



TGM ENVIRONMENTAL SERVICES

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR

**PROPOSED BULK WATER AND SEWER PIPELINES
HAMMANSKRAAL WEST EXT 10**

REF: GAUT 002/17-18/E0166

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ABBREVIATIONS

CTMM	City of Tshwane Metropolitan Municipality
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
GDARD	Gauteng Department of Agriculture and Rural Development
NEMA	National Environmental Management Act
OHSA	Occupational Health and Safety Act
PPE	Personal Protective Equipment
PHRA-G	Provincial Heritage Resources Agency Gauteng
SAHRA	South African Heritage Resources Agency
SAPS	South African Police Service
SCC	Species of Conservation Concern

INFORMATION SHEET

1 Details of the Environmental Assessment Practitioner (EAP)

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ENVIRONMENTAL MANAGEMENT PROGRAMME

2 Introduction

TGM Environmental Services was appointed by Nyeleti Consulting (Pty) Ltd on behalf of City of Tshwane to submit an application to the Gauteng Department of Agriculture and Rural Development (GDARD) for the proposed bulk water and sewer pipelines – Hammanskraal West Ext 10. The project is located in the vicinity of Hammanskraal, within the City of Tshwane Metropolitan Municipality.

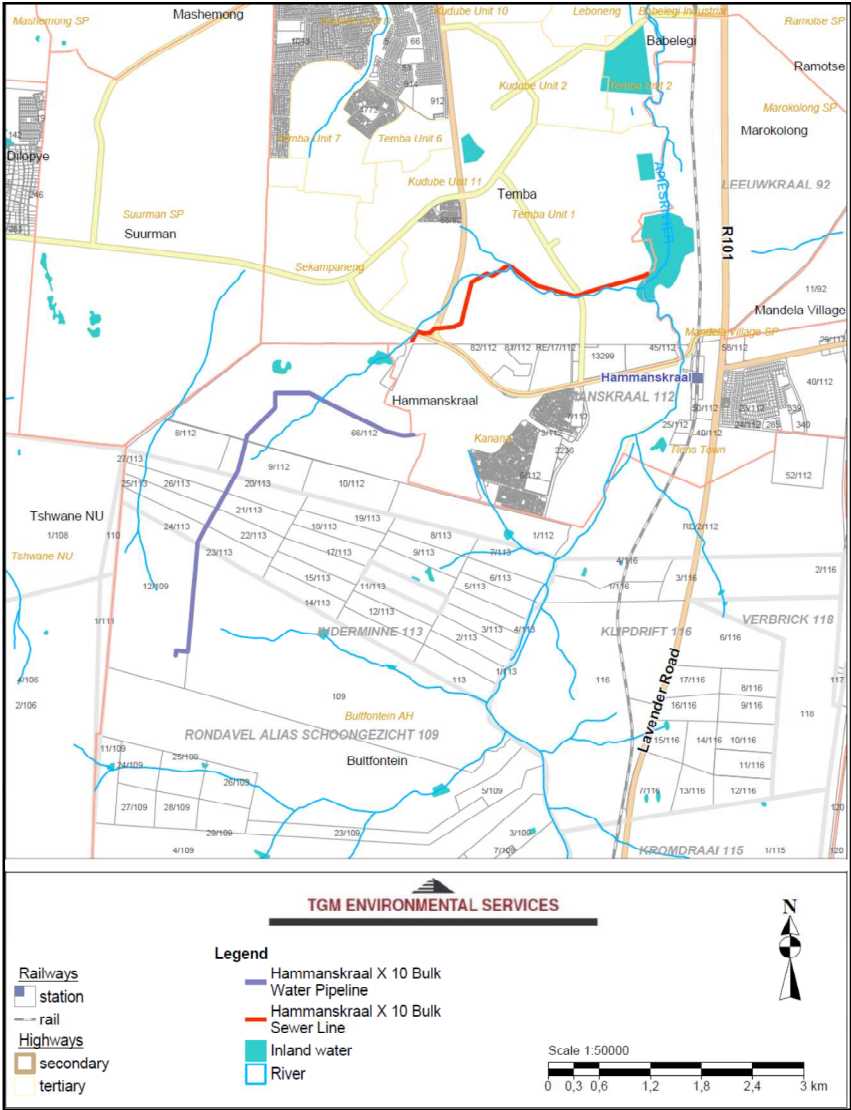


Figure 1: Locality Map

Project description

The project entails the provision of bulk services (water and sewage) to the Hammanskraal West area.

Bulk water pipeline

The proposed steel bulk water pipeline (indicated on the image below) will be 800mm in diameter and approximately 5.2km in length. The bulk water pipeline will be constructed from the Hammanskraal West Reservoir (indicated as 1 on the image below) in an eastern direction (reservoir access road) for approximately 150m. The construction of the pipeline will then continue in a northern direction for approximately 3.3km and in an eastern direction for approximately 1.7km where it will connect with an existing pipeline (indicated as 2 on the image below).

The pipeline will follow the same route as the existing DN600 pumping main, but will as far as possible be constructed on the opposite side of the road. The pipeline will be constructed:

- Along the Northern side of the reservoir access road
- Along the western side of the road on the North-running section
- Along the southern side of the road on the East-running section

The scope includes the connection of the proposed bulk water pipeline to existing pipework at the Hammanskraal reservoir and connection to other proposed and existing pipelines.

Bulk sewer pipeline

The proposed concrete bulk sewer pipeline will be 525mm - 600mm in diameter, except at 3 major road crossings where it will be 900mm in diameter, and is approximately 3.4km in length. The bulk sewer pipeline will follow, for the most part, approximately the same route as the existing DN315 / DN400 outfall sewer that serves Hammanskraal Ext. 2, but will be constructed on the opposite side of the stream in the middle section.

