

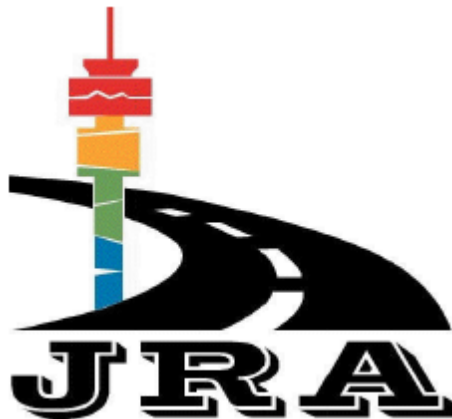
## ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

*for*

### JRA/20/87: RIVER REHABILITATION OF 52 MAIN STREET IN BORDEAUX, RANDBURG IN THE CITY OF JOHANNESBURG

**PREPARED FOR:**

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## 1. INTRODUCTION

Organic Minds (Pty) Ltd (Organic Minds) has been appointed by ROMH Engineers to undertake a Basic Assessment process on behalf of the Johannesburg Roads Agency (hereafter “JRA”) as an independent environmental consultancy to undertake the Basic Assessment (BA) for the Proposed river rehabilitation at Number 52 Main Street, Bordeaux, Johannesburg. The study area is located within the City of Johannesburg Metropolitan Municipality of Gauteng Province. Figure 1 below indicates the location of the project area.

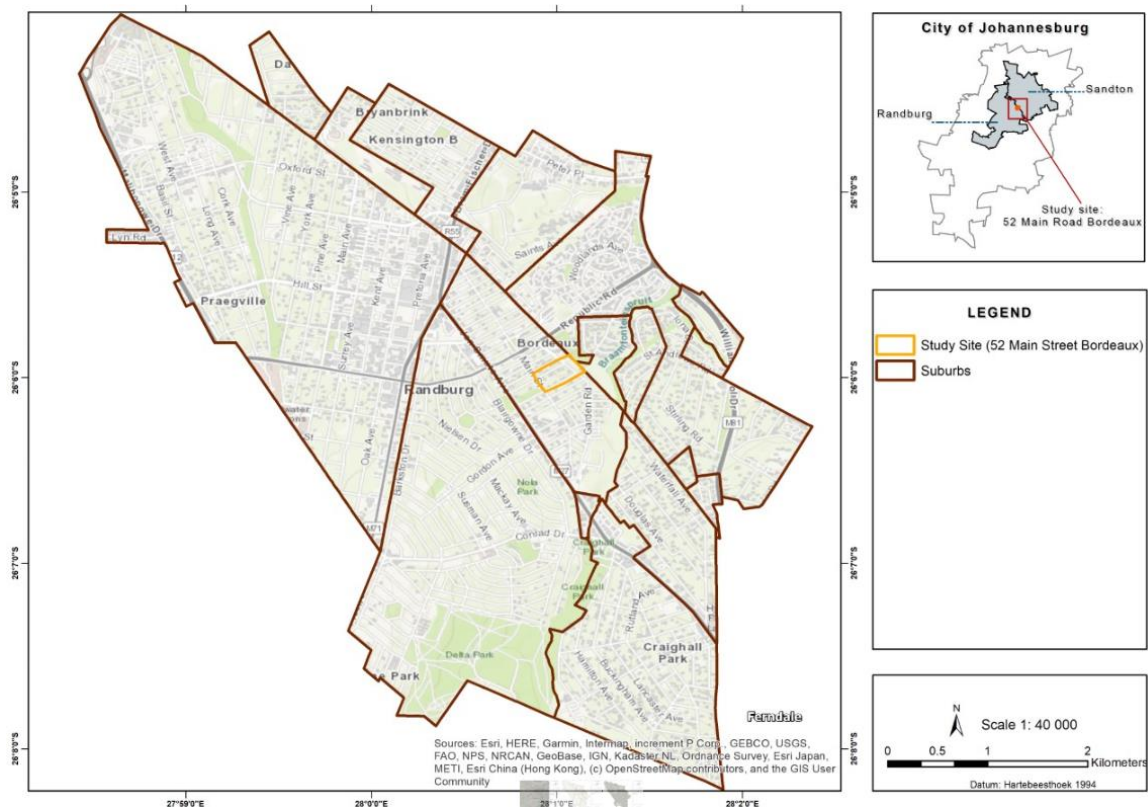


Figure 1: General location of the proposed river rehabilitation project

### 1.1 PROJECT PLAN

The project entails installing a series of dry detention ponds located directly upstream of the problem area. The dry attenuation ponds will be located on existing recreational areas (Bordeaux South Park, Rose Garden Park, and the Denise Park) and shall be designed to as a retro fit solution to retain its current function as a recreational area. Dry attenuation ponds are basins designed to temporarily detain run-off for a minimal duration and slowly release it

in a controlled manner, in efforts to reduce the flood peaks downstream, alleviating the burdens observed downstream in the problem site. The dry ponds will be accompanied with minor rehabilitation works of the project site such as outlet reinstatement and riverbank Stabilisation works.

## 1.2 AIMS OF THE EMPr

The purpose of this Construction EMPr is to provide an easily interpreted reference document that ensures that the project environmental commitments, safeguards and mitigation measures from the environmental planning documents, project approvals, and Scope of Works are implemented. It aims to minimise impacts associated with the construction phase of the development on the environment are kept to a minimum. This includes ensuring that the mitigation measures described in the Basic Assessment Report (if required) are implemented, to ensure continued monitoring of the construction phase and to ensure the involvement of interested and affected parties (IA&Ps) in a meaningful way.

The objectives for the EMPr are:

- To develop, implement and maintain effective management systems for the environmental aspects of the development and associated works.
- To document details of environmental protection measures and controls so that they are able to provide long term protection for the natural environment.
- To ensure compliance with relevant legislation (National, Provincial and Local), regulatory requirements and environmental documents.
- To maximise the value and outcomes of environmental monitoring activities so that identified impacts are controlled and minimised.
- To ensure that all Environmental Management considerations are implemented during the operational and maintenance phases of the project.

The EMPr has been developed based on the findings of the on-site assessment undertaken by Organic Minds and the following specialist studies undertaken during the basic assessment process of this project:

- Wetland Delineation and Functional Assessment Report.



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- Heritage Impact Assessment.
- Aquatic Ecological Impact Assessment.

All the Environmental specifications and the procedures discussed in this document were also developed in accordance with the relevant legislation applicable to the development.

## 2. PREPARATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

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### EXPERTISE OF ENVIRONMENTAL PRACTITIONER THAT PREPARED THE EMPr

Joseph Chauke is the Principal author of this EMPr. He is a SACNASP registered professional with more than 10 years of environmental management experiences. He holds a BSc Honours in Environmental Sciences from the University of the Witwatersrand, Johannesburg, South Africa. His key focus is on environmental advisory, environmental auditing, and compliance as well as environmental reporting. Joseph is a Project Manager and Environmental Scientist at Organic Mind Solutions.

## 3. DESCRIPTION OF SENSITIVE ENVIRONMENT

The study area is located within Quaternary Catchment A21C, Water Management Area 3 (Crocodile Marico) and drains into the Braamfontein spruit which opens into the Jukskei River. According to the Vegetation Map of South Africa, Lesotho and Swaziland, the site is situated in the Egoli Granite Grassland, a protected grassland type currently under severe pressure

from urbanisation (Mucina & Rutherford, 2006). According to the Gauteng Conservation Plan (Version 3.3), the study area is located within both important areas and ecological support areas. No National Freshwater Ecosystem Priority Areas (NFEPA) wetlands were identified within the study area. No wetland areas were identified within the study area; however, a riparian zone was recorded. The riparian zone identified onsite is associated with a very high order stream that flows from west to east towards the Braamfonteinspruit.

