

Environmental Management Programme for the Rehabilitation of the Skoenmakers River, Eastern Cape

DEA Reference Numbers: 14/12/16/3/3/1/1508

Report Prepared for

Department of Water and Sanitation



Report Number 472748



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 **srk** consulting

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Department of Water and Sanitation

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List of Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
DEDEA	Department of Economic Development and Environmental Affairs
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environment Control Officer
EMPr	Environmental Management Programme
I&APs	Interested and Affected Parties
NEMA	National Environmental Management Act, Act 107 of 1998

1 Introduction

The Skoenmakers River (located in the semi-arid Karoo region of the Eastern Cape) is being used as a transfer route for water transferred by the Orange-Fish-Sundays River Inter-basin Transfer Scheme. The change in the hydrological regime of this once ephemeral stream to a much bigger perennial river, led to dramatic changes to both the physical structure and riparian vegetation structure of the river system. This increased in base flow in the river has caused river bed and bank erosion. At some erosion zones the farmland is closer than 32 m from the edge of the river, and in many cases the riparian vegetation has also been removed due to the farming activity.

The purpose of the Environmental Management Programme (EMPr) is to provide the mitigation and management measures. These will ensure that social and environmental impacts, risks and liabilities identified during the Environmental Impact Assessment (EIA) process are effectively managed during the construction of the proposed rehabilitation of the Skoenmakers River. This proposed Rehabilitation will improve the flow regime along the Skoenmakers River and provide mitigation to the severe bed and bank erosion that is currently taking place.

The EMPr specifies the mitigation and management measures to which the applicant is committed, should the Environmental Authorisation (EA) be granted, and shows how the applicant will mobilise organisational capacity and resources to implement these measures. The EMPr also shows how management measures aimed at mitigation and enhancement will be scheduled.

