ENVIROPRO

IN ASSOCIATION WITH INKANYEZI YETHU

FEBRUARY 2019
ENVIRONMENTAL MANAGEMENT PROGRAMME
TUGELA FERRY IRRIGATION SCHEME UPGRADE
MSINGA LOCAL MUNICIPALITY

EVP1084

+27 31 765 2942

+27 86 549 0342

suzelle@enviropro.co.za

P.O. Box 1391, Kloof, 3640

www.enviropro.co.za

This report was prepared by EnviroPro Environmental Consulting

Josette Oberholzer BSc (Hons) MSc EAPSA certified

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

Iain Jourdan Bsc (Hons) (Dbn)

Tertiary Education:	BSc (Hons)	Geographical Science
Work Experience:	2006 – 2007	Environmental Manager service for Inhlanhla Civils (Pty) Ltd
	2007 – 2010	Senior Manager for KSEMS cc
	2010 – Present	Managing Member of EnviroPro Environmental Consulting

Dustin Bell BSc (Hons) (UKZN)

Tertiary Education:	BSc (Hons)	Environmental Science (*summa cum laude*)
Work Experience:	2011 – 2014	Environmental Consultant for Guy Nicolson Consulting cc
	2014 – 2015	Environmental Control Officer for KSEMS cc
	2015 – Present	Environmental Consultant for EnviroPro Environmental Consulting

Table of Contents

SECTION 1 INTRODUCTION, PROJECT AND SITE DESCRIPTION

1.1. Background

Tugela Ferry Agriculture Co-Op who have obtained financial backing of the Department of Rural Development and Land Reform (DRDLR) propose to undertake upgrade works on the existing Tugela Ferry Irrigation Scheme with the focus on the Block 1 siphon and Block 6 abstraction point. The project is located within the Msinga Local Municipality, Umzinyathi District Municipality. This site is located directly east of the Tugela Ferry Town.

1.2. Scope of Work

Prepare an EMPr for the Tugela Ferry Irrigation Scheme upgrades 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 (Tugela Ferry Agriculture Co-Op with the backing of the Department of Rural Development and Land Reform) 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 (BVI) is responsible for:

- Appointing the appropriately 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 IAPs 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 appropriate 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 Description

The existing Tugela Ferry Irrigation Scheme is located within Wards 3, 4 and 5 of the Msinga Local Municipality and Umzinyathi District Municipality. The irrigation scheme has been in operation since the 1800s, however due to poor maintenance and the age of the scheme parts of the canal network and related facilities has fallen into disrepair. Therefore, in order to ensure the longevity of the scheme the Tugela Ferry Agriculture Co-Op who have obtained financial backing of the Department of Rural Development and Land Reform (DRDLR) has proposed a number of new works associated with the canal network. The entire Tugela Ferry Irrigation Scheme is broken down into 7 blocks with the focus of this application being new infrastructure only in Blocks 1 and 6.

The following is a description of the proposed works in Blocks 1 and 6:

- Works being proposed within Block 1, include the construction of a new siphon underneath the Tugela River Tributary. The new Block 1 siphon is located approximately 8.9km west of Tugela Ferry Town (as the crow flies) at the following point location, 28°45'8.96"S; 30°21'5.67"E. Currently there is an existing siphon running underneath the Tugela River Tributary. However due to the age of this siphon and the structure has been damaged and is leaking water into the Tugela River Tributary. The canal feeding this siphon have also been severally damaged due to the ongoing erosion of the embankments which support the canal. The engineer has determined that refurbishing the existing siphon and embankments would only be a temporary fix due to the nature of the environment and such a new siphon bypassing this area has been proposed. The new siphon will tie into the existing canal on either side of the Tugela River Tributary at the following points, inlet - 28°45'8.14"S 30°21'4.35"E, outlet - 28°45'14.84"S 30°21'5.21"E. The siphon consists of no working parts. To work the siphon relies on the water level in the canal near the inlet being at a higher level than the water level in the canal near the outlet. This allows for the water to flow without the need for mechanical input.

