APPENDIX E

Unitas Ext 16 EMPr

GCS

Water & Environmental Consultants

63 Wessel Road, Rivonia, 2128 PO Box 2597, Rivonia, 2128 South Africa
Tel: +27 (0) 11 803 5726 **Fax:** +27 (0) 11 803 5745 **Web:** www.gcs-sa.biz

Environmental Management Plan
Unitas Park – Extension 16

Version - 1

August 2021

Phumaf Holdings (Pty) Ltd

GCS Project Number: 19.0921

Client Reference: 034RFP/7001/2019

GDARD Reference: 002/20-21/E0042

Environmental Management Plan
Unitas Park – Extension 16

Version – 1

July 2021

DOCUMENT ISSUE STATUS

Report Issue	Version 1		
GCS Reference Number	19.0921		
Client Reference	034RFP/7001/2019		
GDARD Reference	002/20-21/E0042		
Title	Environmental Management Plan (EMP) for Unitas Park Extension 16, Gauteng Province		
	Name	**Signature**	**Date**
Author	Karin Loukes		20 August 2021
Document Reviewer	Gerda Bothma		23 August 2021

CONTENTS PAGE

LIST OF FIGURES

LIST OF TABLES

1 OVERVIEW

1.1 Project Background

The Gauteng Rapid Land Release Programme (GRLRP) aims at fast tracking the release of serviced stands form State owned land to qualifying beneficiaries. The proposed site is located within Unitas Park, Vereeniging within the Sedibeng District Municipality and Emfuleni Local Municipality, 6 km north-west of the Vereeniging central business district (CBD), sandwiched between roads R54 and R42 (see **Figure 2-3** and **Figure 2-4).**

GCS Water and Environmental Consultants (Pty) Ltd (GCS) has developed this Environmental Management Plan (EMP) report in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998, as amended) where the application is for an EA. These regulations help guide management actions against the identified potential impacts through the construction, operation and decommissioning phases. Additionally, the EMP sets actions that enhance the project and its implementation through the recommended mitigation measures and as such this report is presented.

1.2 Purpose of the EMPr

This EMP has been developed in line with requirements under the NEMA Environmental Impact Assessment (EIA) Regulations to guide environmental management action throughout the project lifespan and ensure that any adverse environmental impacts that result from the activities are adequately managed and mitigated for. Section 19 of the NEMA EIA Regulations of 2017, as amended (GN R326 in GG 40772, April 2017), requires that the Applicant submit an Environmental Management Programme (EMPr) to the Competent Authority. This EMPr will form part of the Environmental Authorisation for Unitas Park – Extension 16, once approved.

Furthermore, the EMPr is an important environmental management tool, developed in line with best practices under NEMA and other environmental legislation, and informed by the EAP's professional experience as well as any relevant specialist information. The EMPr provides management guidance for activities undertaken at the development site. If correctly followed, the EMPr ensures that any adverse environmental impacts which could result from the development are adequately managed and mitigated for.

The EMP outlines all environmental management and monitoring actions, set to a timeline and with specific assigned responsibilities. This EMP is legally binding and any person who contravenes the provisions herein is liable for imprisonment or a fine. This document should be viewed as "live" and thus, should be updated as and when necessary, during the rehabilitation project. The objectives of the EMP are as follows:

- Ensure compliance with the relevant legislation;
- Verify environmental performance through information on impacts as they occur;

- Respond to changes in project implementation or unforeseen events; and
- Provide feedback on for continual improvement in environmental performance.

It is understood the all-contract documentation related to the construction, operation and decommissioning (if required) of the proposed development will include the conditions of this EMPr. It is important to note that the contract obligations must include the recording of any complaints on the project in the environmental register. Further, it is incumbent on the ECO to keep an accurate audit trail showing compliance with the EMPr during construction phase.

1.3 Content of the EMPr

According to Appendix 4 of the NEMA EIA Regulations of 2014, as amended (GN 326 in GG 40772, April 2017), the EMPr for a project must include certain information. **Table 1-1** below describes how this report meets those requirements.