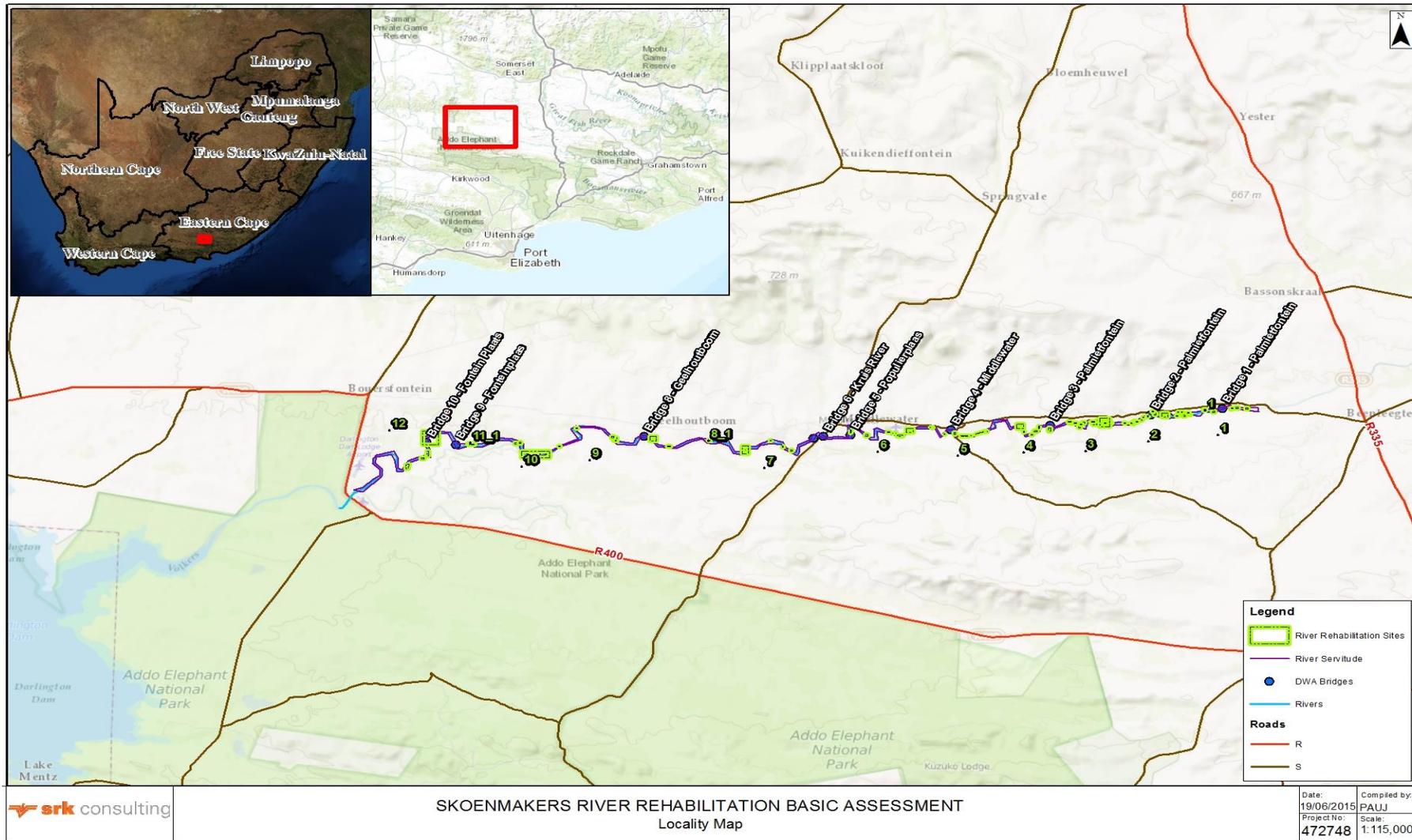


Figure 1-1 Rehabilitation sites

1.1 Environmental Assessment Practitioner (EAP)

1.1.1 Details of the EAP

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1.1.2 Expertise of EAP

This EMPr was prepared by Fiona Evans under technical guidance of Manda Hinsch, and reviewed by Matt Braune.

Fiona Evans is an Environmental Consultant with SRK. She has Honours in Ecology, Environment and Conservation obtained from the University of the Witwatersrand, and has two years of project experience in environmental management. Fiona has both personally prepared and given input to various EMPr's. Manda Hinsch is an Associate Partner and Principal Environmental Scientist with SRK and has 34 years of experience in water quality management, waste management, project management and water and environmental legislation. Manda is a fellow member of the Professional Natural Scientists South Africa and FWISA. Matt Braune is a Partner and civil engineer. Matt has over 34 years of experience in the field of water engineering. His expertise include numerous surface water and urban storm water management projects, hydraulic studies regarding the design of flood and erosion control measures and co-ordination of multi-disciplinary project teams of engineers, geologists, environmental scientists and technicians.

The project team collectively possesses the core competence required to prepare the EMPr for the proposed project. .

2 Description of the proposed activity

2.1 Construction of the River Crossing

Riprap (dumped rock) is proposed for erosion protection on the Skoenmakers River. Riprap has minimal maintenance compared to other mitigation measures such as Reno mattresses, gabion boxes or concrete blocks.

The riprap size was designed in accordance with SANRAL (2015) guidelines. A sample of the guidelines is as illustrated in Figure 2. The riprap angle of repose was taken as 40 degrees and the angle of the sides slope of the channel as 1:2.5 (V: H). A steeper slope will increase the riprap diameter, and contractors found 1:2.5 to 1:3 more practical slopes to work with in the past. The 100 year ARI flood was used to design the riprap sizes.