  The siphon will comprise of two 825mm diameter concrete pipes laid 500mm apart. Both concrete pipes will be encased in concrete, the total width of the concrete encasement will be 3192mm while the height will be 1246mm. A 300m thick reno mattress will on top of the concrete encasement which will be a level of the river bed. The entire length of the siphon will be 244m, however only 101m of this siphon is located within 32m of the Tugela River Tributary, please refer to Figure 3.

- Works being proposed within Block 6, include the construction of a new abstraction point within the Tugela River. The new Block 6 abstraction point is located approximately 3.6km west of Tugela Ferry Town (as the crow flies) at the following point location, 28°45'15.35"S 30°24'21.63"E. There is an existing abstraction facility located at the following point location, 28°45'11.88"S 30°25'41.62"E. however due to the nature of the Tugela River at this point i.e. multiple channels, water is not always available at this point along the river bank. Due to this poor abstraction placement the facility has been vandalised and vital equipment and machinery has been stolen. The engineer has determined that instead of refurbishing the existing abstraction point a new facility is required due to the lack of availability of water.

  The bulk of the abstraction facility will not be located within the Tugela River but within 32m. The abstraction facility which will be completely fenced will include a 2500mm x 2500mm x 6650mm (width, length, height) pump chamber below ground which will sit on a 650mm deep concrete base. Located at the bottom of this chamber will be 4 pumps in parallel with a combined duty of 220 ℓ/s and a head of 15m. The intake pipe, diameter of 500mm, will be located within the Tugela River 1m below the surface of the river. This pipe (30m) will feed into the pump chamber at a depth of 6250mm below the ground. The pump chamber will be connected to the 500mm outlet pipe by means of a 10000mm long flanged steel pipe which will pass through the calve chamber. The valve chamber will be 5000mm x 3480mm x 1500mm (width, length, height) below ground. The valve chamber will include the

resilient seal valve to stop the flow of water when required. The 500mm outlet pipe will tie into the existing dam which will enable irrigation of the entire area of Block 6.

Figure 1: Aerial photograph showing an overview of the Tugela Ferry Irrigation Scheme Upgrades.

