaced in the same area that it was excavated from. Much of this topsoil, especially the top 30cm will retain grass and vegetation seeds.	CON/ EO		

	• Soil stockpiles must not exceed 2m in height, must be covered, or grassed to prevent erosion caused by exposure to heavy wind or rain.			
Vegetation clearing and planting	• Only vegetation within the development footprint may be cleared. Any vegetation clearing must be done under the supervision of the ECO and Engineer. • No non-indigenous garden variety plants must be used.	CON/ EO		
Alien vegetation control	• On-going control of alien vegetation within the construction area must be maintained.	CON/ EO		
	• An alien eradication program must be in place to control the spread of alien invasive species on site.	CON/ EO		
Cultural and Heritage items	• Should any items with historical or archaeological value be found during construction, these must be reported to AMAFA and work in the affected area must be stopped immediately.	CON		

3.4 Soil, Stormwater Runoff; Erosion

Activity	Required Action / remediation to control environmental impact	Person	In place (Yes / No)	Comments
Stormwater system	• Temporary stormwater protection measures must be established before construction activities commence.	CON		
	• No contaminated runoff or grey water is allowed to be discharged from the Site Camp into the Bazangoma and Mpipambi Rivers or surrounding environment.	CON		
	• Storm water must not be allowed to flow into surrounding properties and must enter existing stormwater channels.	CON		
Storm water Quality	• Only clean stormwater may be diverted to the Bazangoma and Mpipambi Rivers and then precautions must be in place to prevent erosion of the riverbanks. These precautions can include gabion baskets, berms or diversion ditches, sandbags.	CON		
	• Washings from any vessels or any containers must not enter the Bazangoma and Mpipambi Rivers or storm water. These washings are to be contained and removed as waste.	CON		

Incidents	• Entry of any substance (i.e. any material or substance that is not clean stormwater) into the storm water or a water body is considered an incident and must be reported to the ECO **immediately** for the purposes of maintaining the site's incident records.	CON/ EO		
Storm water flow	• The drainage system must be regularly checked to ensure an unobstructed water flow. • Channelled flow must not be permitted to enter the Bazangoma and Mpipambi Rivers where it erodes the banks and damage the streams.	CON		
Erosion Control	• Install erosion barriers (gabion baskets, berms or diversion ditches, sandbags) and other sediment control structures (grates or grids, geofabric) before clearing in order to prevent substances from entering exposed drains or channels.	CON		
	• Identify any steeper areas where erosion is more likely to occur. These areas must be protected from erosion. This can be achieved through planting of vegetation, placement of berms or use of hessian material.	CON/ EO		
	• Regularly check and clean material from behind erosion barriers.	CON/ EO		
	• Sediment / soil must not be permitted to enter the Bazangoma and Mpipambi Rivers. The contractor must install erosion barriers (gabion baskets, berms or diversion ditches, sandbags) and other sediment control structures (grates or grids, geofabric).	CON/ EO		

3.5 Housekeeping, Waste Storage Handling and Disposal

Activity	Required Action / remediation to control environmental impact	Person	In place (Yes / No)	Comments
General Waste Storage	• The waste area to be designated and demarcated within the construction camp (as per section 3).	CON		
	• Solid waste must be stored in covered, tip proof metal drums to be collected and disposed of by a certified waste contractor. • Proof of safe disposal of solid waste must documented and these records must be maintained on site for review by EDTEA.	CON		

Hazardous waste	• Hazardous materials that require disposal (cement, paints, solvents, old fuel/oil etc.) must be disposed of at a registered hazardous landfill site.	CON		
	• These materials must be removed by a hazardous waste contractor. Proof of disposal must be available to the ECO for scrutiny and kept on record. • Proof of safe disposal of solid waste must documented and these records must be maintained on site for review by EDTEA.	CON		
Waste from Chemical toilets	• Install chemical toilets and insure disposal of waste at a licenced disposal facility. Proof of disposal must be kept on site at all times.	CON		
	• Waste from the toilets must be collected on a weekly basis by a registered and reputable company.	CON		
	• Safe disposal certificates for toilet waste must be obtained and kept on site as assurance that the waste was properly disposed of.	CON		
	• Toilets must not be situated on slopes or within 40m of any watercourse and must be secured to prevent them tipping over.	CON		
	• Staff must use facilities provided and are not permitted to use any other areas on site as toilet facilities.	CON		
	• Chemical toilets must be checked daily and cleaned.	CON		
Waste storage and handling	• No waste may be buried or burned on site or dumped on surrounding properties and farmland. All waste must be disposed of at a licences waste disposal facility. Proof of disposal must be kept on site at all times.	CON		
	• All skips must be covered to contain odours and prevent waste from blowing around the site.	CON		
	• A register of all waste generated and disposed of must be maintained.	CON/EO		
	• No dumping is permitted. There must be no dumping on site under any circumstances. The contractor is liable to a fine should there be any evidence of illegal dumping. • The ECO to review damage and advise on rehabilitation measures if required.	CON		