Table 1-1: Contents of this Environmental Management Programme (EMPr)

REQUIREMENT	SECTION IN THIS REPORT
Details of— (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.4
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2.3
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 2.2
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— (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities;	Section 4
A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated above will be achieved, and must, where applicable, include actions to— (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and	Section 4

(iv) Comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
The method of monitoring the implementation of the impact management actions;	Section 3
The frequency of monitoring the implementation of the impact management actions;	Section 3
An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 3
The time periods within which the impact management actions must be implemented;	Section 4
The mechanism for monitoring compliance with the impact management actions;	Section 3
A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 3
An environmental awareness plan describing the manner in which— (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 4
Any specific information that may be required by the competent authority.	NA

1.4 Details of the Proponent and Environmental Assessment Practitioner (EAP)

The details of the applicant are provided in **Table 1-2.**

Table 1-2: Name and address of applicant.

ITEM	DETAILS
Company Name	Department of Human Settlement (DHS) – Provincial
Company Representative	Daniel Molokomme
Contact Persons	Daniel Molokomme
Telephone No.	016 440 7628
Facsimile No.	016 950 5050
E-mail Address	Daniel.Molokomme@gauteng.gov.za
Postal Address	Private Bag X79, Marshalltown, 2001

GCS Water and Environment (Pty) Ltd (GCS) have been appointed as the independent Environmental Assessment Practitioners (EAP) to undertake the environmental processes required to obtain approval for the proposed listed activities, as requested by the relevant competent authorities. The contact details of the EAP are provided in **Table 1-3** and the EAP's CV is attached as Appendix C. GCS have been appointed by Phumaf Holdings (Pty) Ltd (Phumaf) as the independent environmental assessment practitioners (EAPs), to oversee the development of this EMP.

Table 1-3: Name and address of Environmental Assessment Practitioner (EAP).

ITEM	DETAILS
Company Name	GCS Water and Environment (Pty) Ltd
Company Representative	Gerda Bothma
Telephone No.	+27 (0)11 803 5726
Facsimile No.	+27 (0)11 803 5745
E-mail Address	gerdab@gcs-sa.biz
Postal Address	PO Box 2597, Rivonia, 2128

Gerda Bothma has over 20 years' experience within the environmental and waste management field and strives to deliver custom environmental services to clients. Ms Bothma began her career in the environmental field within the government sector, managing environmental aspects and impacts as well as reviewing environmental assessments with the view of authorizing or declining authorization of the developments.

After six years within the government sector she joined a consulting engineering firm where she was ultimately responsible for the Management of the Environmental Sub-Division. Ms Bothma has experience in project and client management, financial management and the compilation and costing of project proposals and tenders. She has been involved in several engineering projects as the Environmental Assessment Practitioner as well as the Environmental Control Officer during construction, working closely with the Occupational Health and Safety Officer. Ms Bothma has also been involved in projects where waste licensing as well as water use licensing processes formed an integral part of the services offered. Environmental auditing and compliance monitoring of waste disposal sites also forms part of her experience gained. She also has experience in dealing with projects which involve NEC3 Contracts.

1.5 Assumptions and Limitations

This EMPr has been drafted with the acknowledgment of the following assumptions and limitations:

- Information used to guide the development of this EMPr was gained during the site visit, through the Department of Environmental Affairs' (DEA) Online Screening Tool, through specialist input and using the EAP's professional experience in township development. Additionally, the specialist studies were included as part of the assessment;
- The mitigation measures recommended in this EMP document are based on the risks/impacts identified through the scoping assessment, professional knowledge and specialist input. These impacts were identified according to the provided project description and the known receiving environment. Should the scope of the project

change, the risks will have to be reassessed and mitigation measures updated accordingly.

1.6 Legal Requirements

The EMP should take cognizance of the relevant South African legislation as well as best practice guidelines. **Table 1-4** below lists the most relevant environmental legislation and guidelines applicable to this project and the EMP.

Table 1-4: Applicable legislation and best practice guidelines to be considered in this EMP.