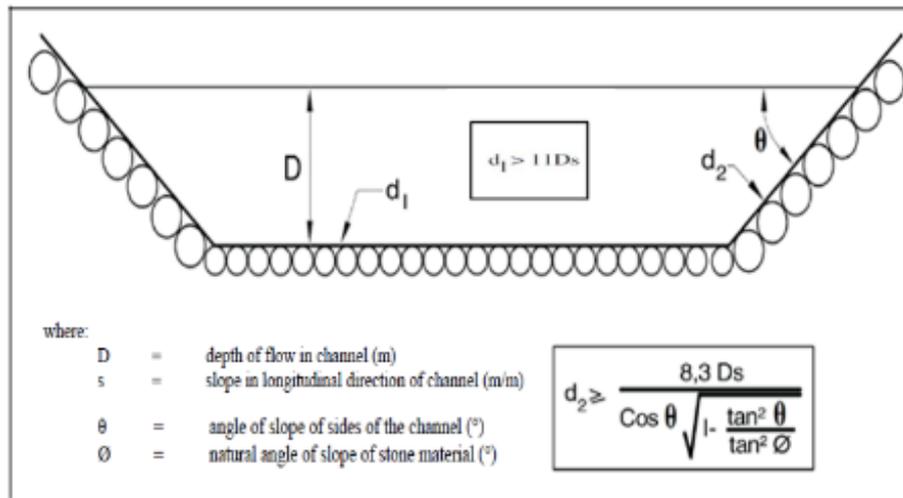


Figure 2 Required sizes of rock for erosion protection of loose bed channels (SANRAL, 2015)

Based on the identified critical erosion zones, corresponding 100 year ARI flood water depths, velocities, water level elevations and scour depth values were extracted from the simulated MIKE 21C results. At the selected zone, the simulated maximum scour depth was taken as the required toe elevation of the riprap (refer to Appendices).

From the energy slope and the simulated water depth, the median riprap diameter d_{50} was calculated. A factor of safety of 1.3 was used on the riprap diameter and riprap sizes were rounded up to the nearest 50 mm. The top elevation of the riprap was calculated based on the maximum water level at the selected location and 0.5 m freeboard allowance. In scenarios where the 100 year ARI water level was above the natural ground elevations, the ground elevation (top of bank) was used to determine the top of the riprap. A typical cross section and grading to be used is shown in Figure 3.

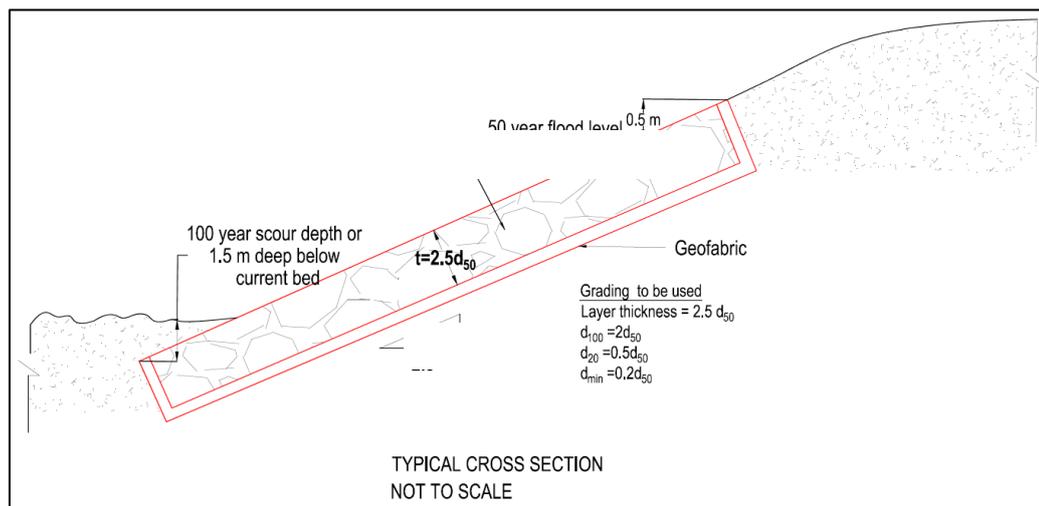


Figure 3 Typical riprap cross section

The grading of the riprap and the thickness is as indicated in the figure above. The slope should be 1:2.5 (V: H). The toe of the riprap should be at least 1.5 m deep below the current river bed level at the bank in alluvial material, or to rock. The riprap should therefore be extended into the main

channel as required to achieve this toe depth. The riprap rock should be slightly angular or angular in shape, and should be durable.