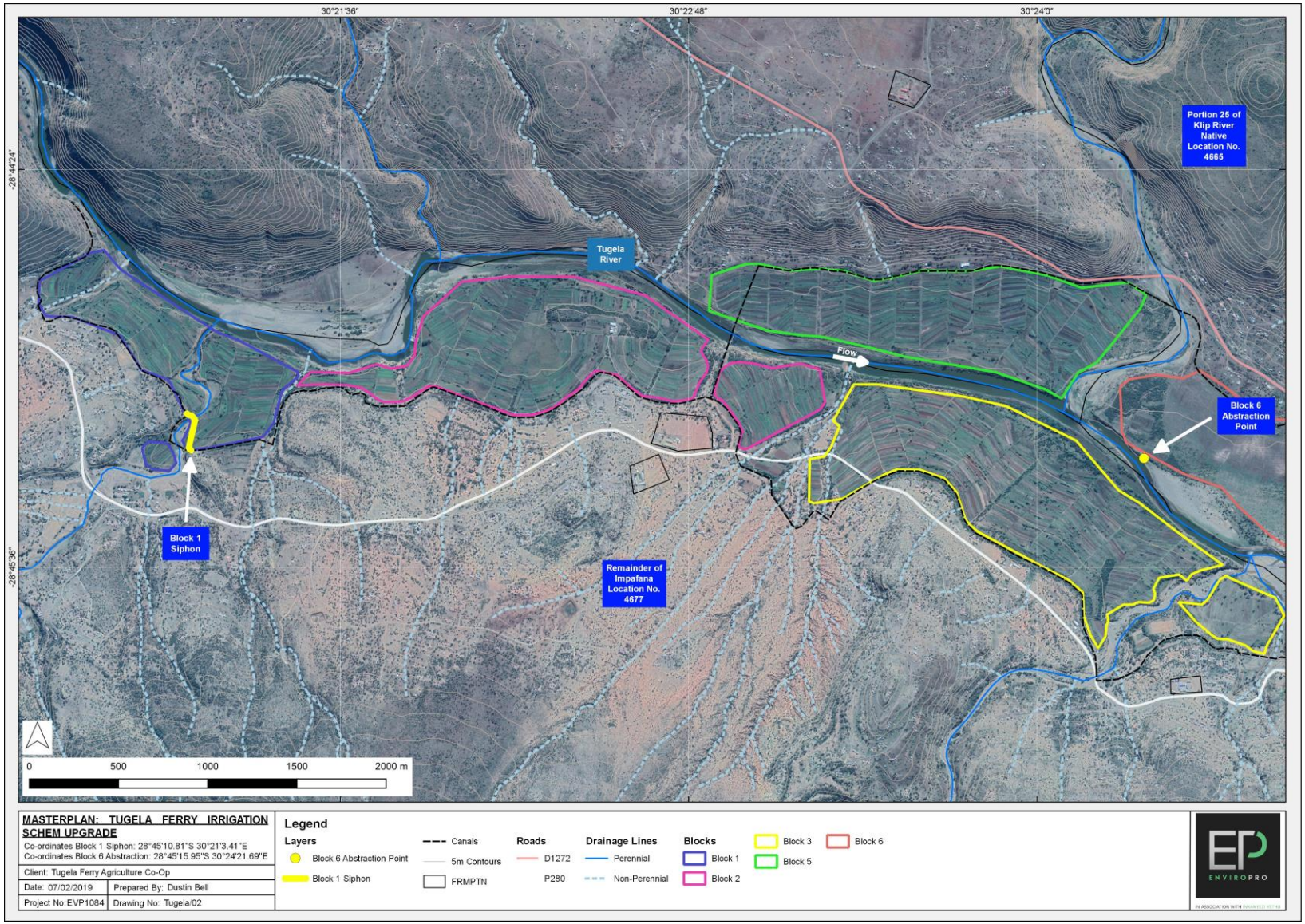


Figure 2: Block 1 siphon engineering drawing