It is likely that the Bordeaux South Park, Rose Garden Park, and the Denise Park located up gradient of the study area were all constructed on a historically connected wetland system (Hillslope seepage and valley bottom wetland areas). The active channel within the study area developed due to erosion as a result of the hardening of the catchment associated with urbanisation. The vegetation cover of the riparian zone is largely changed from historical grassy wetland conditions and the majority of the woody and the non-woody vegetation is exotic. The combined EC scores for the riparian area on the study site is an E - Seriously Modified. Some of the identified impacts include canalization of sections of the active channel, bank stabilization, active erosion within the channel, conversion of sections of the watercourse into the Bordeaux South Park (recreational area). The watercourses within the study area are considered to be of ecological importance and sensitive on a provincial or local scale. The EIS score of 1.0 falls into a category characterised by Moderate ecological importance and sensitivity.

## 4. ROLES AND RESPONSIBILITIES

The implementation of this EMPr requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction phase. The stakeholders are discussed below.

### 4.1 DEVELOPER

- The developer remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMPr.
- Although the developer appoints specific role players to perform functions on his/her behalf, this responsibility is delegated.

- The developer is responsible for ensuring that sufficient resources (time, financial, human, equipment, etc.) are available to the other role players (e.g., the ECO, ELO, and contractor) to efficiently perform their tasks in terms of the EMPr.
- The developer is liable for restoring the environment in the event of negligence leading to damage to the environment.
- The developer must ensure to appoint an independent Environmental Control Officer (ECO to monitor and audit the implementation of the EMPr and environmental authorisation.
- The ECO must have the appropriate experience and qualifications to undertake the necessary tasks.
- The developer must ensure that the EMPr is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMPr.
- The developer must appoint an independent Environmental Control Officer (ECO) during the construction phase to oversee all the environmental aspects relating to the development.
- Submit an environmental audit report to the relevant competent authority (GDARD).

## 4.2 CONTRACTOR AND SERVICE PROVIDERS

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- The contractor, as the developer's agent on site, is bound to the EMPr conditions through his/her contract with the developer and is responsible for ensuring that he adheres to all the conditions of the EMPr.
- Thoroughly familiarise him/herself with the EMPr requirements before construction begins and must request clarification on any aspect of these documents, should they be unclear.
- Ensuring that he/she has provided sufficient budget for complying with all EMPr conditions at the tender stage.
- Ensuring adherence to the environmental management specifications.

- Ensuring that Method Statements are submitted to the Site Manager, and ECO, for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications of the EMPr.
- Ensuring that any instructions (whether verbal or written) issued by the site Manager, project manager or site engineer, ECO, in terms of the EMPr are adhered to.
- Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- Ensuring that incidents register is kept in the site office, which lists all transgressions issued by the ECO.
- Ensuring that a register of all public complaints is maintained.
- Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e., ensure their staff are appropriately trained as to the environmental obligations).
- He/she must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site.

#### 4.3 THE ENVIRONMENTAL CONTROL OFFICER (ECO)

The Environmental Control Officer (ECO) is appointed by the developer as an independent monitor of the implementation of the EMPr. He/she must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site. The ECO must attend relevant project meetings, conduct inspections to assess compliance with the EMPr and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:

- Assisting in ensuring that the necessary environmental authorisations and permits have been obtained prior to construction commencing.
- Reviewing the Contractor's construction Method Statements.
- Monthly site inspections of all construction areas with regard to compliance with the EMPr.



- Monitoring and verifying adherence to the EMPr, the EA and approved Method Statements at all times.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Taking appropriate action if the specifications are not followed.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel coming onto site.
- Advising on the removal of person(s) and/or equipment not complying with the specifications.
- Auditing the implementation of the EMPr and compliance with the EA on a monthly basis.
- Compiling a final audit report regarding the EMPr and its implementation during the construction period after completion of the contract and submitting this report to the Employer and the authorising authority.

The ECO has the right to enter the site and do monitoring and auditing at any time, subject to compliance with health and safety requirements applicable to the site (e.g., wearing of safety boots and protective head gear).

#### 4.3.1 LIAISON WITH AUTHORITIES

The ECO will be responsible for liaising with the Gauteng Department of Agriculture and Rural Development (GDARD). The ECO must submit monthly environmental audit reports to the authorities. These audit reports must contain information on the contractor and developer's levels of compliance with the EMPr. The audit report must also include a description of the general state of the site, with specific reference to sensitive areas and areas of non-conformance. The ECO must indicate suggested corrective action measures to eliminate the cause of the non-conformance incidents. In order to keep a record of any impacts, an Environmental Log Sheet (refer to Appendix 1) is to be kept on a continual basis.

#### 4.3.2 LIAISON WITH CONTRACTORS

The ECO is responsible for informing the contractors of any decisions that are taken concerning environmental management during the construction phase. This would also include informing the contractors of the necessary corrective actions to be taken.



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### 4.4 RESIDENT ENGINEER (RE)

The Resident Engineer (RE) will be appointed by the „Consultant“ and will be required to oversee the construction programme and construction activities performed by the Contractor. The RE is expected to liaise with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences. He/she will oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications. The RE will also be required to be familiar with the EMPr specifications and further monitor the Contractor’s compliance with the Environmental Specifications on a daily basis, through the Site Diary, and enforce compliance.

### 4.5 ENVIRONMENTAL LIAISON OFFICER (ELO)

The contractor must appoint an Environmental Liaison Officer (ELO) to assist with day-to-day monitoring of the construction activities. Any issues raised by the ECO will be routed to the ELO for the contractors’ attention. The ELO shall be permanently on site during the construction phase to oversee the Contractor’s internal compliance with the EMPr requirements and ensuring that the environmental specifications are adhered to. The ELO should ideally also be a senior and respected member of the construction crew.

The ELO will be responsible for keeping detailed records of all site activities that may pertain to the environment and include all these aspects in an environmental register. This register must be presented at each EMC meeting and be made available to the ECO during his/her monthly audits. In addition to the environmental register the ELO must keep a register of complaints from any community members on environmental issues. Finally, the ELO will be required to keep a record of all on-site environmentally related incidents and how these incidents were dealt with. Past experience has revealed that, ELO’s that can relate to the work force are the most effective for information transfer and ensuring compliance with the EMPr.

## 5. ENVIRONMENTAL MANAGEMENT PROGRAM (EMPr)

The following table forms the core of this EMPr for the construction and operational phases of the development. This table should be used as a checklist on site, especially during the construction phase. Compliance with this EMPr must be audited monthly during the



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construction phase and once immediately following completion of construction. This must be followed up with annual audits for a period of two years during the operational phase.