	• Do not place waste containers, skip bins or building materials on steep slopes or within 32m of the stream.	CON/EO		
	• Waste accumulated on site must be removed on a weekly basis. The waste must be moved to a licenced waste disposal facility.	CON		
	• Provide litterbins throughout the site for use by all staff on site.	CON		
Waste separation	• **Hazardous:** Hazardous waste must be stored separately from general waste. ○ Hazardous waste must be disposed of at an approved hazardous waste landfill and safe disposal certificates must be obtained. ○ Hazardous waste includes used oils, lubricants, solvents, solvent based paints, concrete waste, and cement.	CON/EO		
	• **Oils** must be within a bunded storage area and treated as flammable waste. ○ Where possible used oils must be recycled. ○ Safe disposal certificates must be kept on site demonstrating disposal or recycling of the used oils. ○ Solid paint waste may be disposed of as general waste.	CON/EO		
	• **Concrete waste:** ○ Return excess concrete with the delivery truck to supplier for recycling or proper disposal. ○ Any other excess concrete i.e. on-site mixed concrete can be stored in a lined bin for eventual recycling or disposal.	CON/EO		

3.6 Noise				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Noise Generation and suppression	• All construction vehicles must be fitted with standard silencers and be well maintained.	CON		

	• Workers must be trained regarding noise on site and construction hours must be kept to working hours (07h00 to 17h00).	CON		

3.7 Dust & Emissions				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Dust from stockpiles	• Cover any stockpiled fine material that may release dust with plastic.	CON		
Dust from surfaces	• Damp down surfaces and stockpiles as required to reduce windblown dust.	CON		
	• A water cart may be used which must remain on designated roadways if required.	CON		
	• If dust from the site is likely to create problems for nearby residents, these areas must be shielded with shade cloth.	CON		

3.8 Vehicle Maintenance, Operation, Driving On Site and Vehicle Washing				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Access points	• Haulage roads must be demarcated at site set up.	CON		
	• Turning areas must be located within the construction footprint and must be clearly designated.	CON/ EO		
	• Temporary access roads must not be located within adjoining properties.	CON/ EO		
	• No ad hoc haulage roads or turning areas may be created.	CON/ EO		

	• Limit vehicle entry point to the designated access point and ensure no other point of entry is used.	CON/ EO		
	• All vehicles to remain in the parking area designated within the construction site.	CON/ EO		
Vehicle servicing and repairs	• No major equipment or vehicle servicing to occur on site i.e. major disassembly and repair work, clutch replacements and oil or lubricant changes must be carried out at a suitably equipped workshop.	CON		
	• Only minor emergency repairs, i.e. those necessary to get the vehicle moving so that it can be taken to a repair facility to be carried out i.e. stopping of oil leaks, lubricating of hydraulics, changing of buckets / breakers on Excavators and TLBs or changing of tyres. This must be carried out in designated work shop areas within the allowed construction camps. These areas to be hard surfaced and bunded.	CON		
	• Drip trays are to be used by all leaking vehicles and equipment.	CON/ EO		
	• All vehicles to be equipped with drip trays.	CON/ EO		
	• All small machinery used on site must be situated on a drip tray (i.e. pumps, generators, compressors etc.).	CON/ EO		
	• All vehicles to be regularly maintained and maintenance records must be made available on request.	CON/ EO		
	• No leaking vehicles to be allowed on site.	CON/ EO		
	• Any vehicles that are leaking must not be allowed entry to site.	CON/ EO		
	• No vehicles to be washed on site - cement trucks are not permitted to wash out cement mixers on site.	CON/ EO		