LEGISLATION/ GUIDELINES	DESCRIPTION	APPLICABILITY
The Constitution of the Republic of South Africa (Act 108 of 1996)	The Constitution is the supreme act to which all other acts must speak to and sets out the rights for every citizen of South Africa and aims to address past social injustices. With respect to the environment, Section 24 of the constitution states that: "Everyone has the right: a) To an environment that is not harmful to their health or well-being; b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: i. Prevent pollution and ecological degradation; ii. Promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".	The Applicant must ensure that environmental impacts are avoided, mitigated or managed as far as possible throughout the life cycle of the project.
National Environmental Management Act (Act 107 of 1998) (NEMA)	Framework law giving effect to the constitutional environmental right. Provides the framework for regulatory tools in respect of environmental impacts. Section 24 of NEMA regulates environmental authorisations. Section 28(1) states that "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment".	Residential developments outside an urban area where the total land to be developed is larger than 1 ha requires Environmental Authorisation through a Basic Assessment process. The Applicant must ensure that environmental impacts are avoided, mitigated or managed as far as possible throughout the life cycle of the project.

LEGISLATION/ GUIDELINES	DESCRIPTION	APPLICABILITY
National Environmental Management: Waste Act (Act 59 of 2008) (NEM:WA)	Regulates inter alia the duty of care, management, transport and disposal of waste. Section 16(1) of the NEM:WA provides that: "A holder of waste must, within the holder's power, take all reasonable measures to – a) avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; b) reduce, re-use, recycle and recover waste; c) where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; d) manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts; e) prevent any employee or any person under his or her supervision from contravening this Act; and f) prevent the waste from being used for an unauthorised purpose." The NEM:WA also provides for a licensing regime specific to waste management activities.	While no Waste Management Licence will be required for this development, the Applicant must ensure that waste is appropriately managed throughout the life cycle of the project.
National Environmental Management: Air Quality Act (Act 39 of 2004) (NEM:AQA)	Regulates activities which may have a detrimental effect on ambient air quality including certain processes and dust generating activities.	An Air Emissions Licence will not be required, however, duty of care should be employed during construction to minimise air pollution as far as possible.
National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM:BA)	Regulates the protection of biodiversity and the management of invasive species. Section 73 speaks to duty of care with respect to listed invasive species and states that "A person who is the owner of land on which a listed invasive species occurs must notify any relevant competent authority, in writing, of the listed invasive species occurring on that land, take steps to control and eradicate the listed invasive species and to prevent it from spreading and take all the required steps to prevent or minimise harm to biodiversity."	Should a threatened or protected species be discovered on the site, a permit will be required to remove or relocate the specimen. It is also the duty of the Applicant to remove invasive species found on site.
Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA)	Regulates the eradication of weeds and invader plants, including those occurring on development sites.	It is the duty of the Applicant to remove invasive species found on site.

LEGISLATION/ GUIDELINES	DESCRIPTION	APPLICABILITY
National Water Act (Act 36 of 1998) (NWA)	Regulates the protection of the water resources and the use of water. Section 19(1) states that "An owner of land, a person in control of land or a person who occupies or uses the land on which – a) any activity or process is or was performed or undertaken; or b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring." Section 21 outlines various water uses for which authorization is required.	A Water Use Licence will be required for this development and will be undertaken simultaneously.
The National Heritage Resources Act (Act 25 of 1999) (NHRA)	Section 34(1) of NHRA states that "No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority."	A heritage study undertaken on the site confirmed that no heritage features or sites of significance were identified. However, should a heritage artefact be found during development, the chance find procedure should be adhered to.
Spatial Planning and Land Use Management Act (Act 16 of 2013) (SPLUMA)	The aim of SPLUMA is to provide a uniform system of spatial planning and land use management throughout the country. SPLUMA places emphases on the fundamental role municipal planning and municipalities have on effective spatial planning and development. Based on the above use is primarily governed by the applicable land use or zoning scheme and land may not be used in contravention of such a scheme. Despite any issued environmental authorisation, activities can only be executed on land with the appropriate zoning permitting such activities.	The land on which the settlement will be developed must be appropriately rezoned by the Applicant with the assistance of a town planner.
Carbon Tax Act (Act 15 of 2019)	Regulates and guides the imposition of taxes on businesses or organisations in relation to their carbon emissions.	The Applicant must adhere to the reporting stipulations within the Act.
Occupational Health and Safety Act (Act 85 of 1993) (OHSA) and Regulations for Hazardous Chemical	Makes provision to protect the health and safety of employees at work or others affected by activities undertaken by businesses or industries.	The Applicant must adhere to the stipulations within the Act throughout the lifecycle of the activity.