The proposed pipeline will be constructed from a point on the northern side of Hammanskraal Ext. 10 where it will collect flow from Ext. 4 (indicated as 3 on the image below). The pipeline will cross the K224 Provincial road (Harry Gwala Avenue) and continue in an easterly direction to cross the unnamed road towards Temba. From there it will run in a northerly direction parallel to and on the western side of the existing outfall sewer serving Ext. 2 and then in a north eastern direction to a point indicated as 4 on the image below. The pipeline will continue along the northern side of the unnamed tributary of the Apies River in an easterly direction where it will cross Temba Road and will connect at an existing manhole (indicated as 5 on the image below) to the existing 1200mm dia. outfall sewer that is running on the western side along the Apies River to the Temba Wastewater Treatment Plant.

The scope of the contract includes the “design of water reticulation for metered yard connections and /or waterborne sanitation and toilet top structures including all the bulk services if necessary in Hammanskraal West Extension 10”. This application however only deals with the provision of bulk services as the water reticulation for metered yard connections and /or waterborne sanitation and toilet top structures do not constitute a listed activity in terms of the NEMA Regulations, 2014 (as amended) and confirmation thereof was obtained from GDARD.



Figure 2: Proposed bulk water and sewer pipelines

Sensitivity according to the C-Plan

The eastern and central portion of the sewer pipeline falls within a CBA (Important Area), considered important for “Red” and “Orange” listed plant, “Red” listed mammal habitat and for primary vegetation. A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.

The water pipeline traverses two areas considered to be ESAs, while the western most section of the sewer pipeline is also situated within an ESA. An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.

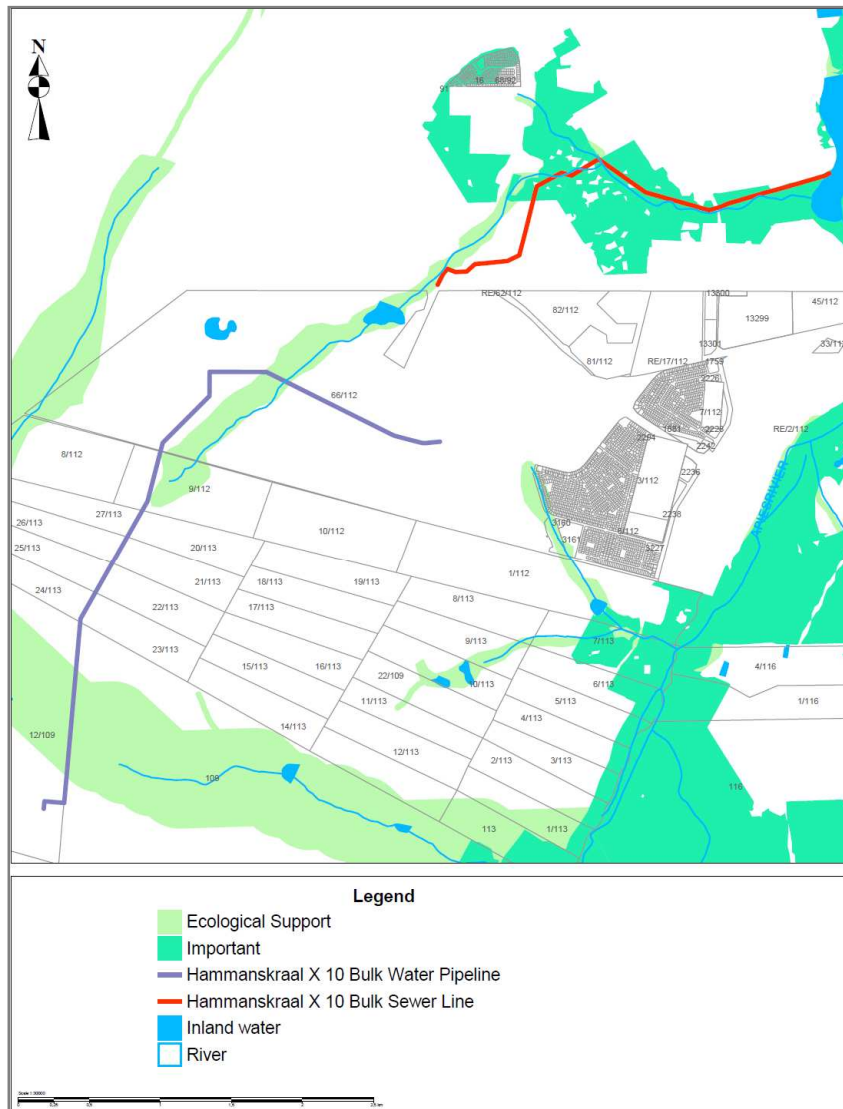


Figure 3: C-Plan

This Environmental Management Programme (EMPr) serves the purpose to ensure that the facility is operated in an environmentally responsible manner and that potential impacts identified and associated with this activity are adequately mitigated during the construction and operational phases of the project.