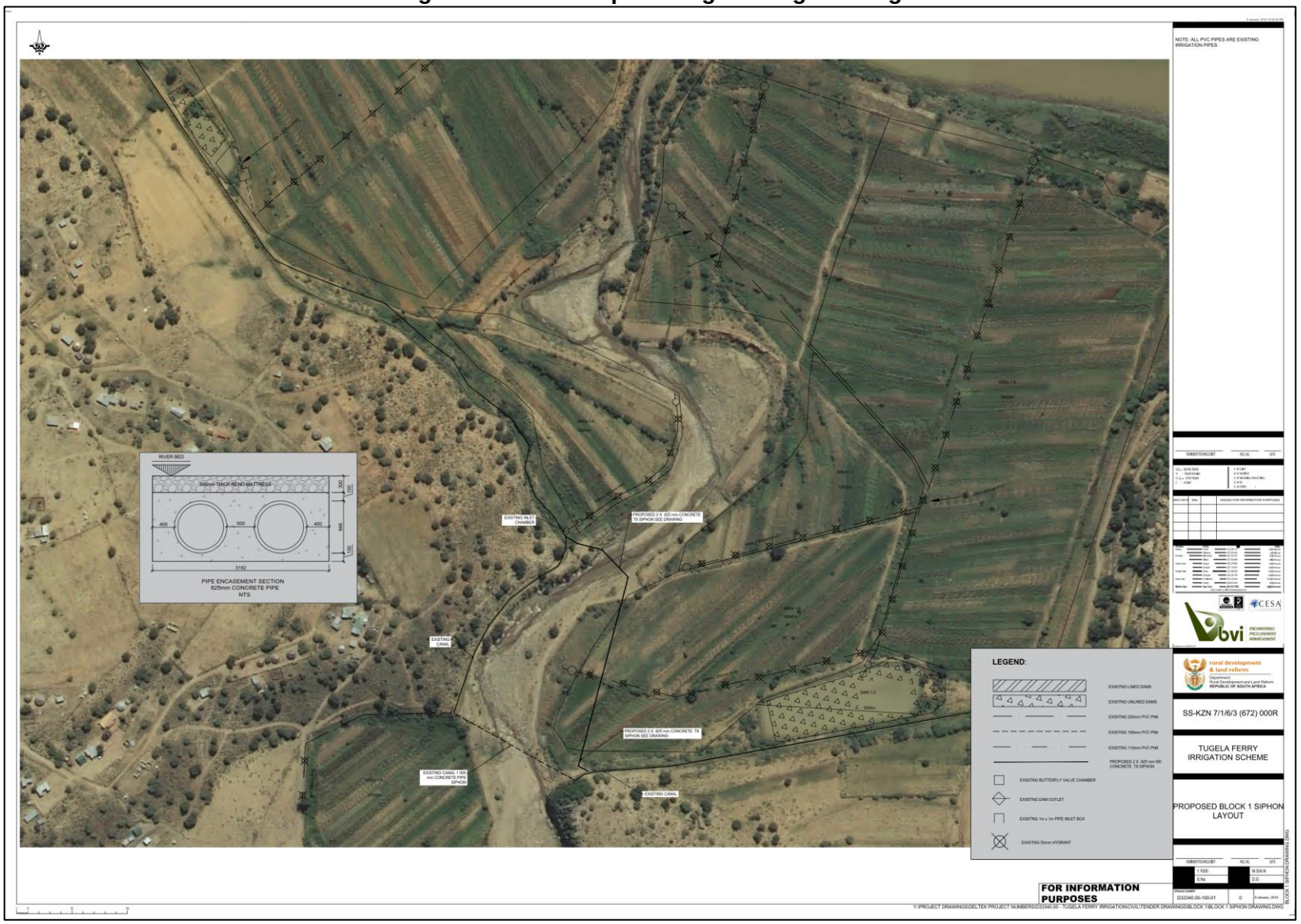
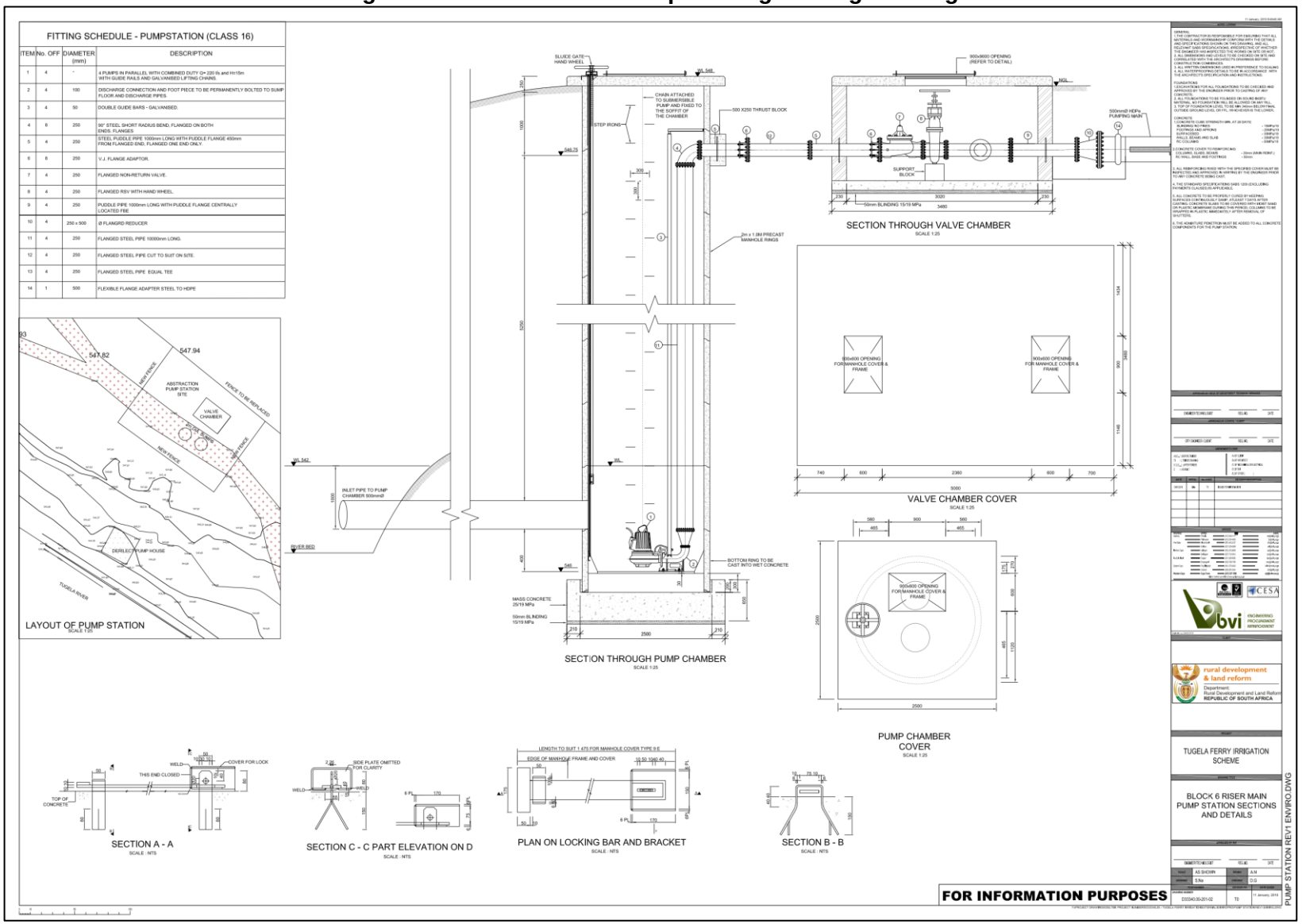