	• Only emergency (breakdown where equipment is no longer mobile) and minor maintenance (e.g. greasing) may be done on site. Any other planned or required maintenance must be done offsite at a suitable location.	CON		

3.9 Incidents, Spills and Emergency Response				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Spill kits	• Adequate spill kits and containers for spilled and contaminated material to be on standby on site.	CON/EO		
	• Keep clearly marked booms and/or absorbent material on site to contain spills if they occur.	CON/ EO		
	• All staff must be trained on how to react in the case of an emergency.	CON-SHE		
	• If a spill occurs, stop the source, contain it, clean up in accordance with MSDSs and notify relevant authorities.	CON/ EO		
	• Make staff aware of emergency phone numbers to use in the case of a large spill.	CON/ EO		
Definition of incidents	• All incidents are to be recorded.	CON/ EO		
	• **Minor incidents**: small spills less than 5 l that do not enter stormwater or the stream/river, minor non-compliance with EMPr that does not cause major environmental impact i.e. housekeeping issues etc. ○ **Action:** Supervisor and staff on site to record and address and notify ECO. Take photos of spill. Prevent spill from spreading and contain. Collect spilled material and contaminated soil and place in sealed container for disposal. ECO to advise on remediation measures and to follow up on actions taken to address incident.	CON/ EO		

	○ **Records:** On site incident register.			
	• **Major incidents:** Large spills or any spills that enter stormwater or the stream/river, fires, explosions. Please see definition of a reportable incident provided below. ○ **Action:** Report immediately to ECO, action to be taken to prevent further damage and incident to be reported to authorities. ECO to advise on remediation measures and to follow up on actions taken to address incident. ○ **Records:** On site incident register and report to authorities.	CON/ EO		

3.10 Sewage and Grey Water Management				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Sewage	• Adequate toilet facilities (such as chemical toilets) sufficient in number to cater for the number of staff on site must be provided. One toilet per 15 staff must be provided.	CON		
	• Waste must be managed as per section 3.5 namely removed by licensed contractor and safe disposal certificates retained to prove proper disposal. • Safe disposal certificates must be kept on site for review by the EDTEA.	CON/ EO		
Grey water / wash water	• Grey water must not be permitted to enter the surrounding properties or stormwater.	CON/ EO		
	• Vehicles, especially cement trucks, must not be washed on site these must be washed at a wash bay facility off site.	CON/ EO		
	• Alternately the wash water can be collected and returned with the supplier's truck for disposal by the supplier.	CON/ EO		

SECTION 4 POST CONSTRUCTION, REHABILITATION AND OPERATION

4.0 Post Construction Activities

Activity	Required Action / remediation to control environmental impact	Person	In place (Yes / No)	Comments
Post Construction Audit	• Clearance from the ECO must be obtained to ensure the all of the requirements of the EMPr have been complied with.	ECO		
Stormwater	• The Contractor must check that the stormwater channels are free from building rubble, spoil materials, and waste materials.	CON		
	• Ensure that in the long term; stormwater is protected from ingress by potential pollutants.	CON		
Waste & Spills	• All spillages must be cleaned and contaminated soil must be removed and disposed.	CON/ EO		
	• All remaining waste bins and / or skips must be removed and disposed of. Records of disposal must be retained.	CON/ EO		
	• All excess concrete must be removed from site on completion of works and disposed of. Washing of the excess into the ground is not allowed.	CON/ EO		
	• All excess aggregate must also be removed.	CON		
	• Used oil must have been collected by a registered used oil contractor and documentation to this effect provided.	CON		
	• Surfaces are to be checked for waste products from activities such as concreting are cleared in a manner approved by the ECO.	CON		
	• No litter must be left on site.	CON/EO		
Structures, materials and stockpiles	• Any fences, barriers, or demarcations utilized for the construction phase must be removed and disposed of.	CON		