3 Objective of the EMPr

As per As per Section (1) of Appendix 4 of Regulation 982 an EMPr must comply with Section 24N of the Act and include –

Table 1: Requirements according to Appendix 4 of GNR 982

Requirements according to Appendix 4 of GNR 982	Section in report
a) Details of the EAP who prepared the EMPr and the expertise of that EAP to prepare the EMPr, including curriculum vitae.	Section 1
b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 2
c) A map at an appropriate scale which superimposes the proposed activity, its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers.	Section 2
d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including – <ul style="list-style-type: none"> • Planning and design; • Pre-construction activities; • Construction activities; • Rehabilitation of the environment after construction and where applicable post closure; • Where relevant, operation activities. 	Section 4
f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must where applicable, include actions to – <ul style="list-style-type: none"> • Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; • Comply with any prescribed environmental management standards or practices; • Comply with any applicable provisions of the Act regarding closure where applicable; • Comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable; 	Section 5
g) The method of monitoring the implementation of the impact management actions as mentioned in the above paragraph (f);	Section 7
h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 7
i) An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 6
j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 12
k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 6
l) A program for reporting on compliance, taking into account the	Section 7

requirements as prescribed by the Regulations;	
m) An environmental awareness plan describing the manner in which - <ul style="list-style-type: none"> The applicant intends to inform his or her employees of any environmental risk which may result from their work; and Risks must be dealt with in order to avoid pollution or the degradation of the environment; and 	Section 8
n) Any specific information that may be required by the competent authority.	Section 9 & 10

4 A description of the Impact Management Outcomes

The purpose of the EMPr is to act as an instrument to be used by the City of Tshwane Metropolitan Municipality to ensure sound environmental practices are incorporated during the construction and operational phase of the development.

The EMPr is a detailed programme for the implementation of the mitigation measures to minimise negative environmental impacts during the life-cycle of a project. The EMPr contributes to the preparation of the contract documentation by developing clauses to which the contractor must adhere for the protection of the environment. The EMPr specifies how the construction of the project is to be carried out and includes the actions required for the Post-Construction Phase to ensure that all the environmental impacts are managed for the duration of the project's life-cycle.

The EMPr is to be implemented in a co-operative spirit with all parties (project proponent, contractor, affected parties) involved in the setting of environmental objectives and practices.

The table below provides a summary of the identified impacts and their pre-mitigation and post-mitigation impact significance rating scores as per the environmental impact assessment process for the following phases of the proposed development –

- Construction phase; and
- Operational phase.

A rehabilitation plan has been developed for implementation for rehabilitation of the environment after construction of the proposed development, please refer to Annexure A for the plan.

Table 2: Identified impacts and their pre-mitigation and post-mitigation impact significance rating scores

Potential Impacts	Significance rating of impacts	Significance rating of impacts after mitigation
CONSTRUCTION PHASE		
1.1 Dust /Air pollution	Very Low	Very Low

The generation of dust associated with construction activities & earthworks		
2.1 Visual Impacts	Very Low	Very Low
2.2 Bulk earthworks	Very Low	Very Low
3.1 Soil erosion, loss of topsoil, deterioration of soil quality	Low	Low
3.2 Soil Pollution	Low	Very Low
4.1 Degradation, destruction of habitats/ ecosystem	Low	Low
4.2 Impacts on fauna and flora	Medium	Low
4.3 Invasive species	Low	Low
5.1 Stormwater flow and drainage	Low	Low
5.2 Impacts on water quality	Low	Low
5.3 Impacts on functioning of watercourses	Medium	Low
6.1 Noise/ vibration	Very Low	Very Low
6.2 Visual impact	Very Low	Very Low
7.1 Safety and Security	Low	Low
7.2 Economic opportunities	Positive – Medium	Positive – Medium
8.1 Destruction of cultural / heritage sites	Insignificant	Insignificant
9.1 Waste	Very Low	Very Low
9.2 Pressure on existing infrastructure and services	Low	Low
10.1 Functional design and alignment of Bulk Sewer Pipe	Very Low	Very Low
OPERATIONAL PHASE		
11.1 Operation and maintenance of the water pipeline	Medium	Medium
11.2 Operation and maintenance of the sewer pipeline	Medium	Medium
11.3 Contribute to the provision of quality basic services and infrastructure in the area	Positive – Very High	Positive – Very High

5 A description of the proposed impact management actions

The specifications outlined in the EMPr are applicable to all activities undertaken by all persons involved in the execution of the works, including sub-contractors, the workforce and suppliers for the duration of activities for the proposed project.

In order to attain the impact management outcomes as outlined in Section 4 the EMPr is to address issues in the following manner:

The objective of the EMPr is to address the following issues:

1. Environmental Management considerations are implemented from the start;
2. Precautions against damage are taken timely, and
3. Impacts of the development on the environment are minimised.

6 Implementation of the EMPr

6.1 The Applicant

- 6.1.1 The overall responsibility for ensuring compliance lies with the Applicant.
- 6.1.2 The Applicant shall comply with the conditions set in the Environmental Authorisation by the GDARD.
- 6.1.3 The Applicant shall ensure that the Contractor and all staff members, sub-contractors and suppliers understand and adhere to the EMPr.
- 6.1.4 The Applicant shall ensure that all sub-contractors and suppliers are contractually bound to adhere to the EMPr and Environmental Code of Conduct.

6.2 Environmental Control Officer

- 6.2.1 The Applicant shall appoint a suitably qualified Environmental Control Officer (ECO) to supervise the implementation of the EMPr.
- 6.2.2 The Contractor must be notified of this appointment and furnished with the contact details of the ECO.
- 6.2.3 The ECO shall be responsible for:
 - Day to day implementation of the EMPr and coordination of all environmental matters on site.
 - Ensuring that all staff members are adequately trained and aware of the EMPr and its Environmental Code of Conduct.
 - Fortnightly environmental inspections (according to the criteria specified in the EMPr).
 - Liaison with the project manager, client and public.

6.3 Contractor

- 6.3.1 The Contractor, including all sub-contractors, shall comply with the specifications in the EMPr.
- 6.3.2 A representative of each sub-contractor will receive a copy of the EMPr.
- 6.3.3 A representative of each sub-contractor will be required to sign the Environmental Code of Conduct to give assurance that they understand the EMPr and that they undertake to comply with conditions therein.