Figure 3: Block 2 abstraction point engineering drawing



1.9. 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 February 2019. 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**

1.10. 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	Tugela Ferry Agriculture Co-Op with the backing of the Department of Rural Development and Land Reform	Riaz Dawjee	082 469 1434
Consulting Engineer	BVI	Deon Govender	031 266 8382
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		
Wildlife Related Incident	Ezemvelo KZN Wildlife	Dominic Wieners	033 845 1455
Heritage Resources	AMAFA	Weziwe Tchabalala	033 394 6543
Fire Emergency	Fire Department	-	0800 033911
Crime Emergency	Police	-	10111

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

Figure 4: (a) View look along the length of the Block 1 siphon from the inlet; **(b)** View of the river at the Block 1 siphon site; **(c)** View of the existing canal embankment near the Block 1 siphon site.

Figure 5: (a) The disturbed dirt track where the main abstraction facility will be located; **(b)** View from the position of the main abstraction facility looking downstream; **(c)** Photograph showing the approximate location of the inlet pipe.

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
Block 1 Siphon				
There is the potential for erosion to take place within the Tugela River Tributary resulting in downstream sedimentation of this eroded material due to clearing and the operation of the construction site within the Tugela River Tributary.	The following measures must be carried out to mitigate against erosion on the Block 1 siphon site: • The areas of the Tugela River Tributary that are not within the direct project footprint must be demarcated as 'no-go' areas. • All construction activities occurring within the Tugela River Tributary 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 siphon in the dry season. • No excavated material or fill material may be stored within the Tugela River Tributary or within 32m of the Tugela River Tributary. • Bedding material that will be used must not be stored within 32m of the Tugela River Tributary before it is used.	CON		
The habitat for fauna living within the construction footprint will be modified due to the excavation and construction activities taking place within the Tugela River Tributary.	The following measures must be carried out to mitigate against excessive habitat destruction on the Block 1 siphon: • 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 Tugela River Tributary substrate/habitat outside the construction footprint must be avoided by ensuring the Tugela River Tributary 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;	CON		