	• All structures and imported materials within the construction camp must be removed.	CON		
	• The remaining building materials must be removed from the site.	CON		
Damage	• Any damage incurred on the neighbouring homesteads by the contractor must be repaired by the contractor.	CON		
	• Any damage to existing infrastructure must be repaired or replaced on completion of the upgrade.	CON		
Close Out	• A meeting must be held between Engineer, the ECO, and the contractor to approve all remediation activities and ensure that the site has been restored to a condition, which has been approved by the Engineer.	ENG		
Vegetation	• All vegetation planting must be completed and any areas that have been disturbed or cleared must have been rehabilitated and re vegetated.	ECO		
	• Re-vegetation of cleared land must utilize only 100% locally indigenous plant material to ensure no erosion occurs once the site is vacated.	CON/EO		
	• Ensure that no sensitive habitats have been damaged during the construction phase.	ECO		
	• Where habitats have been damaged these must be reported to the ECO and procedures for rehabilitation of these habitats must be undertaken.	CON/EO		
Erosion	• Any eroded soil on paths / roadways / other areas must be collected and replaced in the area from which it was eroded. These high risk erosion areas must be protected from further soil erosion.	CON/EO		

4.1 Rehabilitation				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Rehabilitation of areas surrounding the P20-1 culvert	• Cleared areas to be re-grassed on completion. Indigenous grasses to be used and the use of vetiver or kukuyu grass is not supported. Rather an indigenous grass seed mix must be used to rehabilitate the site. Species within this mix should include *Urochloa panicoides* (Garden Signal Grass), *Pogonarthria squarrosa* (Herringbone grass), *Eragrotis curvula* (Weeping Love Grass) and *Chloris gayana* (Rhodes Grass). • Where possible, vegetation that was removed during clearing must be kept aside and re-used. This can be kept on site in nursery areas or if the replanting occurs within a few days of clearing, can be kept to one side and immediately re-planted. • Grass can be reintroduced by Hydroseeding or planting of grass plugs. • Cleared areas must not be left exposed for periods longer than two weeks and must be re- vegetated in stages as each section is completed. • Where serious habitat damage has taken the damaged must be reported to the ECO. Consultation between the ECO, contractor, and engineer must take place. Whereby the contractor must develop and suitable method statement which must focus on the rehabilitation of the damaged area. This method statement must be approved by both the ECO and engineer. The contractor must then implement this method statement under the supervision of the ECO.	CON/ EO		
Top Soil	• Top soil removed during the excavations must be kept to one side (stored more than 32m from Bazangoma and Mpipambi Rivers) and re-used in the same area that it was excavated from. Much of this topsoil, especially the top 30cm will retain grass and vegetation seeds. • This top soil to be used when re-vegetating and rehabilitating areas cleared for construction/ excavation.	CON/ EO		
Rehabilitation of eroded areas	• Any erosion damage caused during construction must be repaired. The affected area must be reshaped and soil replaced.	CON/ EO		

	• The eroded area must be re-vegetated or measures put in place to control further erosion. The contractor must install erosion barriers (gabion baskets, berms or diversion ditches, sandbags) and other sediment control structures (grates or grids, geofabric).			
Removal of alien invasive plants	• Alien invasive species must be removed on an on-going basis. • Use of chemical pesticides must be avoided and mechanical removal by hand is preferred.	CON/ EO		
Damage to the Kwanomashele River	• Where the Bazangoma and Mpipambi Rivers has been damaged the following measures are to be taken to ensure restoration of the habitat: o ECO must assess the damaged area o Any construction debris or contaminants within the Bazangoma and Mpipambi Rivers must be removed o Original soil structure must be restored o Any impedance or diversion to waterflow must be removed o Area must be vegetated with suitable riparian or wetland species • No loose soil or damaged banks can be left behind after construction.	CON/ EO		

4.2 Operation				
Activity	**Required Action / remediation to control environmental impact**	**Person**	**In place (Yes / No)**	**Comments**
Maintenance of the two culverts and one bridge	• The culverts will require maintenance to ensure that any potential blockages i.e. vegetation and debris are removed ensuring that water flows through unobstructed. This work will be undertaken manually (no machinery) by DoT appointed staff. • Any maintenance on the structure that triggers a Listing Notice as per the EIA Regulation, 2014 must only take place once an environmental authorisation has been received from EDTEA.	APP		
Soil Erosion	• The erosion protection features installed on the site must be checked to ensure, they continue to perform their function during the operational phase of the project.	APP		

Vegetation	• Alien vegetation must be monitored and removed on an on-going basis. • Indigenous vegetation planting must continue on an on-going basis if it is required.	APP		

SECTION 5 DEFINITIONS

Stormwater
Clean rainwater, must be allowed to enter the stormwater system or natural water bodies without causing erosion. Stormwater must not be contaminated with any other substance including soaps, washings, hazardous materials, soil etc.