7 Environmental Reporting Procedures

An Environmental Incidents Register and an Environmental Complaints Register will be in place and will be maintained by the ECO. Upon occurrence of non-compliance or a complaint of an environmental nature the incident will be recorded in the relevant register.

The registers must be made available to the ECO upon every fortnightly site visit. EMPr related issues would be discussed at all construction site meetings. A copy of the relevant sections of the minutes of these site meetings must be made available to the ECO.

8 Environmental Awareness Plan

The ECO will be responsible for putting in place an Environmental Awareness Training Programme for all staff members. Before commencing with any work, all staff members shall be briefed about the Environmental Code of Conduct. The training programme has to be approved by the ECO. After being briefed about the contents of the Environmental Code of Conduct, staff members shall sign an Environmental Training register as proof of their training.

9 Environmental Control Measures

The EMPr outlines measures to be implemented in order to minimise any potential environmental degradation associated with the construction activities. It should serve as a guide for the Contractor and the construction workforce on their roles and responsibilities concerning environmental management on the construction site and provide a framework for environmental monitoring throughout the construction period.

Measures to control potential environmental impacts during the construction phase are specified. Except where otherwise stated, all these control measures will apply throughout the construction period and, as part of the project contract, the Contractor shall adhere to these measures at all times.

10 Contract

The Contractor/s shall be handed a copy of all relevant documentation regarding the project and shall, before any work is conducted, meet with the ECO in order that the contractor shall familiarise himself with the environmental issues concerning the site.

A commitment from the Contractor is required on the following issues:

- To take into consideration the landowners in the surrounding area;
- Always behave professionally on and off site;
- To ensure quality of work done, technical and environmental;
- To resolve problems and claims arising from damage immediately to ensure a smooth flow of operations (take relevant steps to ensure no further damage or disturbance and resolve

environmental problems adequately with the use of risk management and emergency response procedures);

- To use this EMPr for the benefit of all involved;
- To preserve the natural environment by limiting destructive actions on site;
- To have an eco-friendly approach; and
- Not to litter.

An agreement is to be signed by the contractor that:

- He knows and understands the content of the EMPr; and
- He is able and shall comply with all legislation pertaining to the nature of the work to be done and all things incidental thereto.

11 Statutory, Legal and other requirements

The following sources of South African Law have been identified and will form the basis of the EMPr:

- 9.1 Constitution of the Republic of South Africa, Act No. 108 of 1996
- 9.2 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)
- 9.3 NEMA EIA Regulations, 2014 (Government Notice Regulations Nos. 982, 983, 984, 985)
- 9.4 National Water Act, 1998 (Act No. 36 of 1998)
- 9.5 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
- 9.7 National Road Traffic Act, (Act No. 93 of 1996)
- 9.8 Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
- 9.9 National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- 9.10 Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
- 9.11 National Heritage Resources Act 1999 (Act No. 25 of 1999) (NHRA)
- 9.12 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- 9.13 Gauteng Agriculture Potential Atlas
- 9.14 GDARD Requirements for Biodiversity Assessments (Version 3)
- 9.15 Red Data Plant Policy
- 9.16 Gauteng Conservation Plan (C-Plan Version 3.3)
- 9.17 South African Guidelines for Sustainable Drainage Systems
- 9.18 Gauteng Environmental Management Framework
- 9.19 City of Tshwane by-laws

12 Environmental Management Programme

The following tables form the core of this EMPr for the construction and operational phases of this project. These tables should be used as a checklist on site, especially during the construction phase.

Table 3: Construction Phase

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
<p>FLORA AND FAUNA</p>	<p>Protection of existing indigenous flora and fauna against degradation, destruction of habitats/ ecosystem</p> <p>Prevention of impacts on fauna and flora</p>	<ul style="list-style-type: none"> • Sensitive areas to be identified and mapped according to the specialist studies and input from the ECO. • A Map and coordinates are to be provide to the Contractor. • A photographic survey is required prior to construction in order to be used as a baseline control. • An environmental awareness training programme for all staff members must be put in place by the Contractor before commencing with any work, all staff members shall be appropriately briefed about the importance of the sensitive areas and their preservation. • Construction footprint to be demarcated according to the specialist reports and Detail designs. • Site clearing is to be limited to the construction footprint, and the destruction of vegetation in no-go areas should be prevented • It is recommended that the clearing of vegetation from the site should be selective and done just before construction so as to minimise erosion and dust. The ECO should be consulted. • Maintain fence/barrier around relevant areas during construction period • Disturbance to birds, animals and reptiles and their habitats should be prevented at all times • No littering by construction workers is permitted. Any litter will be collected, deposited in a waste bin, and removed off-site to a licensed Landfill site • Cleared indigenous vegetation can be stockpiled for possible reuse in later rehabilitation or landscaping, or as a brush pack for erosion prevention • Stockpiles of vegetation are only to be located in areas approved by the ECO, and may not exceed 2m 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<p>in height. Methods of stacking must take cognisance of the possible creation of a fire hazard</p> <ul style="list-style-type: none"> • No burning of stockpiled vegetation is permitted • Any species of fauna encountered during the construction phase should be moved to a safe location where no harm can be bestowed on the species. • No wood for fires etc. to be collected from out of the veld or along watercourses. • Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect floral and faunal habitat, need to be strictly managed in all areas, particularly within areas of increased ecological sensitivity. • Proliferation of alien and invasive plant species are expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the proposed development footprint areas. Alien and invasive plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled; • The vegetation component within the freshwater environment is already transformed to an extent as a result of alien plant invasion; therefore, these species should be eradicated and controlled to prevent their spread beyond the project footprint. • Removal of the alien and weed species encountered within the freshwater resources must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational, and maintenance phases; and • Species specific and area specific eradication recommendations: 		