Note that the filter as shown in Figure 3 is as important as the riprap median diameter and the grading as indicated in the figure. The filter should consist of a geofabric, with subsequent layers above it designed as a natural filter. The filter layers median diameters should not vary from layer to layer by more than a factor 5. The first layer on top of the geofabric could be gravel. The natural filter layers are required to protect the geofabric during dumping of the riprap rocks, as well as during turbulent flood flows. The proposed minimum thickness of each filter layer is $2x d_{50}$ of the layer, but not less than 0.1 m. It is also proposed that the grading of each natural filter layer should be based on the riprap grading as indicated in Figure 3.

Please refer to the method statement attached in Appendix J (Skoenmakers River Erosion Protection Report) of the Basic Assessment Report for more information.

3 Legislation guidelines

The environmental component of the project will comply with the requirements of inter alia, the following Legislation, and the Regulations promulgated thereunder:

- The Constitution of the Republic of South Africa (Act No. 108 of 1996).
- The NEMA, (Act No. 107 of 1998) and Regulation 543.
- The NEM:WA (Act No. 59 of 2008) and Regulation 718.
- National Environmental Management: Air Quality Act (Act No. 39 of 2004).
- National Environmental Management: Biodiversity Act (Act No. 10 of 2008).
- The Environmental Conservation Act (Act No. 73 of 1989).
- The Hazardous Substances Act (Act No. 15 of 1973).
- The National Water Act (Act No. 36 of 1998).
- The National Heritage Resources Act (Act No. 25 of 1999).
- The Health Act (Act No. 61 of 2003).
- Occupational Health and Safety Act (Act No. 85 of 1993).

4 Motivation for the proposed project

The Rehabilitation of the river will prevent more erosion and improve the ecological state of the Skoenmakers River.

The existing river crossing has been affected by erosion of river banks, siltation and blockages. The rehabilitation of the river is a necessary environmental option in order to remediate these environmental problems affecting the river and adjacent farming activities. The proposed erosion protection measures will be beneficial for the water course as well as the community members that make use of the river and the nearby area.

5 Environmental management programme

The Environmental Management Programme (EMPr) is a requirement of GN R. 543(22) and complies with the requirements of GN R. 543(33). The EMPr contains mitigation and management measures suggested to ameliorate the impacts associated with the proposed activities.

The EMPr is divided into two phases; construction and operation. Planning and design has not been included as part of the EMPr. This stage of the proposed bridge upgrade has already been completed. Further, due to the permanent nature of the river crossings, no impacts or mitigation measures for a closure and rehabilitation phase has been assessed. Should the need arise; the EMPr shall be amended to accommodate the need for rehabilitation and closure.

5.1 The Environmental Control Officer

An independent Environmental Control Officer (ECO) must be appointed by the applicant to oversee all environmental aspects relating to the proposed river rehabilitation. The ECO should be appointed to assess environmental compliance to the EMPr during the construction (rehabilitation) phase. The ECO will be responsible for providing feedback on emergent environmental problems associated with the proposed rehabilitation. In addition the ECO will be responsible for;

- Liaison with relevant authorities;
- Liaison with contractors regarding environmental management; and
- Undertaking weekly compliance monitoring during rehabilitation.

5.2 Environmental objectives

In order to ascertain the relevant level of mitigation and management measures required to ameliorate the impacts associated with proposed river crossing upgrade, the objectives of the EMPr need to be identified. Below is a summary of the environmental objectives that will be addressed in the EMPr.

- **Surface Water**
 - Limit the contamination of surface water.
- **Waste Management**
 - To ensure that general and hazardous waste is handled correctly.
- **Heritage**
 - Minimise impacts on any cultural or heritage artefacts.
- **Soil and Land Use:**
 - Minimise contamination of soil.
- **Biodiversity**
 - Minimise the disturbance of ecologically sensitive areas.
 - Prevent the spread and establishment of alien vegetation.
- **Air Quality**
 - Minimise deterioration in air quality.