Grey water
This is wash water that may contain non-hazardous soaps i.e. bath water, vehicle wash water etc. This must not be permitted to enter the stormwater system but can be disposed of in the sewage system or as effluent. If no sewage system is available on site the grey water must be collected and disposed of.

Sewage
Human excrement from chemical toilets.

Raw materials for which source statement must be obtained
Topsoil, sands, natural gravels, crushed stone, asphalt, clay liners, timber etc. E.G.: sand may only be obtained from an approved sand winning operation, which is licensed and has an approved EMPr for operation.

Incidents
All incidents must be recorded. Minor incidents could include small spills of less than 5l that do not enter a water body or any stormwater drains, as well as housekeeping issues and general small non-compliances with the requirements of the EMPr. Major incidents are those that must be reported to the authorities and include all incidents involving contamination of a water body or stormwater or other reportable incidents as defined below.

Reportable incident is defined as 'an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed' NEMA Section 30, 'includes any incident or accident in which a substance (a) pollutes or has the potential to pollute a water resource; or (b) has, or is likely to have, a detrimental effect on a water resource.' NWA Section 20.

SECTION 6 RECORDS

Training Register – Record any training that has taken place.		
Training Conducted:		
Training provided by:		
Date of Training	**Name**	**Signature**

Non-conformance Record – Record any non-conformances i.e. small spills, overflowing waste bins etc.				
Date of Non conformance	**Details of non-conformance**	**Mitigation required**	**Corrective action taken**	**Date action completed**

Complaints register – Record any complaints received from neighbours or the public regarding dust or pollutions, noise or nuisance.					
Date of complaint	**Complainant's Name**	**Complainants Contact Number**	**Details of complaint**	**Corrective action taken**	**Date action completed**

Environmental Emergency Response and Definition of an Incident

Aim of this document	• To effectively manage response to emergency incidents and control these incidents should they occur. • To ensure that such incidents are recorded and, where possible, all measures are taken to prevent them from re-occurring. • To provide a definition for what would be considered a reportable incident in terms of the environmental legislation. Activities covered in this procedure include: • Identification and definition of an incident and whether or not it needs to be reported to the authorities. • Reporting to the relevant authorities in the event that a reportable incident occurs • Procedure to follow in the event of a spill or fire.
Personnel Duties and Responsibilities	The contractor is responsible for: • Ensuring all activities are carried out as per this procedure and that the company complies with relevant legislation. • Maintaining a register of all incidents as well as ensuring that an incident report is generated for each incident, including details of the incident and how it was closed out. • Ensuring that safe disposal certificates are obtained for any waste materials generated as a result of an incident and that this waste is recorded. • Providing the necessary spill kit equipment and drums for storage of contaminated soil etc.
Training Requirements	• All personnel and manpower to undergo a site safety and environmental induction prior to starting work on site. All employees to be trained on how to respond to an environmental incident and who to contact in order to ensure that the incident is addressed and recorded and if necessary reported.
Definition of a "reportable incident"	• In terms of the National Environmental Management Act, major incidents must be reported to the authorities. In terms of the National Water Act, any incident involving a substance which has the potential to pollute a water resource must be reported i.e. any spill of into a watercourse or into the stormwater system must be reported. The relevant sections from the legislation are provided below:
National Environmental Management Act	*As defined by NEMA, section 30 "Control of emergency incidents".* *(1) In this section—* *(a) "incident" means an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed;* *(b) "responsible person" includes any person who—* *(i) is responsible for the incident;* *(ii) owns any hazardous substance involved in the incident; or* *(iii) was in control of any hazardous substance involved in the incident at the time of the incident;* *(c) "relevant authority" means—*