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<ul style="list-style-type: none"> ➤ Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used. ➤ Footprint areas should be kept as small as possible when removing alien plant species. ➤ No vehicles should be allowed to drive through designated sensitive wetland areas during the eradication of alien and weed species. • Informal fires in the vicinity of development area should be prohibited during all development phases. • One protected tree species, namely <i>Sclerocarya birrea</i> subsp. <i>caffra</i> was encountered scattered throughout the Transformed Bushveld, Transformed Habitat Units Watercourse areas. This species is protected in terms of the National Forest Act (NFA) of 1998. • It is recommended that a site-specific walkdown of the proposed bulk sewer and potable water pipelines be performed prior to construction in order to identify and mark individuals of the protected tree species <i>Sclerocarya birrea</i> subsp. <i>caffra</i>. Disturbance of the trees must be avoided as far as possible. If no option other than destruction of the trees remains, the necessary permits must be applied for in terms of the National Forest Act (NFA) of 1998. • Should any other floral SCC species be encountered within study area, the following should be ensured: <ul style="list-style-type: none"> ➤ If any threatened species, or nationally or provincially protected floral will be disturbed, ensure effective relocation of individuals to suitable similar habitat. Arrangement with the relevant authorities needs to take place to rescue and relocate the species. • All rescue and relocation plans should be overseen by a suitably qualified specialist. • Should any SCC or other threatened or protected faunal species be noted within the development footprint areas, area suitable management plan must 		

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<p>be determined with the assistance of a suitably qualified specialist</p> <ul style="list-style-type: none"> No trapping or hunting of fauna is to take place. 		
<p>IMPACT ON FUNCTIONING OF THE WATERCOURSE</p>	<p>Minimise the impact on the functioning of the watercourses.</p>	<ul style="list-style-type: none"> Areas of increased ecological importance and sensitivity, such as watercourse areas, should be considered during all phases of the development planning phase. If feasible, construction must be scheduled for the drier winter period in order to minimise the risk of sediment-laden runoff reaching the freshwater resources as a result of the construction activities; Should it be necessary to clear any areas of vegetation, these areas, including contractor laydown areas, must remain as small as possible, in order to reduce the risk of further proliferation of alien vegetation, and in order to retain a level of protection to the freshwater resources during construction (e.g. sediment trapping, slowing of stormwater runoff etc.); Contractor laydown areas and all non-essential activities are to remain outside of the delineated freshwater resources and the allocated setback area, and as much as feasible no natural/indigenous riparian vegetation is to be cleared; It is highly recommended that an alien vegetation management plan be compiled during the planning phase and implemented concurrently with the commencement of construction; All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the river. During trenching, soils should not be stockpiled within close proximity to the river or the dewatered section, but should rather be outside of the temporary zone boundaries in order to prevent sedimentation of the river, and stockpiles may not exceed 2m in height; Any remaining soils following the completion of 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<p>construction activities are to be levelled and re-seeded with indigenous flora species to minimise the risk of further sedimentation of the freshwater resources, and to aid in the natural reclamation process;</p> <ul style="list-style-type: none"> • All manholes located within the 1:100 year floodline must be constructed in such a way as to elevate the manhole cover above the 1:100 year flood level. This can be done by extending the collar of the manhole above the ground level and then building up a mound of appropriate soil around the manhole which is then sloped as gently as possible back to natural ground level; • It is recommended that the managing authority test the integrity of the sewer pipeline at least once every five years or more often should there be any sign or reports of leaks; and • Should a blockage occur within the sewer pipeline, all possible steps are to be taken to prevent the pollution of the freshwater system during repair, including the placement of sheeting around the manhole used for access as well as containment barrels for any effluent withdrawn. 		
<p>DEVELOPMENT FOOTPRINT, CONSTRUCTION CAMP AND RELATED ACTIVITIES</p>	<p>Location of construction site office and related buildings</p>	<ul style="list-style-type: none"> • It must be ensured that, as far as possible, all proposed infrastructure is placed outside of sensitive habitat areas. Where this is not possible. Suitable mitigation measures as outlined in the specialist reports and rehabilitation plan should be adhered to. • All areas of increased ecological sensitivity beyond the development footprint should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel. Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. • An environmental awareness training programme for all staff members must be put in place by the Contractor. Before commencing with any work, all staff members shall be appropriately briefed about the EMPr and relevant occupational health and safety 	<ul style="list-style-type: none"> • ECO • Contractor • Project Manager 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<p>issues.</p> <ul style="list-style-type: none"> • No temporary accommodation or temporary storage sites to be erected within 100m of any river, stream, drainage line, wetland or farm dam. • All construction material, equipment and any foreign objects brought into the area by contractors and staff to be removed immediately after completion of construction. • All development footprint areas should remain as small as possible and should not encroach into the freshwater areas unless absolutely essential and part of the proposed development. It must be ensured that the freshwater habitat is off-limits to construction vehicles and non-essential personnel; • The boundaries of footprint areas, including contractor laydown areas, are to be clearly defined and it should be ensured that all activities remain within defined footprint areas. Edge effects will need to be extremely carefully controlled; • Planning of temporary roads and access routes should avoid freshwater areas and be restricted to existing roads where possible; • Appropriate sanitary facilities must be provided for the life of the construction phase and all waste removed to an appropriate waste facility; • All hazardous chemicals as well as stockpiles should be stored on bunded surfaces and have facilities constructed to control runoff from these areas; • It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage; • No fires should be permitted in or near the construction area; and • Ensuring that an adequate number of waste and "spill" bins are provided will also prevent litter and ensure the proper disposal of waste and spills. 		
	Access Control	<ul style="list-style-type: none"> • Construction related traffic to and from site to be 	<ul style="list-style-type: none"> • Contractor 	<ul style="list-style-type: none"> • Ongoing by