**Table 1: Planning and Design Phase: Environmental Management Programme for the proposed project.**



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Activity / issue	Action required	Responsible party	Frequency
Appointment and Duties of ECO	The Developer must appoint an independent Environmental Control Officer (ECO) who must monitor the contractor's compliance with the EMPr	Developer	Once-Off
	The developer must provide the ECO and contractor with a copy of the EMPr.	Developer	Once-Off
	The priority of the ECO is to maintain the integrity of the development conditions outlined in the EMPr.	ECO	Continuous
	The ECO must form part of the project management team and attend all project meetings.	ECO	Continuous
	The contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing activities on site.	ECO, Contractor, Developer	Once-off
	Report on environmental compliance at the monthly site meetings	ECO, ELO	
	An Environmental Completion Statement will be prepared by the ECO for submission to JRA indicating completion of the project and compliance with the EMP and conditions. This statement will be prepared after the final audit at the end of the construction phase.	ECO	Once Off
Appointment and Duties of ELO	The contractor must appoint an Environmental Liaison Officer (ELO). This person will be required to monitor the situation with a direct hands-on approach and ensure compliance and cooperation of all personnel. He should be fluent in the languages of the employees	Contractor	Once-Off
EMPr Training for Site Personnel	This EMPr must be made binding to the main contractor as well as individual contractors and should be included in tender documentation for the construction contract.	Developer, ECO	Once-Off
	The Contractor shall ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include. <ul style="list-style-type: none"> <li>• What is meant by "Environment"?</li> </ul>	Contractor	Continuous



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	<ul style="list-style-type: none"> <li>• Why the environment needs to be protected and conserved.</li> <li>• How construction activities can impact on the environment.</li> <li>• What can be done to mitigate against such impacts?</li> <li>• Awareness of emergency and spills response provisions</li> </ul> <p>- Social responsibility during construction of the detention ponds. It is the Contractor's responsibility to provide the site foreman with environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.</p> <p>- Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary.</p> <p>- Use should be made of environmental awareness posters on site.</p> <p>- The need for a "clean site" policy also needs to be explained to the workers.</p> <p>- Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.</p> <p>The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed.</p>		
<p>EMPr Training for Site Personnel</p>	<p>Environmental inductions may take the form of onsite talks and demonstrations by the Contractor and the ECO. Induction report will be signed by the Contractor as well as the Employee undergoing Induction, and records kept for auditing purposes and copies given to the ECO for filing. The education / awareness programme should be aimed at all levels of management and staff within the Contractor's team, and particularly labour drawn from surrounding communities</p>	<p>ELO, ECO, Contractor, Construction Crew</p>	<p>Continuous</p>
<p>Record Keeping</p>	<ul style="list-style-type: none"> <li>• All specialists report (Heritage Impact Assessment, Aquatic Ecological Assessment, Wetland Delineation and Rehabilitation and Monitoring Plan).</li> <li>• EMPr.</li> <li>• Records must be kept of those that have completed the relevant training.</li> </ul>	<p>Developer, Contractor</p>	<p>Continuous</p>



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	<ul style="list-style-type: none"> <li>Records of attendance and the awareness talk subject must be kept on file.</li> <li>Records of public complaints (public register).</li> <li>Environmental authorisation and any other relevant project permit i.e., Water Use Licence.</li> <li>Waste Documentation.</li> <li>ECO Site Audit/Monitoring Reports.</li> <li>Method Statements etc</li> </ul> <p>The Contractor shall ensure that all pertinent permits, certificates, and permissions have been obtained prior to any activities commencing on site and ensure that they are strictly enforced / adhered to. This includes, for example, the Water Use License from the Department of Water and Sanitation DWS).</p>		
	<p>All records related to the implementation of this management plan (e.g., site instruction book, ECO reports, induction records, method statements, must be kept together in an office where it is safe and can be retrieved easily. Developer, Contractor, ELO, As necessary. All relevant records should be kept for a minimum of two years after construction and should at any time be available for scrutiny by any relevant authorities or stakeholder.</p>	Developer, Contractor, ELO	As necessary
Environmental Protection Plan	<p>Within 21 days of the Commencement Date, the Site Contractor shall prepare and submit to the Project Manager for approval in consultation with the ECO an Environmental Protection Plan. The Plan shall cover all environmental protection works and shall also include descriptions of environmental safeguards and emergency procedures.</p>	Developer, ECO, Contractor	Once - off
	<p>The Plan shall include a description of the administrative structure and lines of communication which shall be established between the Contractor's and his subcontractors' workforce for the implementation of environmental protection procedures. Details of the expertise available for the implementation of environmental protection procedures must also be provided</p>	Contractor, RE, ECO	Once-Off
	<p>In addition, this plan must have a site layout plan and showing the final positions and extent of all permanent and temporary site structures and infrastructure, including:</p> <ul style="list-style-type: none"> <li>Contractors' camp.</li> </ul>	Contractor, RE, ECO	Once-Off



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	<ul style="list-style-type: none"> <li>• Roads and access routes.</li> <li>• Gates and fences.</li> <li>• Rubble and waste storage areas.</li> <li>• Site toilets and ablutions.</li> <li>• Excavations and trenches.</li> <li>• Topsoil stockpiles.</li> <li>• Spoil areas.</li> <li>• Construction materials stores.</li> <li>• Vehicle and equipment store.</li> <li>• Sensitive and No-go areas &amp; applicable buffers. This must include all areas of Environmental sensitivity (natural environment, sensitive habitats, and wetland areas).</li> <li>• All temporary and pollution management structures e.g., bunds and sumps (where applicable)</li> </ul>		
Existing Services and Infrastructure	The Contractor shall ensure that existing services (e.g., roads, pipelines, power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE	Contractor, RE, ECO	Continuous
	The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted.	Contractor	As Necessary
	Such repair or reinstatement will be to the Contractor's cost and shall receive top priority over all other activities.	Contractor	Continuous
	A time limit for the repairs may be stipulated by the RE in consultation with the Contractor.	Contractor, RE, ECO	Continuous
Emergency Preparedness	If chemicals in sufficient quantity and toxicity have the potential to be released on the construction sites, emergency contingency plans should be prepared as safety measures (Bunded areas). These safety measures should be communicated to the relevant personnel on the construction site. All hazardous installations require a Risk Assessment in terms of the Occupational Health and Safety Act, (Act No.85 of 1993) for construction sites	Contractor, ELO	Once-Off



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<p>Method Statements</p>	<p>The Contractor shall submit written Method Statements to the RE for the activities identified by the RE or ECO. Activities that will require method statements include:</p> <ul style="list-style-type: none"> <li>• Logistics for the Environmental Awareness Training Course</li> <li>• Location and Layout of Construction camp</li> <li>• Construction procedures</li> <li>• Solid and Hazardous Waste Management</li> <li>• Drainage and Storm water planning</li> <li>• Dust Control</li> <li>• Stockpiling area</li> <li>• Vegetation removal</li> <li>• Materials and equipment to be used.</li> <li>• Getting the equipment to and from the site</li> <li>• How the equipment material will be moved while on site</li> <li>• How and where material will be stored</li> <li>• The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur.</li> <li>• Timing and location of activities</li> <li>• Compliance/non-compliance with Specifications</li> <li>• Site camp establishment</li> <li>• Concrete pre-cast and batching operation (if required)</li> <li>• Emergency procedures</li> <li>• Materials, equipment and staffing requirements.</li> <li>• Transporting the materials and/or equipment to, from and within the site</li> <li>• Stockpiling of rubble</li> </ul>	<p>Contractor</p>	<p>As necessary</p>
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	<ul style="list-style-type: none"> <li>• General and Hazardous waste management on site</li> <li>• The storage provisions for the materials and/or equipment</li> <li>• The proposed construction procedure designed to implement the relevant Environmental Specifications.</li> <li>• Other information deemed necessary by the RE and/or ECO.</li> </ul> <p>Method Statements shall be submitted at least ten working days prior to the proposed commencement of work on an activity to allow the RE (and/or ECO) time to study and approve the method statement</p>		
Method Statements	Contractor shall not commence work on that activity until such time as the Method Statement has been approved in writing by the RE contract	Contractor, RE, ECO	Continuous
	The Contractor shall carry out the activities in accordance with the approved Method Statement.	Contractor, RE, ECO	Continuous
	Under certain circumstances, the RE may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the RE, and appropriate records retained.	Contractor, RE	Continuous
	Approved Method Statements shall be readily available on the site	Contractor, Developer	Continuous
Site Establishment	The contractor shall establish his construction camp, office/s, and any other infrastructure as per the agreed site layout plan in a manner that does not adversely affect the environment.	Contractor, ECO	Once-Off
	The contractor shall submit a method statement for site clearance for approval by the RE in consultation with the ECO. Site establishment shall take place in an orderly manner and all required amenities shall be installed at Camp site before the main workforce move onto site	RE, Contractor, ECO	Once-Off
	The Construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction activities to the satisfaction of the Project Manager. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.	Contractor, ECO	Continuous