	(i) a municipality with jurisdiction over the area in which an incident occurs; *(ii) a provincial head of department or any other provincial official designated for that purpose by the MEC in a province in which an incident occurs;* *(iii) the Director General;* *(iv) any other Director General of a national department.*
National Water Act	*As defined by the National Water Act section 20 "Control of emergency incidents"* *(1) In this section ``incident'' includes any incident or accident in which a substance -* *(a) pollutes or has the potential to pollute a water resource; or* *(b) has, or is likely to have, a detrimental effect on a water resource.*
Reporting to the authorities	In the event that a reportable incident occurs, the Site Agent / Project Manager and Environmental Control Officer must be notified immediately. No site staff may communicate directly with the authorities. The relevant sections from the legislation are included below: As taken from NEMA, section 30: Control of Emergency Incidents: *(3) The responsible person or, where the incident occurred in the course of that person´s employment, his or her employer must forthwith after knowledge of the incident, report through the most effective means reasonably available—* *(a) the nature of the incident;* *(b) any risks posed by the incident to public health, safety and property;* *(c) the toxicity of substances or byproducts released by the incident; and* *(d) any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment to—* *(i) the Director General;* *(ii) the South African Police Services and the relevant fire prevention service;* *(iii) the relevant provincial head of department or municipality; and* *(iv) all persons whose health may be affected by the incident.* *(4) The responsible person or, where the incident occurred in the course of that person´s employment, his or her employer, must, as soon as reasonably practicable after knowledge of the incident—* *(a) take all reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons;* *(b) undertake cleanup procedures;* *(c) remedy the effects of the incident;* *(d) assess the immediate and long term effects of the incident on the environment and public health.* *(5) The responsible person or, where the incident occurred in the course of that person´s employment, his or her employer, must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including—* *(a) the nature of the incident;* *(b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;* *(c) initial measures taken to minimise impacts;*

	(d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and *(e) measures taken and to be taken to avoid a recurrence of such incident.* *(6) A relevant authority may direct the responsible person to undertake specific measures within a specific time to fulfil his or her obligations under subsections (4) and (5): Provided that the relevant authority must, when considering any such measure or time period, have regard to the following:* *(a) the principles set out in section 2;* *(b) the severity of any impact on the environment as a result of the incident and the costs of the measures being considered;* *(c) any measures already taken or proposed by the person on whom measures are to be imposed, if applicable;* *(d) the desirability of the State fulfilling its role as custodian holding the environment in public trust for the people;* *(e) any other relevant factors.* *(7) A verbal directive must be confirmed in writing at the earliest opportunity, which must be within seven days.* *(8) Should—* *(a) the responsible person fail to comply, or inadequately comply with a directive under subsection (6);* *(b) there be uncertainty as to who the responsible person is; or* *(c) there be an immediate risk of serious danger to the public or potentially serious detriment to the environment, a relevant authority may take the measures it considers necessary to—* *(i) contain and minimise the effects of the incident;* *(ii) undertake cleanup procedures; and* *(iii) remedy the effects of the incident.*
National Water Act section 20: Control of emergency incidents	*(2) In this section, ``responsible person'' includes any person who -* *(a) is responsible for the incident;* *(b) owns the substance involved in the incident; or* *(c) was in control of the substance involved in the incident at the time of the incident.* *(3) The responsible person, any other person involved in the incident or any other person with knowledge of the incident must, as soon as reasonably practicable after obtaining knowledge of the incident, report to -* *(a) the Department;* *(b) the South African Police Service or the relevant fire department; or* *(c) the relevant catchment management agency.* *(4) A responsible person must -* *(a) take all reasonable measures to contain and minimise the effects of the incident;* *(b) undertake clean-up procedures;* *(c) remedy the effects of the incident; and* *(d) take such measures as the catchment management agency may either verbally or in writing direct within the time specified by such institution.*