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<ul style="list-style-type: none"> minimised. Access to construction site to be controlled. Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. 		<ul style="list-style-type: none"> Contractor. Twice a month by ECO. Monthly report
	Provision and control of ablution facilities	<ul style="list-style-type: none"> The Contractor shall make available safe drinking water fit for human consumption at the construction camp and all other working areas No water for drinking, cooking or other purposes should be taken out of farm dams without prior consent of the landowners. Washing and toilet facilities shall be provided on site and in the construction camp At least 1 toilet must be available per 15 workers using the construction camp Toilet paper must be provided and must be available at all times Only certified portable toilets to be used. These are not to be situated within 100m of any watercourses or artificial impoundments (farm dams). These portable toilets to be administered and serviced by a certified, registered company only. 	<ul style="list-style-type: none"> Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report
GEO- TECHNICAL ASPECTS	Excavations.	<ul style="list-style-type: none"> All excavations and foundations must be inspected regularly after any event that may have affected their strength or stability Once earthworks are complete, disturbed areas are to be stabilised with mulch, straw or other approved method Avoid cutting steep embankments 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report
	Soils	<ul style="list-style-type: none"> Sheet runoff from access roads should be slowed down by the strategic placement of berms; As far as possible, all construction activities should occur in the low flow season, during the drier winter months; As much vegetation growth as possible (of indigenous floral species) should be encouraged to protect soils; 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<ul style="list-style-type: none"> All soils compacted as a result of construction activities as well as ongoing operational activities falling outside of project footprint areas should be ripped and profiled. A monitoring plan for the development and the immediate zone of influence should be implemented to prevent erosion and incision. 		
	Destruction or loss of topsoil.	<ul style="list-style-type: none"> Retain topsoil for later use in closure No stockpiling of topsoils is to take place within close proximity to the river, and all stockpiles must be protected with a suitable geotextile to prevent sedimentation of the river; Topsoil and subsoil must be placed on opposite sides of the trench and must be kept separate throughout construction and rehabilitation Topsoil must not be stockpiled for an extensive period (> 3 months) Erect signs and/or danger tape around the exposed excavations to warn the public of the inherent danger. No excess imported soils or stone (if used during the construction phase) may be left behind. These materials need to be removed immediately on completion of the project. Disturbed surface areas should be rehabilitated. No mounds of soils created during construction to be left. Soils to be levelled and sculptured to the original contours of the surrounding soils. 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report
AIR QUALITY AND DUST	Limitation of dust	<ul style="list-style-type: none"> Dust must be suppressed on access roads and construction areas during dry periods by the regular application of water or a biodegradable soil stabilisation agent Speed limits must be implemented in all areas, including public roads and private property to limit the levels of dust pollution It is recommended that the clearing of vegetation from the site should be selective and done just before construction so as to minimise erosion and dust 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<ul style="list-style-type: none"> Excavating, handling or transporting erodible materials in high wind or when dust plumes are visible should be avoided All materials transported to site must be transported in such a manner that they do not fly or fall off the vehicle. This may necessitate covering or wetting friable materials No burning of refuse or vegetation is permitted anywhere on site 		
NOISE	Reduce noise from construction activities impacting on neighbours and on the fauna residing on the site	<ul style="list-style-type: none"> Noise levels shall be kept within acceptable limits, and construction crew must abide by National Noise Laws and local by-laws regarding noise. No sound amplification equipment such as sirens, loud hailers or hooters are to be used on site except in emergencies Construction / management activities involving use of service vehicles, machinery, hammering etc, must be limited to the hours between 7:00am and 5:30pm weekdays; 7:00am and 1:30pm on Saturdays; no noisy construction activities may take place on Sundays or Public Holidays Equipment that is fitted with noise reduction facilities (e.g. side flaps, silencers etc.) must be used as per operating instructions and maintained properly during site operations 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report
TRAFFIC	Construction vehicles	<ul style="list-style-type: none"> The Contractor is to ensure traffic safety at all times, and shall implement road safety precautions for this purpose when works are undertaken on or near public roads Construction vehicles to use public roads outside peak hours No construction vehicles exceeding defined speed limits Appropriate traffic safety signage will be provided to warn the public of construction traffic and flagmen should be on duty where traffic merges with normal road traffic 	<ul style="list-style-type: none"> Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
PRESSURE ON EXISTING INFRASTRUCTURE AND SERVICES	Minimise pressure on existing infrastructure and services	<ul style="list-style-type: none"> • Integrity of existing services to be ensured. • Damage to the SASOL pipeline may result in the following: <ul style="list-style-type: none"> ➢ Fatality, even multiple fatalities ➢ Loss of livestock and environmental impact ➢ Damage to property ➢ Cost of loss of production or financial loss could be as high as 1 Billion Rand 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report
SOLID WASTE MANAGEMENT	Refuse and waste control including waste storage and sorting at source	<ul style="list-style-type: none"> • It must be ensured that construction related waste or spillage and effluent do not affect the immediate and surrounding habitat boundaries. • Proper rubbish/waste bins to be provided. These to be emptied weekly and the waste to be removed to an official waste disposal site. Once again only by officially registered waste-disposal companies and only to official waste sites. • Domestic waste generated on site should be separated at source and recycled • Recycling of building material • Stripping and storage of topsoil for rehabilitation • Waste must not remain on site for more than 2 weeks • Waste disposal certificates must be obtained for any waste that is disposed of • No open fires to be made in the veld 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report
	Control of dumping of building material, rubble and any material used during construction or rehabilitation.	<ul style="list-style-type: none"> • No dumping of building material and rubble shall take place other than where it is required to be used as fill 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report
	Stockpiled material	<ul style="list-style-type: none"> • All stockpiled material shall be controlled and shall be removed on the completion of construction • Methodology of storing topsoil to be approved by ECO • Waste disposal certificates must be obtained for stockpiled material that is disposed of 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO.