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
	• 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 Tugela River Tributary must be prevented as it is detrimental to aquatic biota.			
Clearing of the Block 1 siphon site resulting in the loss of vegetation within the Thukela Valley Bushveld vegetation type.	The following measures must be carried out to mitigate against excessive vegetation clearing on the Block 1 siphon site: • This impact cannot be fully mitigated as it will result in the loss of indigenous vegetation found within the Thukela Valley Bushveld vegetation type. • The vegetation that will be cleared must be restricted to the construction footprint of the Block 1 siphon. No vegetation may be cleared within the Tugela River Tributary other than that required for access to the site or for the construction activities associated with the construction of the siphon. • 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.	CON		
Careless operation by the contractor within the Tugela River Tributary resulting in damage to the Tugela River Tributary 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 Tugela River Tributary during construction: • Areas of the Tugela River Tributary not within the construction footprint must be demarcated as no-go areas; • Heavy vehicles must avoid working near the Tugela River Tributary as far as possible; • A 32m buffer must be imposed on the rest of the Tugela River Tributary with no traffic, vehicles or storage permitted within this buffer zone; • Vehicles may not cross the Tugela River Tributary at any other point than the construction footprint of siphon; • Non-essential equipment and vehicles are to remain at least 32m from the Tugela River Tributary at all times.	CON		
Disturbance of the Block 1 siphon 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		
Long-term erosion within the Tugela River Tributary and damage to	The siphon will be designed as per the engineering drawings: • The siphon will be encased with concrete underneath the river.	APP		

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
watercourse banks where siphon has been placed.	• Reno mattresses will also be included in the design to stabilize the banks and prevent erosion of the banks during high flow events. • The trench must also be rehabilitated effectively before contractors leave the site. • Soil adjacent to the siphon must be compacted effectively to the same level or slightly higher than the surrounding land to prevent settling which could create depressions for water to travel along, creating erosion funnels and exposing the siphon.			
Potential alteration of flow dynamics within the Tugela River Tributary due to poor placement of the siphon.	The following measures must be carried out to avoid potential alteration of flow dynamics within the Tugela River Tributary: • The contractor must build the siphon as per the approved design (D33340.00-100-01), as the siphon has been designed to ensure that the natural flow of the Tugela River Tributary is not interrupted • Conduct regular inspections and maintenance must be conducted on the Tugela River Tributary when required.	APP		
The siphon bursting resulting in localised flooding and erosion.	The following measures must be carried out to avoid a potential failure the Block 1 siphon: • The contractor must build the siphon as per the approved design (D33340.00-100-01), as the siphon has been designed to ensure that the natural flow of the Tugela River Tributary is not interrupted • Conduct regular inspections and maintenance must be conducted on the Tugela River Tributary when required.	APP		
Maintenance will be required for the Block 1 siphon meaning workmen will need to enter the Tugela River Tributary.	The maintenance of the Block 1 siphon must only be conducted when required and for short periods of time.	APP		
Block 6 Abstraction Point				
There is the potential for erosion to take place within the Tugela River resulting in downstream sedimentation of this eroded material due to clearing and the operation of the construction site within the Tugela River.	The following measures must be carried out to mitigate against erosion on the Block 6 abstraction site: • The areas of the Tugela River that are not within the direct project footprint must be demarcated as 'no-go' areas. • All construction activities occurring within the Tugela 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.	CON		

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 the abstraction facility in the dry season. • No excavated material or fill material may be stored within the Tugela River or within 32m of the Tugela River. • Bedding material that will be used must not be stored within 32m of the Tugela River before it is used.			
The habitat for fauna living within the construction footprint will be modified due to the excavation and construction activities taking place within the Tugela River and with 32m of the river.	The following measures must be carried out to mitigate against excessive habitat destruction on the Block 6 abstraction 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 Tugela River substrate/habitat outside the construction footprint must be avoided by ensuring the Tugela River 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 must be prevented as it is detrimental to aquatic biota.	CON		
Clearing of the Block 6 abstraction site resulting in the loss of vegetation within the Highveld Alluvial Vegetation type.	The following measures must be carried out to mitigate against excessive vegetation clearing on the Block 6 abstraction site: • This impact cannot be fully mitigated as it will result in the loss of indigenous vegetation found within the Highveld Alluvial Vegetation type. • The vegetation that will be cleared must be restricted to the construction footprint of the Block 6 abstraction facility. No vegetation may be cleared within the Tugela River other than that required for access to the site or for the construction activities associated with the construction of the Block 6 abstraction facility.	CON		