Spill response	
Responsible Person/s	The spill is reported to the site foreman who must notify his superior. All employees must be made aware of the procedure in case of a spill.
Procedure	1. Identify nature of spill e.g. paint, oil or lubricants 2. Locate spill kit 3. Contain spill according to the training provided 4. Where necessary, contact external spill control contractors 5. Ensure spill does not cause any external contamination (such as storm/ground water or soil) 6. Ensure that cleanup measures are taken if any contamination has occurred 7. Record in emergency response record the: • Nature of incident • Cause of incident • Clean up measures • Mitigation measures taken 8. Record in non-conformance register 9. The ECO and Project Manager will determine if the event qualifies as an incident and take steps to report the incident to the necessary authorities i.e. EDTEA and DWA. 10. The ECO shall review all spill reports
Fire	
Responsible Person/s	The fire is reported to the site foreman All employees must be made aware of the procedure in case of fire.
Procedure	1. Identify source and nature of fire. 2. In case of small fire extinguish with material appropriate to the nature of the fire 3. In case of a large fire contact Fire Department 4. In the site camp, seal off exposed stormwater drains to ensure firewater does not cause any external contamination. If on site, take measures to prevent firewater entering any water body. 5. Ensure that clean-up measures are taken if any contamination has occurred 6. Record in emergency response record the: • Nature of incident • Cause of incident • Clean up measures • Mitigation measures taken 7. Record in non-compliance register 8. The ECO and Project Manager will determine if the event qualifies as an incident and take steps to report to the authorities. 9. The EO shall review incident / nonconformance reports 10. Adjustments will be made, if necessary, to the operational and emergency procedures and the Environmental Management System to prevent future occurrences

Explosion	
Responsible Person/S	The explosion is reported to the site foreman who must notify his superior. All employees must be made aware of the procedure in case of explosion.
Procedure	1. Identify source and nature of explosion. 2. In case of small fire as a result of the explosion, extinguish with material appropriate to the nature of the fire 3. In case of a large fire as a result of the explosion contact Fire Department 4. In the site camp, seal off exposed stormwater drains to ensure firewater does not cause any external contamination. If on site, take measures to prevent firewater entering any water body. 5. Ensure that clean-up measures are taken if any contamination has occurred 6. Record in emergency response record the: • Nature of incident • Cause of incident • Clean up measures • Mitigation measures taken 7. Record in non-compliance register 8. The ECO and Project Manager will determine if the event qualifies as an incident and take steps to report the incident to the necessary authorities i.e. EDTEA and DWS. 9. The ECO shall review spill reports
Resource Requirements	
Materials	• Separate drums for contaminated soil. • Spade and clean soil • Fire equipment

Alien Plant Control Plan

Alien Plant Control Plan	
Activity	**Site Mitigation Measures to control alien plants**
Training and expertise of personnel involved in Alien plant management on site	• It is rare that either a contractor has employees or members respectively with good knowledge of alien plants and their eradication, who can then eradicate these plants effectively and on a near-complete basis. Partial knowledge means that some alien species are missed or ignored or indigenous plants harmed. Partial work, or work that is not sustained is also ineffective in the long run as any residual presence can regenerate and expand quickly, particularly if live material or many seeds still in the ground. • As a result, the contractor must continually train their works as to the importance of alien plant control and at the same time providing them with the correct knowledge as to which plant must be removed and what method must take place.
Alien Invasive Plant Management in construction area	• The construction area must be kept free of alien invasive plants. Regular inspections of the site must take place. The following methods of alien plant control can be adapted: o Mechanical Control ▪ Hand pulling ▪ Manual removal using hand tools ▪ Manual removal using mechanised tools o Chemical Control ▪ Foliar spraying ▪ Handheld spraying ▪ High pressure spraying • The construction area must be rehabilitated immediately following the completion of construction to ensure that alien invasive plants do not become established. • The construction area must be regularly inspected following rehabilitation and alien invasive plants removed if they have become established.
Responsible Use of herbicides	• Problem plants in construction areas usually short-lived weeds for which mechanical methods alone are not successful some use of herbicides may be unavoidable. The following must be followed with the use of herbicides: o Do not spray herbicides in windy conditions o Preferably spray in dry conditions and not prior to any predicted heavy rainfall as most pesticide movement either to the surface or to the groundwater will occur in the first major storm event after application. Heavy losses are reported when application occurs immediately before a major storm. o A buffer zone which must remain untreated must be retained around Kwanomashele River. A minimum buffer of 10m must be retained. This are will have to be managed by mechanical means. o Empty containers or unused herbicides must be disposed of correctly and may not be dumped on site.