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
	Removal of excavated material	<ul style="list-style-type: none"> To avoid compaction of soil and material left in heaps Trucks removing excavated material should use existing roads No waste may be placed in any excavations on site Spoil should be disposed of at a licensed Landfill site Waste disposal certificates must be obtained for any waste that is disposed of 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Monthly report Ongoing by Contractor. Twice a month by ECO. Monthly report
POLLUTION	Minimise soil and groundwater pollution	<ul style="list-style-type: none"> All hazardous materials such as but not limited to paint, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the terrestrial and water environments. Provide containment areas for potential pollutants at construction camps Fuels and chemicals must be stored in adequate storage facilities that are secure, enclosed, banded and lined Ensure handling, transport and disposal of hazardous substances are adequately controlled and managed according to the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (2nd Edition, 1998). Any residue from spillages shall be removed from site by appropriate contractors. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of the adjudicating authority or any other relevant department. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into the topsoil; In the event of a vehicle breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss. All spills should they occur, should be immediately cleaned up and treated accordingly. 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<ul style="list-style-type: none"> • Drip trays are to be utilised during daily greasing and re-fuelling of machinery and to catch incidental spills and pollutants • Drip trays are to be inspected daily for leaks and effectiveness, and emptied when necessary. This is to be closely monitored during rain events to prevent overflow • The Contractor must have a basic spill control kit available at each construction camp site and around the construction site. The spill control kits must include absorptive material that can handle all forms of hydrocarbon as well as floating blankets / pillows that can be placed on watercourses. 		
SAFETY AND SECURITY	Ensure social well-being of site personnel	<ul style="list-style-type: none"> • Signs should be erected on all entrance gates indicating that no temporary jobs are available, thereby limiting opportunistic labourers and crime • The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act (Act No. 85 of 1993) (OHSA) and the National Building Regulations • All structures that are vulnerable to high winds must be secured (including toilets) • Potentially hazardous areas such as trenches are to be cordoned off and clearly marked at all times • Necessary Personal Protective Equipment (PPE) and safety gear appropriate to the task being undertaken is to be provided to all site personnel (e.g. hard hats, safety boots, masks etc.) • All vehicles and equipment used on site must be operated by appropriately trained and / or licensed individuals in compliance with all safety measures as laid out in the OHSA • An environmental awareness training programme for all staff members shall be put in place by the Contractor. Before commencing with any work, all staff members shall be appropriately briefed about the EMPr and relevant occupational health and safety 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<p>issues</p> <ul style="list-style-type: none"> • All construction workers shall be issued with ID badges and clearly identifiable uniforms • Access to fuel and other equipment stores is to be strictly controlled. • Emergency procedures must be produced and communicated to all the employees on site. This will ensure that accidents are responded to appropriately and the impacts thereof are minimised. This will also ensure that potential liabilities and damage to life and the environment are avoided. • Adequate emergency facilities must be provided for the treatment of any emergency on the site. • The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. Emergency contact numbers are to be displayed conspicuously at prominent locations around the construction site and the construction crew camps at all times 		
CONCRETE AND CEMENT PREPARATION AND HANDLING	The use and preparation of concrete on site has the potential to impact negatively on the environment. Water borne contaminants must be contained on site and mitigated.	<ul style="list-style-type: none"> • Cement preparation areas or bulk cement delivery areas must be located prior to construction • Do not mix cement and concrete directly on the ground • After closure of batching plants and/or concrete preparation areas all waste/excess concrete shall be removed together with contaminated soil • Waste material to be removed to a licensed Landfill site • Waste disposal certificates must be obtained for any waste that is disposed of. 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report
STORM-WATER MANAGEMENT	Manage storm water flow and drainage	<ul style="list-style-type: none"> • It must be ensured that storm water is managed on site in a suitable manner. • Storm water runoff to be inspected after first heavy rains after construction. Problem areas which would include erosion, impediment of water flow etc. should be rectified as soon as possible. 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO.

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		<ul style="list-style-type: none"> All works on the site must be aimed at preventing contamination of the watercourses. 		<ul style="list-style-type: none"> Monthly report
GRAVES, ARCHAEOLOGICAL AND OTHER HERITAGE SITES	Protection of Archaeological and heritage sites.	<ul style="list-style-type: none"> A paleontological protocol for finds should be implemented If any graves are located in future, they should ideally be preserved <i>in-situ</i> or alternatively relocated according to existing legislation. The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMPr <p><u>Chance find procedure:</u></p> <ul style="list-style-type: none"> If during the construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or rock engraving, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area. The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA. 	<ul style="list-style-type: none"> ECO Contractor PHRA-G 	<ul style="list-style-type: none"> Ongoing by Contractor. Twice a month by ECO. Monthly report
	Protection of graves	<ul style="list-style-type: none"> Should human bones, skeletons or graves/burial sites be found, the South African Police Service (SAPS) and the South African Heritage Recourses Agency's 	<ul style="list-style-type: none"> ECO Contractor 	<ul style="list-style-type: none"> Ongoing by Contractor.