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	Safe drinking water for human consumption shall be available at the site offices and at other convenient locations on site. All water used on site must be taken from a legal source and comply with the recognised standards for potable and other uses.	Contractor, ECO	Continuous
	No fires on site will be allowed. Activities which may pose a risk of fire must be identified and suitable measures must be put in place to prevent any possible damage by fire. Contractors must inform the staff of the risk of fires and fire prevention and emergency procedures in the event of a fire. Fire-fighting equipment shall be supplied by the Contractor at suitable locations	Contractor, ECO	Continuous
	The construction camp must preferably be positioned where it will not visually impact on adjacent landowners and should not be located in an environmentally sensitive area	Contractor, ECO	Once-off
	All sensitive areas, heritage (if encountered), wetland, drainage lines, should be demarcated and fenced off before development commences. These areas should be treated as “no go” areas. Activities in the wetland should only be limited to those areas authorised;	Contractor, ECO, ELO	Continuous
	Invasive alien plant species should be treated in an appropriate manner	ELO and Contractor	Continuous
	Alien plant eradication and follow-up control activities prior to construction, to prevent spread into disturbed soils, as well as follow up control during construction.	ELO and Contractor	Continuous



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**Table 2: Pre - Construction Phase: Environmental Management Programme for the proposed project**

Activity / issue	Action required	Responsible party	Frequency
Environmental Construction Site Management	Locate and clearly indicate convenient access routes, temporary loading and packing areas and turning circles so that vehicle movement can be confined to these areas	ELO, Contractor	Continuous
	Locate chemical toilets so that they are easily accessible for servicing	ELO, Contractor	Continuous
	Direct lights so that they do not pose a nuisance to neighbours	ELO, Contractor	Continuous
	Locate temporary waste bins and skips so that they are easily accessible for removal	ELO, Contractor	Continuous
	Those areas surrounding the construction site that are not part of the demarcated development area should be considered as “no-go” areas for employees, machinery or even visitors.	Developer, ECO, Contractor	Continuous
Changing the physical structure within a water resource	Avoid activities within the delineated riparian zone and associated buffer zone. Only authorised activities are to be undertaken;	Contractor	Continuous
	Project engineers should compile a method statement, outlining the construction methodologies. The required mitigation measures to limit the impacts on the watercourse and associated buffers should be contained within the method statement. The method statement must be approved by the ECO and be available on site for reference purposes	Project Engineer	As necessary
	Plan construction activities to have the smallest possible footprint	Developer, Project Engineers	Once-off



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	Demarcate the construction footprint prior to commencement of construction and ensure that all workers and contractors are aware that access beyond the demarcated areas is not allowed. Where the structures will affect a wetland, the edge / boundary of this wetland must be clearly demarcated in the field with poles, sticks, or any solid structure that will last for the duration of the development. These indicators could be coloured as follows and communicated to workers Red – Indicating the edge / boundary of the wetland Orange – Indicating the edge of the buffer zone	Developer, Project Engineers, Contractor, ECO, ELO	Continuous
	Ensure that copies of the Wetland and Rehabilitation Reports and other applicable documents are available on site and that all workers and contractors are aware of it. Implementation thereof should be monitored by the appointed the site Safety and Environmental Officer (SHE) or independent Environmental Control officer (ECO)	Contractor, Developer, ELO	Continuous
	Plan construction activities that necessitate construction within the wetland to only cross the wetland at approved designated points as per designs	Developer	Once - off

**Table 3: Construction Phase: Environmental Management Programme for the proposed project**

<b>Activity / issue</b>	<b>Action required</b>	<b>Responsible party</b>	<b>Frequency</b>
Prevention of pollution on wetland	If concrete batching will be required on site. The contractors must provide and maintain a method statement for “cement and concrete batching”. The method statement must provide information on proposed location, storage, washing & disposal of cement, packaging, tools, and plant storage	Contractor, RE ECO	Once-off
	Cement, asphalt, and plaster should only be mixed within mixing trays. Washing and cleaning of equipment should also be done within a bermed area (outside of the wetland buffer), in order to trap any cement, asphalt or plaster and avoid excessive soil erosion. These sites must be rehabilitated prior to commencing the operational phase	Contractor, RE ECO	As necessary
	Where access cannot be avoided into sensitive areas (wetland), the amount of vehicle and personnel traffic should be kept to a minimum and should make use of only one route	Contractor, RE ECO	As necessary



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Materials such as fuel, oil, paint, herbicide, and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas. These substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall	Contractor, RE ECO	Continuous
Storage of materials as described above may not be within the 1:100 flood line, watercourses, or associated buffer areas	Contractor, ELO ECO	Continuous
No vehicles will be allowed within the 10m of sensitive environments (wetland, drainage lines)	Contractor, ELO ECO	Continuous
In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water and Sanitation (DWS) must be informed immediately	Contractor, ELO	As necessary
No hydrocarbon spillages and dirty water from site must not be allowed to flow into the watercourse.	Contractor, ELO	As necessary
All equipment should be parked overnight and/or fuelled at least 30 meters from the watercourse	Contractor, ELO	As necessary
Spill kits must be available on site for the clean-up of any hydrocarbon spillages	Contractor, ELO, ECO	Continuous
Drip trays (minimum of 10cm deep) must be placed under all leaking vehicles and machinery under repair and maintenance. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised	Contractor, ELO	As necessary
Construction vehicles are to be maintained in good working order so as to reduce the probability of leakage of fuels and lubricants	Contractor, ELO	Continuous
Provision of adequate sanitation facilities located outside of the watercourse or its associated buffer zone	Contractor, ELO	Continuous
Remove all construction equipment and material on completion of construction	Contractor, ELO, ECO	Continuous
Where any hard structures (concrete, gabion or otherwise) are used, it should be well keyed into the surrounding bank walls and secured to the ground	Contractor	As necessary
Construction in and around watercourses must be restricted to the dryer winter months	Developer, Contractor	Continuous
A temporary fence or demarcation must be erected around the works area to prevent access to sensitive environs	Contractor, ELO	Once-off