5.3 Construction Phase

The process of rehabilitation will be referred to as the construction phase. This section of the EMPr provides management principles and mitigation measures for the construction phase of the project. Environmental actions, procedures and responsibilities as required during the construction phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfaction of the Project Manager and Environmental Control Officer. Please refer to Table 5-1 for the proposed mitigation measures.

Table 5-1: Proposed mitigation measures for the construction (Rehabilitation) phase

POTENTIAL ENVIRONMENTAL IMPACT (NATURE OF THE IMPACT)	No.	RECOMMENDED MITIGATION MEASURES		
		Management and mitigation measures	Timeframe	Responsibility
Surface water				
Construction activities within the river and on the river banks will loosen sedimentary material resulting in an increase in the current sediment load.	1	The construction footprint must be declared and no construction activities must extend past the demarkated construction zone.	On-going	ECO
	2	The amount of heavy machinery and equipment needed to work within the river course should be limited. Only the equipment that is absolutely necessary should be allowed in the river course.	On-going	ECO
	3	Strict controls and environmental education should be employed for all the construction workers that are working within the water course.	Prior to the commencement of construction	ECO
	4	Construction should preferably take place during the dry season.	March-August	Project management
Spillages from the equipment that will be used during construction activities could result in pollution of the water by hydrocarbons.	5	Plastic trays and liners must be used to prevent cement and spillages of other hazardous substances such as oil or diesel into the water body.	On-going	ECO
	6	No re-fuelling of vehicles or machinery will be allowed on the construction site. All re-fuelling will be done in the site camp or another designated area off site.	On - going	ECO
Noise				
Construction activities resulting in noise disturbance in the surrounding area	7	Any potential noise disturbance will be temporary. No mitigation required	{-}	{-}
Waste management				
Contamination of the area with general waste (litter, construction material etc.) and hazardous waste (Oils, hydrocarbon etc.) produced during the construction phase may have negative impacts on the surrounding environment.	8	Any waste produced during the construction should be removed as soon as possible and disposed of at a Municipal Landfill Site.	Weekly during construction	ECO
	9	All construction materials should be stored in designated areas.	On-going	ECO
	10	No dumping of excess construction materials will be allowed in the bush surrounding the construction site.	On-going	ECO
	11	No waste is to be buried or burned on site.	On-going	ECO

POTENTIAL ENVIRONMENTAL IMPACT (NATURE OF THE IMPACT)	No.	RECOMMENDED MITIGATION MEASURES		
		Management and mitigation measures	Timeframe	Responsibility
	12	Chemical toilets are to be maintained in a clean state on a regular basis and must be moved to ensure that they adequately service the work areas. The contractor is to ensure that the surrounding bush is not being used as an ablution facility.	On-going	Contractor/ECO
	13	Appropriate disposal facilities, such as litter bins, must be provided within the construction camp.	On-going	ECO
Heritage				
Impact on unidentified heritage artefacts and impacts on heritage resources.		The Location of all heritage sites must be known to the construction subcontractor		
		A buffer zone around heritage sites of at least 100 meters must be maintained.		
		All heritage sites must be fenced off and clearly demarcated.		
	14	If any artefacts of archaeological or cultural interest are found, including graves, then the area will be marked and all activities in that vicinity will cease with immediate effect. SAHRA and the North West Provincial Heritage Resources Authority (NWPHERA)/the Provincial Heritage Resources Authority - Gauteng (PHRA-G) will be notified of the finding and operations at that specific site will only continue after the relevant NWPHERA has granted permission to do so.	On-going	ECO
Soil and Land Use				
Indirect Impact: Disturbance of vegetation on the river banks due to the construction activities may lead to further erosion of the river banks.	15	No parking of vehicles or equipment should take place off the access road or designated parking areas.	On-going	ECO
	16	All work must take place within the construction footprint area and the construction area must be rehabilitated once the construction process has been completed.	After construction	ECO
Biodiversity				
Construction activities could result in the disturbance of the vegetation specifically on the banks of the water course.	17	No vehicles or plant should be parked within the river course when not actively working on the construction.	On-going	ECO