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
		(SAHRA) BGG office must be notified immediately and all work must cease until the SAPS has finalised its investigation	<ul style="list-style-type: none"> • PHRA-G • SAHRA • SAPS 	<ul style="list-style-type: none"> • Twice a month by ECO. • Monthly report
CLOSURE AND REHABILITATION	Reduction in the potential of land if construction and construction camp sites are not rehabilitated	<ul style="list-style-type: none"> • To ensure that the rehabilitation of the construction area take place and the impact of these activities are limited. • Construction rubble must be collected and disposed of at a suitable landfill site; and • All alien vegetation in the footprint area as well as immediate vicinity of the proposed development should be removed. Alien vegetation control should take place for a minimum period of two growing seasons after rehabilitation is completed. • Incorporate adequate erosion management measures in order to prevent erosion and the associated sedimentation of the watercourse areas. • All disturbed habitat areas must be rehabilitated and reseeded with an indigenous seed mixture as soon as possible to ensure that faunal habitat is re-instated 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report
	Rehabilitation	<ul style="list-style-type: none"> • The Freshwater Resource Rehabilitation and Management Plan to be implemented. Please refer to Annexure A for the Freshwater Resource Rehabilitation and Management Plan. 	<ul style="list-style-type: none"> • ECO • Contractor 	<ul style="list-style-type: none"> • Ongoing by Contractor. • Twice a month by ECO. • Monthly report

Table 4: Operational Phase

ISSUE	OBJECTIVE	MITIGATION MEASURES	RESPONSIBILITY	MONITORING FREQUENCY
FLORA AND FAUNA	Protection of existing indigenous flora and fauna	<ul style="list-style-type: none"> Only use existing roads and vehicle paths during routine maintenance. 	<ul style="list-style-type: none"> CTMM 	<ul style="list-style-type: none"> Ongoing
WATERCOURSES ON SITE	Protection of the watercourses on site.	<ul style="list-style-type: none"> Do not drive through watercourses unless over an existing bridge or road. 	<ul style="list-style-type: none"> CTMM 	<ul style="list-style-type: none"> Ongoing
TRAFFIC	Minimise traffic congestion on surrounding roads.	<ul style="list-style-type: none"> Maintain a control of traffic 	<ul style="list-style-type: none"> CTMM 	<ul style="list-style-type: none"> Ongoing
EMPLOYMENT	Make provision for local Employment where possible.	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> CTMM 	<ul style="list-style-type: none"> Ongoing
STORM WATER MANAGEMENT	Maintenance of storm water system	<ul style="list-style-type: none"> Regular maintenance of system. 	<ul style="list-style-type: none"> CTMM 	<ul style="list-style-type: none"> Ongoing
PRESSURE ON EXISTING INFRASTRUCTURE AND SERVICES	Minimise pressure on existing infrastructure and services	<ul style="list-style-type: none"> Integrity of existing services in the area to be ensured. 	<ul style="list-style-type: none"> CTMM 	<ul style="list-style-type: none"> Ongoing

13 Site documentation, monitoring and reporting

13.1 What needs to be monitored

- Site clearance
- On-site sanitary facilities
- Excavation
- Community relations
- Removal of rubble
- Disposal of Material
- Construction activities
- Protection of buildings and structures
- Protection of the watercourse on site
- Construction of structures
- Progress in terms of construction programme
- Rehabilitation
- Re-vegetation

13.2 How, what procedures

- Site inspections by the ECO
- Site inspections by the Contractor
- Reporting to by the Project Manager

13.3 Recording of Information/Data

The standard site documentation shall be used to keep records on site. All documents shall be kept on site and be made available for monitoring purposes. The documentation shall be signed by all parties to ensure that such documents are legal.

The following documentation shall be kept on site:

- Environmental Authorisation
- Copy of the Environmental Management Programme
- Environmental Complaints register
- Environmental Incidents register
- Environmental Training register

13.4 Reporting

Who should be reported to?

- Applicant
- GDARD
- CTMM
- SAHRA
- PHRA-G

14 Post Construction Audit

A post construction environmental audit is to be conducted by the ECO in order to ensure that all conditions of the EMPr have been adhered to.

15 Amendments to the EMPr

The EMPr is to be submitted to the GDARD for approval prior to implementation. Any changes to the EMPr are to be indicated in the form of addendums.

ANNEXURE A

FRESHWATER RESOURCE REHABILITATION AND MANAGEMENT PLAN

ANNEXURE B

ENVIRONMENTAL CODE OF CONDUCT

The applicant is committed to ensuring that the construction of the development is done according to the highest environmental standards so that the ecological footprint of the development is minimised where possible.

The applicant requires that all construction personnel involved in the construction process accept their responsibilities towards the EMPr and the environment. This includes all permanent, contract or temporary workers as well as any other person involved with the project or visiting the site. Ignorance, negligence, recklessness or a general lack of commitment will not be tolerated.

If you do not understand the rules you must seek assistance to ensure compliance. The following people can assist you in ensuring compliance with the EMPr.

Your Supervisor:

Environmental Control Officer:

Project Manager:

ANNEXURE C

CURRICULUM VITAE OF EAP

ANNEXURE D

ENVIRONMENTAL COMPLAINTS REGISTER

Environmental Complaints Register					
Name of Complainant	Contact Details	Nature of Complaint	Responsible Person	Date Action Taken	Details of Action Taken

ANNEXURE E

ENVIRONMENTAL INCIDENTS REGISTER

Environmental Incidents Register					
Date	Incident	Action Required	Responsible Person	Action Implemented	Date Implemented

ANNEXURE F

ENVIRONMENTAL TRAINING REGISTER

ENVIRONMENTAL TRAINING REGISTER					
Company	Employee	Employee signature	Supervisor	Supervisor Signature	Date