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	Prevent pedestrian and vehicular access into the watercourse	Contractor, ELO	Continuous
	Consider the various methods of construction and take cognisance of that which will have the least impact on watercourses	Developer, Contractors, ECO	Continuous
Environmental incidents	The contractor must take corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves	Contractor, ELO,	Continuous
Handling and Storage of hydrocarbons	Materials storage areas will not be allowed in close proximity to ecologically sensitive areas (watercourse on site)	Contractor	Continuous
	Storage of potentially hazardous materials should be above any 100-year flood line or the functional wetland boundary (and its associated buffer zone). These materials include fuel, oil, cement, bitumen etc.	Contractor, ECO	Continuous
	Spill kits must be available on site for the clean-up of any hydrocarbon spillages	Contractor, ECO	Continuous
	The areas around fuel tanks are to be bunded in accordance with SANS 1089:1999: Part 1	ELO, Contractor	Once-Off
	Hazardous chemicals or potentially hazardous chemicals used during construction shall be stored in secondary containers and all relevant Material Safety Data Sheets (MSDSs) shall be available on site	Contractor	Continuous
	<ul style="list-style-type: none"> <li>• Concrete is to be mixed on mixing trays only, not on exposed soil.</li> <li>• Concrete and tar shall be mixed only in areas which have been specially demarcated for this purpose.</li> <li>• After all the concrete / tar mixing is complete all waste concrete / tar shall be removed from the batching area and disposed of at an approved dumpsite;</li> </ul>	Contractor, ELO	Continuous
	The relevant emergency procedures relevant to particular chemicals used on site, as per the MSDSs and suppliers' guidelines, will be followed in the event of an emergency	Contractor	Continuous
	The contractor shall prevent discharge of any pollutants such as cement, asphalt, concrete, lime, chemicals, fuels and oils into any water sources and adequate storm water control measures will be implemented where these substances are handled	Contractor	Continuous



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Handling and disposal of contaminated water	No discharge of pollutants such as cement, concrete, lime, chemicals, fuels, or oils will be allowed into any watercourse	ELO, Contractor	Continuous
	Surface water draining off contaminated areas containing carbon fuels (e.g., oils, diesel etc.) would need to be channelled towards a sump which will separate these chemicals and oils;	Contractor	Continuous
	Only above ground temporary storage tanks will be allowed on site	ELO, Contractor	Continuous
	Contaminated or potentially contaminated water should not be discharged into the watercourse on site	ELO, Contractor	Continuous
Lighting	Working hours shall generally be restricted to daylight hours	ELO, Contractor	Continuous
	If working hours are required outside of daylight hours, the contractor shall provide notification by completing the Night work Application three days in advance of the work taking place	ELO, Contractor	Continuous
	Security lights shall be directed from the perimeter wall towards the centre of the camp with a down angle	ELO, Contractor	Continuous
Waste management	Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites	ELO, Contractor	Continuous
	All building rubble, solid and liquid waste etc must be disposed of as necessary at an appropriately licensed refuse facility.	ELO, Contractor	Continuous
	Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site	ELO, Contractor	Continuous
	The construction site must be kept in a clean and orderly state at all times	ELO, Contractor, Construction Crew	Continuous
	No waste may be dumped into the watercourse on site	ELO, Contractor, ECO	Continuous
	No burning of waste will be allowed on site	ELO, Contractor	Continuous
	All related documents for disposal of general and hazardous waste are to retain on site to be included in the end of project documents.	ELO, Contractor, ECO	Continuous
	Empty containers in which hazardous substances were kept are to be treated as hazardous waste	ELO, Contractor, ECO	Continuous



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	Ensure that no litter, refuse, wastes, rubbish, rubble, debris, and builders waste generated on the premises be placed, dumped, or deposited on adjacent/surrounding properties during or after the construction period of the project are disposed of an approved at dumping site as approved by the Council.	ELO, Contractor	Continuous
Storm water Management	No stockpiles or construction materials may be stored or placed within the watercourse (Riparian Zone) that may be in close proximity of storm water drains	Contractor, ELO, ECO	Continuous
	Should a freak storm displace the temporary earth embankments or other erosion control structures, a visual inspection of the site must be made, and any damage be recorded. Any damage and loss of soil resulting from a storm is to be remedied immediately. Should the temporary walls collapse due to construction error, the contractor is to fund the remediation process	Contractor, ELO, ECO	Continuous
	Storm water at the construction crew camp must be managed so as to reduce the silt loads into the ecological environment. Measures must be implemented to distribute storm water as evenly as possible to avoid point sources of erosion	Contractor, ELO, ECO	Continuous
	The site must be managed in a manner that prevent pollution of drains, downstream watercourses, or groundwater, due to suspended solids, silt, or chemicals	Contractor, ELO, ECO	Continuous
	No stockpiles or construction materials may be stored or placed in close proximity to storm water drains.	Contractor, ELO, ECO	Continuous
	Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.	Contractor, ELO, ECO	Continuous
Noise Management	Construction and the use of construction machinery should be limited between 06h00 and 18h00 on weekdays only	Developer, Contractor	Continuous
	Institute noise control measures throughout the construction phase for all applicable activities, including the construction times.	ELO, Contractor	Once-Off
	Unnecessary honking of construction vehicles should not be allowed on site	Contractor, ELO, ECO	Continuous
	Inform residents of nearby residential areas of planned noisy activities outside the timeframes stated above	Contractor, ELO, ECO	Once-Off





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	No construction should occur during weekends, unless the adjacent residents have been notified in writing at least three days in advance	Contractor, ELO	Once-Off
	Construction activities must abide by the national noise laws and the municipal noise by-laws with regard to the abatement of noise caused by mechanical equipment.	Developer, Contractor, ELO	Continuous
Air Pollution	Wet all unprotected cleared areas and stockpiles with water to suppress dust pollution during dry and windy periods.	ECO, ELO	As Necessary
	All forms of dust/air pollution must be managed in terms of the NEMA Air Quality Act (AQA) 2004, (Act 39 of 2004); this includes the control of noxious and offensive gases, smoke, dust, and vehicular emissions. Under no circumstances may toxic pollutants of high concentration be released into the air.	ECO, ELO	As Necessary
	Burning of vegetation including tree trunks and stumps cut during site clearing and establishment shall not be permitted. Woody material should be chipped and reused as mulch back on the site.	ELO, Contractor	As Necessary
	Ensure proper rehabilitation of disturbed areas in order to minimise bare patches that can be a source of fugitive dust	ELO, Contractor	As Necessary
Crime, safety, and security	Ensure that the construction vehicles are under the control of competent personnel and are in proper working order.	ELO, Contractor	Continues
	Ensure that only suitably qualified personnel use construction vehicle	ELO, Contractor	Continues
	Ensure that the contact details of the police or security company and ambulance services are available on site	ELO, Contractor	Continues
	Limit access to the construction crew camp to construction workers through access control.	ELO, Contractor	Continues
	Comply with the requirements of the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) requirements	ELO, Contractor	Continues
	Ensure that the handling of equipment and materials is supervised and adequately instructed	ELO, Contractor	Continues
	Vehicular traffic during construction activities must be limited to a maximum speed limit of 60 km/hr	ELO, Contractor	Continues
Crime, safety and	If blasting is required, site notices informing the public of the planned activities must be placed at visible locations a few days prior to any blasting.	Contractor, ELO	As necessary