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.			
Careless operation by the contractor within the Tugela River resulting in damage to the Tugela River 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 Tugela River during construction: • Areas of the Tugela River not within the construction footprint must be demarcated as no-go areas; • Heavy vehicles must avoid working near the Tugela River as far as possible; • A 32m buffer must be imposed on the rest of the Tugela River with no traffic, vehicles or storage permitted within this buffer zone; • Vehicles may not cross the Tugela River at any other point than the construction footprint of Block 6 Abstraction Site; • Non-essential equipment and vehicles are to remain at least 32m from the Tugela River at all times.	CON		
Disturbance of the Block 6 abstraction 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		
Flood events along the Tugela River damaging the facility	The abstraction point has been designed so that the main facility is located outside the channel of the river. This will ensure that during sever flood events the main facility will be protected from the flood high velocity waters. • The contractor must build the abstraction point as per the approved design (D33340.00-201-02). • Conduct regular inspections and maintenance must be conducted on the abstraction point when required.	APP		
Potential alteration of flow dynamics within the Tugela River due to poor placement of the inlet pipe.	The following measures must be carried out to avoid potential alteration of flow dynamics within the Tugela River: • The contractor must build the abstraction point as per the approved design (D33340.00-201-02). • Conduct regular inspections and maintenance must be conducted on the abstraction point when required.	APP		
Utilisation and storage of hydrocarbons in close proximity to the Tugela River	In order to service the abstraction point hydrocarbons will need to be utilised within the facility: • All hydrocarbons must be stored off site and only brought to site when required.	APP		

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
	• Any storage of hydrocarbons within 32m of the Tugela River is prohibited.			
Maintenance will be required for the Block 6 abstraction point meaning workmen entering the Tugela River.	The maintenance of the Block 6 abstraction point must only be conducted when required and for short periods of time.	APP		
Abstraction of water from the Tugela River putting pressure on lower Thukela River Reserve	The abstraction was determined to be a limited impact on the overall established Reserve. Considering this, the overall cumulative impact of the abstraction will be limited should the Reserve be maintained. • Only abstract volumes of water that is required. • Maintain a daily register of the volumes of water that were abstracted.	APP		

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. • Do not set up the construction camps within 32m of any watercourse 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. o A designated area must be set aside for this, which must be hard surfaced and bunded. o If emergency repairs are required, this must not be conducted within 32m of any watercourse, riparian zone or wet area. o Drip trays must be used. o Any other planned or required maintenance must be done off site at a suitable location. o 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 other contaminants are separated out of	CON		

	the effluent prior to remaining runoff being discharged into municipal sewer. o 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
EMPr	• Keep a hard copy of the 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. <u>In other words, documented proof that materials have been sustainably sourced must be maintained on site for review by EDTEA</u>. 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; 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	EO		

	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 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. • The contractor must enter into negotiation with the local community regarding the identification of areas where excess spoil can be used for rehabilitation purposes.	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		
Soil	• Top soil removed during the excavations must be kept to one side (stored more than 32m from any watercourse). • 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. • Soil stockpiles must not exceed 2m in height, must be covered, or grassed to prevent erosion caused by exposure to heavy wind or rain. • Topsoil must not to be mixed with subsoil. Stockpiling of top and subsoils must be in the correct sequence. The soil profile must be restored to the natural structure with topsoil and subsoil being replaced in sequence. • Soil must not to be stockpiled against tree trunks as this will encourage ant infestations.	CON/ EO		

Excess Material	• Excess material must first be used for;
	  ○ Creation of rock gabions where required for slope protection and erosion control;
	  ○ Rehabilitation of cuts
	  ○ Backfill for excavations.
	• Should the volume of excess spoil be too large to use in the manner described above, or if the density of spoil stockpiles becomes too high, the spoil must be removed from the working area to a permitted landfill site.
		CON/ EO		