POTENTIAL ENVIRONMENTAL IMPACT (NATURE OF THE IMPACT)	No.	RECOMMENDED MITIGATION MEASURES		
		Management and mitigation measures	Timeframe	Responsibility
	18	The protection of threatened or protected species (TOPS) must be carried out in accordance to NEMBA (Act 10 of 2004) Chapter 4, Part 2. This will include any amendments or changes to regulations and guidelines pertaining to the protection of TOPS.	On-going	ECO
Disturbance of fauna during site clearance and construction activities	19	The protection of threatened or protected species (TOPS) must be carried out in accordance to NEMBA (Act 10 of 2004) Chapter 4, Part 2. This will include any amendments or changes to regulations and guidelines pertaining to the protection of TOPS.	On-going	ECO
	20	No trapping or hunting of fauna should be allowed on site during any phase of the project.	On-going	ECO
Construction activities and spillages will negatively impact on aquatic biota present in the Skoenmakers River.	21	Plastic trays and liners must be used to prevent cement and spillages of other hazardous substances such as oil or diesel into the water body.	On-going	ECO
	22	No refuelling of vehicles or machinery will be allowed on the construction site. All refuelling will be done in the site camp or another designated area off site.	On - going	ECO
	23	The construction footprint must be declared and no construction activities must extend past the demarcated construction zone.	On-going	ECO
	24	The amount of heavy machinery and equipment needed to work within the river course should be limited. Only the equipment that is absolutely necessary should be allowed in the river course.	On-going	ECO
	25	Strict controls and environmental education should be employed for all the construction workers that are working within the water course.	Prior to the commencement of construction	ECO
	26	Construction should preferably take place during the dry season.	March-August	Project management
Air quality				
Air pollution from vehicle emissions and fires as well as dust from vehicle movements and stock piles may have a negative impact on air quality.	27	Vehicles travelling to and from the construction site must adhere to the speed limits so as to avoid producing excessive dust. A speed limit of 30 km/h must be adhered to on the construction site.	On-going	ECO
	28	High winds may pick up dust from the stockpiles. Screening of stockpiles may be required by utilising wooden supports and shade cloth.	When applicable	ECO

POTENTIAL ENVIRONMENTAL IMPACT (NATURE OF THE IMPACT)	No.	RECOMMENDED MITIGATION MEASURES		
		Management and mitigation measures	Timeframe	Responsibility
	29	Designated areas must be allocated for informal fires by construction or project personnel.	When Applicable	ECO
	30	Vehicles and machinery are to be kept in good working order and meet the manufacturers specifications. Should excessive emissions be observed, the contractor is to have the equipment seen to within 24 hours.	On-going	Contractor/ECO
General				
At some erosion zones the farmland is closer than 32 m from the edge of the river, and in many cases the riparian vegetation has also been removed due to the farming activity.	31	As part of the river maintenance exercise, crops must not be allowed closer than 32 m from the river banks, and riparian vegetation should be re-established near locations where bank erosion problems have been identified.	On-going	Contractor

5.4 Emergency procedures

Emergency procedures for the management of contractors and employees must be in line with the relevant Health and Safety policies of the Department of Water and Sanitation.

5.5 Organisation structure

The daily management of the construction site will be the responsibility of the Contractor. The Project Manager will also have to appoint an Environmental Control Officer (ECO) who will be responsible for the correct implementation of the conditions of the Environmental Authorisation and the mitigation and management measures contained in the approved EMPr.

5.6 Monitoring, reporting and auditing

Site inspections must be conducted on a weekly basis during construction to ensure continued compliance with the conditions of the environmental authorisation and the measures contained in the approved EMPr.

5.7 Environmental awareness plan

On-site training must be provided for all contractors and personnel working on. No personnel may be allowed onto site without having been instructed on the requirements of the approved EMPr and the Environmental Authorization conditions.

The training must deal specifically with triggers that would require the implementation of mitigation measures contained in the EMPr. These include, but are not limited to:

- Identification of TOPS listed species, both fauna and flora
- Identification of potential heritage resources
- Identification and avoidance of demarcated no-go areas.

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Draft for Comment