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security	The security fence around the development site must be completed before construction commences internally.	Contractor, ELO	Once-Off
	Security fence is to be inspected daily to ensure no illegal entry points are created	Contractor, ELO	Continues
	The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations	Contractor, ELO	Continues
	The contractor must supply his own security arrangements for the construction camp within the framework of the EMPr	Contractor, ELO	Continues
	Equipment and materials must be handled by staff that have been supervised and adequately trained.	Contractor, ELO	Continues
	Staff must be regularly updated about the safety procedures	Contractor, ELO	Continues
	Emergency facilities must be available and adequately supplied for use by staff and customers.	Contractor, ELO	Continues
	Ensure that the handling of equipment's and materials is supervised and adequately instructed.	Contractor, ELO	Continues
	Limit access to the construction crew camp only to the workforce	Contractor, ELO	Continues
	Any crimes to be reported to the local South African Police Service (SAPS). These incidents are either reported by the PM or through the knowledge of the PM.		Continues
Stripping of vegetation	<ul style="list-style-type: none"> <li>• All employees to be clearly identifiable.</li> <li>• Proper supervision of employees at all times.</li> <li>• Construction activities must remain within construction footprint.</li> <li>• No unauthorized people to be allowed on site</li> </ul>	Contractor, ELO	Continuous
	Appropriate notification signs must be erected, warning the residents, pedestrians, and cyclist about the hazards around the construction site and presence of heavy vehicles	Contractor, ELO	Continuous
Stripping of vegetation	The working strip must be effectively monitored to prevent excessive vegetation removal. By maintaining the maximum amount of stabilising vegetation, the extent of erosive action will be contained.	Contractor, ELO	As necessary



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Re-vegetation must be on-going and relevant to terrestrial, wetness zone and slope	Contractor, ELO	As necessary
Where possible, remove vegetation as sods that can be replanted as part of the rehabilitation of vegetation around the conduit footprint. Store sods in already cleared areas or degraded areas and water at least once wee	Contractor, ELO	As necessary
Stripping of vegetation for construction must occur in a phased manner and must be restricted to the construction footprint to reduce the risk of erosion during times of precipitation	Contractor, ELO	As necessary
Limit the removal of naturally occurring vegetation to only that which is absolutely necessary	Contractor, ELO	Once-off, As necessary
Vegetation to be retained during the construction phase must be clearly demarcated with danger tape	Contractor, ELO, ECO	Once-off, As necessary
Where activities occur in areas that slope towards the watercourse, the slopes must be re-vegetated by either using removed sods or by seeding with a grass mixture containing species naturally occurring in the area. Sloped areas where vegetation has been removed or destroyed should be replanted immediately after the initial disturbance to reduce the potential of erosion or invasion of the disturbed soils by alien invasive plant species.	Contractor, ELO	As necessary
Indigenous hydrophytes (e.g., reeds) should be established on the banks of the watercourse as this could help stabilise the banks and limit sedimentation.	Contractor, ELO	Continuous
Where possible, cut vegetation to ground level rather than removing completely, leaving root systems to ensure rapid re-colonisation;	Contractor, ELO, ECO	As necessary
Limit the removal of naturally occurring vegetation to only that which is absolutely necessary	Contractor, ELO, ECO	As necessary
Where earthworks will take place in riparian areas: Naturally occurring indigenous riparian plant species (e.g., <i>Typha capensis</i> , <i>Schoenoplectus sp.</i> <i>Cyperus congestus</i> and grasses such as <i>Imperata cylindrica</i> , <i>Leersia hexandra</i> , <i>Phragmites australis</i> ) must be identified prior to construction and shall be.	Contractor, ELO, ECO	As necessary



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	<ul style="list-style-type: none"> <li>Removed appropriately with their root ball intact. riparian vegetation removed shall be stockpiled neatly on the periphery of the area being stripped, for use in wetland rehabilitation (Teixeira-Leite, 2009)</li> </ul>		
	All rehabilitated areas must be monitored for the presence of exotic and alien plant species during rehabilitation	Contractor, ELO, ECO	
Excavation	Topsoil and subsoil must be placed on opposite sides of the trench and must be kept separate throughout construction and rehabilitation	Contractor, ELO, ECO	As necessary
	Topsoil must not be stockpiled for an extensive period (> 3 months). This is to prevent the redundancy of the existing seed bank as well as the alteration of the soil characteristics (permeability, bulk density etc.)	Contractor, ELO, ECO	As necessary
	Erect signs and/or danger tape around the exposed excavations to warn the public of the inherent dangers	Contractor, ELO	As necessary
	Ensure that excavated and stockpiled soil material is stored and bermed on the higher lying areas of the site and not in any storm water run-off channels or any other areas where it is likely to cause erosion or where water would naturally accumulate	Contractor, ELO, ECO	As necessary
Stockpiling of soil	It is imperative that this soil be collected and stored to ensure that valuable seeds in the soil are not lost to the process of eventual rehabilitation of the site.	ELO, Contactor	As necessary
	Disturbance of topsoil on construction sites with severe slopes should be minimised at all costs.	ELO, Contactor	As necessary
	The areas where excavated soil will be stockpiled must be bordered by berms to prevent soil loss caused by rain	ELO, Contactor	As necessary
	Topsoil shall be stripped after clearing of woody vegetation and before excavation or construction commences.	ELO, Contactor	As necessary
	Soil shall be stripped to a minimum depth of 300 mm or to the depth of bedrock where soil is shallower than 300 mm	ELO, Contactor	As necessary
	Herbaceous vegetation, overlying grass and other fine organic matter shall not be removed from the stripped soil.	ELO, Contactor	As necessary
	Position topsoil stockpiles away from the watercourse and drainage lines	ELO, Contactor	As necessary



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	When possible and space allows: Stockpiled soil (particularly topsoil) must be protected by erosion-control berms if exposed for a period of greater than 14 days during the wet season (this will prevent topsoil being leached of its nutrient content and/or being washed away or mixed with other stockpiled soil).	ELO, Contactor	As necessary
	The topsoil will be stored in such a way and at such a place that it will not cause damming up of water or wash away itself	ELO, Contactor	As necessary
	If topsoil is to be stockpiled for extended periods, especially during the wet season, then the ECO may recommend one of the following measures: <ul style="list-style-type: none"> <li>• The covering of the stockpiles with a protective material such as hessian mats.</li> <li>• Seeded with a temporary grass to keep the microbial activity within the soil alive.</li> </ul>	ELO, Contactor	As necessary
	Soil stockpiles shall not be higher than 1,5m and the slopes of soil stockpiles shall not have a vertical/horizontal gradient exceeding 1: 1,5	ELO, Contactor	As necessary
	Ensure that topsoil is at no time buried, mixed with spoil (excavated subsoil), rubble or building material, or subjected to compaction or contamination by vehicles or machinery. This will render the topsoil unsuitable for use during rehabilitation	ELO, Contactor	As necessary
	The stockpiled topsoil must be replaced as the final soil layer.	ELO, Contactor	As necessary
	Vehicle access onto the topsoil must be strictly prohibited once it has been prepared as per above for seeding to take place and up until the grass has germinated and become established.	ELO, Contactor	As necessary
	Topsoil placement shall be done concurrent with construction as soon as construction in an area has ceased. After topsoil placement is complete, stockpiled vegetative matter may be spread randomly by hand over the top soiled area which may serve as mulch.	ELO, Contactor	As necessary
Destruction of heritage resources	Should any archaeological artefacts be exposed during excavation, work on the area where the artefacts were found, shall cease immediately and the ECO shall be notified as soon as possible	ELO, Contactor	As necessary
	Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist as soon as possible	ECO, Contractor	As necessary