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		
Water resource specialist measures	• The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access; • Laydown yards, camps and storage areas must be beyond the aquatic areas. Where possible, the construction of the pipeline and crossings must take place from the existing road servitudes and not from within the aquatic systems; • 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; • The construction must take place during the dry season to reduce the erosion potential of the exposed surfaces; • Temporary storm water channels and preferential flow paths must be filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion; • The contractor must prevent uncontrolled access of vehicles through the drainage lines, river and wetland systems that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas; • All machinery and equipment must be inspected regularly for faults and possible leaks, these should 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 (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation); • Action plans must be evident on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems; • All removed soil and material must not be stockpiled within the system. Stockpiling must 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 drainage channels 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; • No dumping of construction material on-site may take place; • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; • An alien invasive plant management plan needs to be compiled and implemented post construction to control current invaded areas and prevent the growth of invasive on cleared areas. • An infrastructure monitoring and service plan must be compiled and implemented during the operational phase. • An Environmental Control Officer (ECO) must oversee the construction phase of the project. • The delineated riparian zones and 30m buffer zone for the drainage lines must be adhered to. This is only applicable for the laydown yards, offices, stockpiles, storage areas and the proposed pump station. • Stockpiles must be covered with a tarp when not in use; • Vegetation clearing must be limited to the actual footprint area; • Indiscriminate use of heavy machinery in the buffer and riparian zones must not occur; • Soils which have been compacted during the construction must be ripped and seeded with local vegetation; • Storage areas for hydrocarbons must be located outside the delineated buffer zones and within a bunded area; • Water abstraction will be completed in line with the Reserve. No further water volumes may be abstracted;			

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 Camps into the any watercourse or surrounding environment.	CON		
	• Uncontrolled 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 a watercourse 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 any watercourse 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 any watercourse 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 any watercourse. 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 any watercource.	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	CON		

	shop areas within the allowed construction camps. These areas to be hard surfaced and bunded.			
	• 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. ○ **Records:** On site incident register.	CON/ EO		
	• **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		
	• Any fences, barriers, or demarcations utilized for the construction phase must be removed and disposed of.	CON		

Structures, materials and stockpiles	• 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 project. • Damage to water pipes or sewer infrastructure must be considered as emergency incidents whereby correction must be immediate so as not to waste water resources and to not create environmental damage.	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 surrounding areas	• 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. The cleared surfaces must be re-egetated with *Cynodon dactylon, Sporobolus aficana* and *Eragrostis curvula.* • 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		
Soil	• Top soil removed during the excavations must be kept to one side (stored more than 32m from any watercourse) 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. • In instances where soil compaction has taken place, the compaction must be reversed.	CON/ EO		
Rehabilitation of eroded areas	• Any erosion damage caused during construction must be repaired. The affected area must be reshaped and soil replaced. • 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).	CON/ EO		
Removal of alien invasive plants	• Alien invasive species must be removed on an on-going basis.	CON/ EO		

	• Use of chemical pesticides must be avoided and mechanical removal by hand is preferred.			

Damage to any watercourse	• Where a watercourse has been damaged the following measures are to be taken to ensure restoration of the habitat:
	  ○ ECO must assess the damaged area
	  ○ Any construction debris or contaminants within a watercourse must be removed
	  ○ Original soil structure must be restored
	  ○ Any impedance or diversion to waterflow must be removed
	  ○ 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 siphon and abstraction point	• The siphon and abstraction point will require maintenance. This work must be undertaken by appointed contactor. • Maintenance vehicles and machinery must make use of existing access routes; • Laydown yards, camps, and storage areas must be more than 32m from any water resource; • All machinery and equipment must be inspected regularly for faults and possible leaks, these must be serviced off-site • The contractors used for the maintenance 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 watercourse must not be permitted; • 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;	APP		

	• All removed soil and material must not be stockpiled within the watercourse. Stockpiling must 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; • 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. • Any maintenance on the structures that triggers a Listing Notice note covered in the approved Environmental Authorisation must only take place once approval has been received from EDTEA			
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 any watercourse. A minimum buffer of 10m must be retained. This are will have to be managed by mechanical means.

	○ Empty containers or unused herbicides must be disposed of correctly and may not be dumped on site.