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	Under no circumstances shall archaeological artefacts be removed, destroyed, or interfered	ELO, Contactor	Continuous
	Any archaeological sites exposed during construction activities may not be disturbed prior to authorisation by the South African Heritage Resources Agency	ECO, Contactor	As necessary
Aesthetic / visual	Prevent unnecessary removal of vegetation outside the width of the working area by clearly demarcating the working area	ELO, Contactor	Continuous
	Remove spoil material from the area once the trench has been filled	Contactor	Continuous
	Remove vegetation and topsoil and stockpile separately from subsoil prior to excavation of the cable trench.	ELO, Contactor	Continuous
	Revegetate disturbed ground in the working area by seeding and spreading of vegetation that has been removed from the trench at the start of construction	ELO, Contactor	Continuous
Traffic impact	Access to the site must follow current and established routes. The contractor should be responsible for any damage caused to the road or road curb/verges.	Contactor	Continuous
	The Contractor shall comply with all legislation with regard to manmade facilities and activities in the area, including the Occupational Health and Safety Act (Act 85 of 1993).	Contactor	Continuous
	It must be ensured that a backlog of traffic does not develop on site during peak hours, through the erection of signage to warn motorist of construction, closed road lanes, traffic delays etc,	Contactor	Continuous
	Prior to construction informative hazard Warning Signage must be erected to inform public of the inherent dangers;	ELO, Contactor	Continuous
	During daytime, designate responsibility to some construction crew to guide traffic (traffic controllers) during construction to motorist that will be affected during construction.	ECO, Contactor	Continuous
	During night-time, traffic warning signs must be erected to guide traffic after construction working hours.	ELO, Contactor	Continuous
Prevent/limit sedimentation	Cause of sedimentation should be identified and dealt with appropriately	ELO, Contactor	Continuous
	Should water need to be pumped around the works area and discharged back into the river, care must be taken to ensure that the water is discharged in a manner that does not cause siltation or erosion downstream. As such it is recommended	ELO, Contactor	Continuous



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	that any water to be discharged from pumping around the construction area or from dewatering operations be first discharged into a structure that allows the settlement of all suspended material, and which allows the diffuse discharge of water into the river. The water must be dissipated on re-entry into the watercourse, to reduce the changes of erosion		
	The contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter watercourses. Appropriate measures, e.g., erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken	ELO, Contactor	Continuous
	Silt trenches between the works area and downstream riparian area could be used to trap any sediment washing off the works area and to prevent scouring of the streamline in case of heavy flows. This will provide protection for the downstream section of the watercourse for almost the entire length of road across a riparian area	ELO, Contactor	<b>Continuous</b>
	Where wetlands or riparian areas are adjacent to the construction areas and these areas slopes toward the river, install sediment barriers along the edge of the construction areas as necessary to prevent sediment flow into the river	ELO, Contactor	Continuous
	Sediment barriers must be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls or restoration of adjacent upland areas is complete	ELO, Contactor	Continuous
	It is important that topsoil should be conserved in areas where bedrock is shallow to avoid sedimentation	ELO, Contactor	Continuous
	Should water need to be pumped around the works area and discharged back into the stream, care must be taken to ensure that the water is discharged in a manner that does not cause siltation or erosion downstream. As such it is recommended that any water to be discharged from pumping around the construction area or from dewatering operations be first discharged into a structure that allows the settlement of all suspended material, and which allows the diffuse discharge of water into the stream. The water must be dissipated on re-entry into the watercourse, to reduce the changes of erosion	ELO, Contactor	Continuous
Preventing spread of alien	Appointment of alien plant working group / assign this duty to specific staff: <ul style="list-style-type: none"> <li>• If herbicide must be used it should be registered for aquatic use.</li> <li>• Manual removal methods are preferred to chemical control.</li> </ul>	ELO, Contactor	Continues



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invasive species	<ul style="list-style-type: none"> <li>Acquire the necessary equipment for removal and control.</li> <li>Planned sequence of areas to be cleared of invasive plants.</li> <li>A register of the methods used, dates undertaken, as well as herbicides and dosage used must be kept and available on site. The register must also include incidents of poisoning or spillage.</li> <li>Ensure that contractors can identify the relevant plants and are aware of the removal procedures</li> </ul>		
	Construction equipment must be cleaned prior to site access. This will prevent alien invasive seed from other sites to spread into disturbed soils	ELO, Contactor	Continues
	Alien invasive species that are identified within servitudes should be removed prior to construction related soil disturbances. This will prevent seed spreading into disturbed soils	ELO, Contactor	Continues
Limit Exposure to Erosion	Erosion control of all banks must take place so as to reduce erosion and sedimentation into river channels or wetland areas.	ELO, Contactor	Continues
	Should sedimentation be observed to accumulate and smother vegetation, a wetland specialist should be consulted to find a suitable solution for the specific wetland and its plant species composition	ELO, Contactor	Continues
	The contractor shall be responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed.	ELO, Contactor	During and immediately after Any construction
	Disturbances on site should be kept to a minimum to reduce the loss of material by erosion	ELO, Contactor	As necessary
Completion of Construction	The ECO must ensure that all construction equipment and all foreign material are removed on completion of construction	Developer	As necessary
	On completion of construction activities, monitoring should be done in order to record compliance with the targets set out in the EMP and to highlight any areas where further action is required in terms of rehabilitation or routine monitoring (refer to monitoring plan)	Developer	As necessary





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**Table 5: Rehabilitation Phase: Environmental Management Programme for the proposed project**

Activity / issue	Action required	Responsible party	Frequency
Establishment of Alien Plant species	If establishment of alien invasive plant species in rehabilitated areas or in watercourses occurs. The following must be undertaken: <ul style="list-style-type: none"> <li>• Remove emergent invasive vegetation from the servitudes as well as rehabilitated footprint as soon as it becomes apparent.</li> <li>• Manual labour is preferred above chemical or manual removal.</li> <li>• Do not use herbicides or pesticides in or within 200 meters of wetland areas</li> </ul>	Developer	Continuous
	Burning of vegetation including tree trunks and stumps cut during site clearing and establishment shall not be permitted. Woody material should be chipped and reused as mulch back on the site. No organic matter other than alien invasive material should leave the site. This will enable the environment to be rehabilitated easier.	Contractor, ELO, ECO	Continuous



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	<p>All rehabilitated areas must be monitored for the presence of exotic and alien plant species.</p> <ul style="list-style-type: none"> <li>Should the presence of exotic/alien plant species be observed it should be removed appropriately</li> </ul>	Contractor, ELO, ECO	Continuous
Mobilisation of pollutants	In case of emergencies or unforeseen events, problem must be remediated immediately and any spillage into any watercourses be reported to the Department of Water and Sanitation. In addition, the soil must be stabilised (import additional topsoil if necessary) and revegetated as soon as possible. Re-vegetation should include seeds from the adjacent grassland and any rescued protected plants and/or plants of conservation concern that might have been impacted upon by the emergency / unforeseen event	Contractor, ELO	Continuous
	Remove all project-related material used to support equipment on completion of construction	Contractor, ELO	Continuous
	Any contaminated soil from the onsite needs to be removed and properly disposed off	Contractor, ELO, ECO	As necessary
	Materials such as fuel, oil, paint, herbicides, and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas	Contractor, ELO, ECO	As necessary
	These substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall	Contractor, ELO, ECO	Continuous
	Storage of materials as described above may not be within the 1:100 floodline, watercourses or associated buffer areas	Contractor, ELO, ECO	Continuous
	In the case of significant pollution of the watercourse, the Regional Representative of the Department of Water Affairs (DWS) must be informed immediately	Contractor, ELO, ECO	As necessary
	All equipment should be parked overnight and/or fuelled at least 500 meters from a watercourse	Contractor, ELO, ECO	Continuous
	Drip trays (minimum of 10cm deep) must be placed under all leaking vehicles and machinery that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised.	Contractor, ELO, ECO	Continuous



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	Drip trays must be utilised during repairs and maintenance of all machinery. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle	Contractor, ELO, ECO	As necessary
	Provision of adequate sanitation facilities located outside of the wetland/riparian area or its associated buffer zone	Contractor, ELO, ECO	Continuous
	Any water discharged must comply with the relevant Water Quality limits/guidelines specified by Department of Water and Sanitation (DWS).	Contractor, ELO,	As necessary

## 6. ENVIRONMENTAL AWARENESS PLAN

**OBJECTIVE:** Ensure all operation personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm (Environmental Awareness Plan) To achieve effective environmental management, it is important that Contractors and site employees are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The developer is responsible for informing its employees and contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

- Employees must have a basic understanding of the key environmental features of the site and its surrounding environment.
- Ensuring that a copy of the EMP is readily available on-site and that all site staff is aware of the location and has access to the document. Employees must be familiar with the requirements of the EMPr and the environmental specifications as they apply to the operation of the facility.
- Ensuring that, prior to commencing any new site works, all employees have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Awareness of any other environmental matters, which are deemed to be necessary by the site manager.
- Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimise of disturbance to sensitive areas (watercourse), management of waste and prevention of water pollution.
- Records must be kept of those that have completed the relevant training.
- Training should be done either in a written or verbal format but must be in an appropriate format and language for the receiving audience.

- Refresher sessions must be held to ensure the operating staffs are aware of their environmental obligations.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

### 6.1 ENVIRONMENTAL AWARENESS TRAINING

Environmental Awareness Training must be undertaken by the SHE Manager/Officer and must take the form of an on-site talk and demonstration by the SHE Manager before the commencement of construction activities on site. A record of attendance of this training must be maintained by on site.

### 6.2 INDUCTION TRAINING

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations. Contractors or Engineers staff; site staff, sub-contractors, or visitors to site.

This induction training should include discussing the developer's environmental policy and values, the function of the EMPr and the importance and reasons for compliance to these. The induction training must highlight overall do's and don'ts on site and clarify the repercussions of not complying with these. The reporting procedure must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE officer on site.

### 6.3 TOOLBOX TALKS

Toolbox talks should be held on a scheduled and regular basis (at least once a month) where the foreman/site supervision manager, environmental and safety representative and all employees on site hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on

site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

## 7. MONITORING PROGRAMME

Monitoring refers to the repetitive and continued observation, measurement, and evaluation of environmental criteria to follow changes over a period of time and to assess the efficiency of control measures. The monitoring plan aims to establish whether rehabilitation was successful, whether maintenance or related activities have impacts and whether the implementation of the proposed development has detrimental impacts on the riparian area after construction.

**OBJECTIVE:** Monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the environmental authorisation (once issued). Where this is not clearly dictated, JRA will determine and stipulate the frequency of monitoring required in consultation with the relevant authority. The contractor project manager will work with the site manager of the contractor to ensure that monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specification.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.

- Ensure appropriate and adequate record keeping related to environmental compliance.
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
- Aid communication and feedback to authorities and stakeholders.

## 7.1 METHOD OF MONITORING

- Monitoring will be done as per the ECO monitoring protocol.
- The Contractor is deemed not to have complied with the Performance Specifications if:
  - There is evidence of wilful or accidental contravention of any specification included in the Specification.
  - There is evidence of the contractor carrying out activities not permitted in terms of the Contract and / or the Specification.
  - There is evidence of environmental negligence and / or mismanagement resulting in negative impacts on the environment.
  - The contractor has failed to meet with the requirements of the approved schedule.
- A checklist of items, works and behaviours as outlined in the EMP, and conditions of the Environmental authorisation (EA) will be created that will be monitored.
- Non-compliance of the EMP and EA will be reported as per the ECO monitoring protocol.
- The independent ECO will ensure compliance with the EMPr and will conduct monitoring activities. The ECO will undertake site inspections monthly or as specified in the environmental authorisation once issued. The ECO will report all non-compliances to the Site Manager and submit such reports to GDARD if specified in the environmental authorisation.



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### 7.2 NON-CONFORMANCE REPORT

All supervisory staff and ECO must be provided a means to be able to submit a non-conformance report to the site manager. The Non-conformance report will describe in detail, the cause and effect of any environmental non-conformance by the contractor. Records of penalties may be required by the Authorities within 48 hours. The non-conformance report will be updated upon completion of the corrective measures indicated on the finding sheet. The report must indicate that remediation measures have been implemented timeously and that the non-conformance can be closed out to the satisfaction of the site manager and ECO.

### 7.3 MONITORING REPORTS

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to GDARD as deemed practical or with the Final audit report. The report should include details of the activities undertaken in the reporting period, any non-conformances or incidences recorded, corrective action required and details of these non-conformances or incidents which have been closed out.

### 7.4 INTERNAL AUDITS AND REPORTING

Internal audits must be undertaken by the developer. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr. Findings of the audit must be made available to the external auditor.

### 7.5 FINAL AUDIT REPORT

A final environmental report must be compiled by the ECO and submitted to GDARD upon completion of construction and rehabilitation activities within 30 days of completion of construction phase (i.e., within 30 days of the site handover) and within 30 days of completion of rehabilitation activities). This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance of the environmental authorisation conditions) once issued and the requirements of the EMPr.





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### 8. CONCLUSIONS

Provided that all the proposed mitigation measures are implemented as per the EMPr, project is mitigated, as per the EMPr, the project will result in limited negative environmental impacts that can be mitigated through implementation of this EMPr. It is the applicant's responsibility to ensure that this EMPr is made binding on the contractor by including the EMPr in the contract documentation. The contractor should thoroughly familiarise himself with the requirements of the EMPr and appoint an environmental liaison officer (ELO) to oversee the implementation of the EMPr on a day-to-day basis. Parties responsible for transgression of this EMPr should be held responsible for any rehabilitation that may need to be undertaken. Parties responsible for environmental degradation through irresponsible behaviour/negligence should receive penalties.



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**APPENDIX 1: INCIDENT AND ENVIROENMNTAL LOG**

ENVIRONMENTAL INCIDENT LOG				
Date	Environmental Condition	Corrective Action	Comments	Signature



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**APPENDIX 2: COMPLAINTS RECORD SHEET**

Complaints Record Sheet	File Ref.....	Date:
	Page.... of....	
<b>COMPLAINT RAISED BY:</b>		
<b>CAPACITY OF COMPLAINANT:</b>		
<b>COMPLAINT RECORDED BY:</b>		
<b>COMPLAINT:</b>		
<b>ECO Comments:</b>		
<b>COMPLAINT RAISED BY:</b>		
<b>CAPACITY OF COMPLAINANT:</b>		
<b>COMPLAINT RECORDED BY:</b>		
<b>COMPLAINT:</b>		
<b>ECO Comments:</b>		