LEGISLATION/ GUIDELINES	DESCRIPTION	APPLICABILITY
Substances (GN R1179, 1995)		
Hazardous Substance Act (Act 15 of 1973)	Regulates substances which may cause injury, ill-health or death of human beings through their toxic, corrosive, irritant, strongly sensitizing or flammable nature.	The Applicant must adhere to the stipulations within the Act throughout the lifecycle of the activity.
Emfuleni Local Municipality Notice: Water and Sanitation By-Laws, 2004	Regulates/manages waste water in the Emfuleni Local Municipality.	The Applicant must adhere to the stipulations within the by-laws throughout the lifecycle of the activity.
Emfuleni Local Municipality Solid Waste Management By-Laws, 2017	Regulates collection and removal of refuse for residents and businesses within the municipal area.	The business must adhere to the stipulations within the by-laws throughout the lifecycle of the activity. Waste removal services will be provided by the municipality.
Emfuleni Local Municipality Air Quality Management By-Laws, 2017	Regulates air pollution and provides a management framework to ensure that air pollution is avoided or managed within the municipality's jurisdiction.	The Applicant must adhere to the stipulations within the by-laws throughout the lifecycle of the activity.

2 PROJECT DESCRIPTION

2.1 Site Description

Unitas Park – Extension 16 is located on Portion 222 of the farm Houtkop 549 IQ within Unitas Park, Vereeniging within the Sedibeng District Municipality and Emfuleni Local Municipality (Refer to Figure 2-1 and Figure 2-2). The site was originally planned to have a township layout, with 2680 residential erven, two primary and one high school, three social/commercial facility erven and three open space erven. This layout was approved; however, not proclaimed or registered as this "standard layout" did not accommodate different residential densities and it did not comply with the latest environmental and geotechnical requirements. The new strategy for this site is a proposed 7 250 units comprising of mixed high density and to achieve the proposed yield, the existing layout will have to be withdrawn and a new application submitted.

The area is currently zoned as Farmland on a dolomitic zone in terms of Geophysics. The total extent is approximately 149 hectares and is owned by the Gauteng Provincial Government. The proposed site is currently vacant, with immediate adjacent land portions also being

vacant. There is evidence of water courses on the site, as well as to the southeast of the site. A drainage line appears to run from the site towards Houtkop Road to the southwest, where the surface water drains under the road and continues to flow into a National Freshwater Ecosystem Protection Area (NFEPA). The buffer of the NFEPA includes a portion of the southwest of the site.

The proposed project entails the phased establishment of a mixed use residential development inclusive of the following land uses: low, medium and high density residential; student village; mixed use; innovation hub; social/educational; public open space and sports facility.

Due to capacity constraints identified during the preliminary investigations, the applicant is proposing to include an on-site above ground biological wastewater treatment facility (WWTF) as part of the proposed development. it is envisaged that the proposed WWTF will be designed and constructed in a phased manner, directly aligned with the capacity demand of the implementation of the phased development. The final design of the proposed steel tank aboveground biological WWTF is estimated to treat to general discharge standards with a combined peak capacity of 20Ml/day (with these being phased in two stages of 10Ml/day respectively).

2.2 Development Layout

The preferred layout of the site is detailed in (Figure 2-3). Due to the scale of the project, it is proposed that the development be phased. Phasing is guided by feasible points of access, viable development pockets and the need to balance a combination of land uses and typologies within one phase.

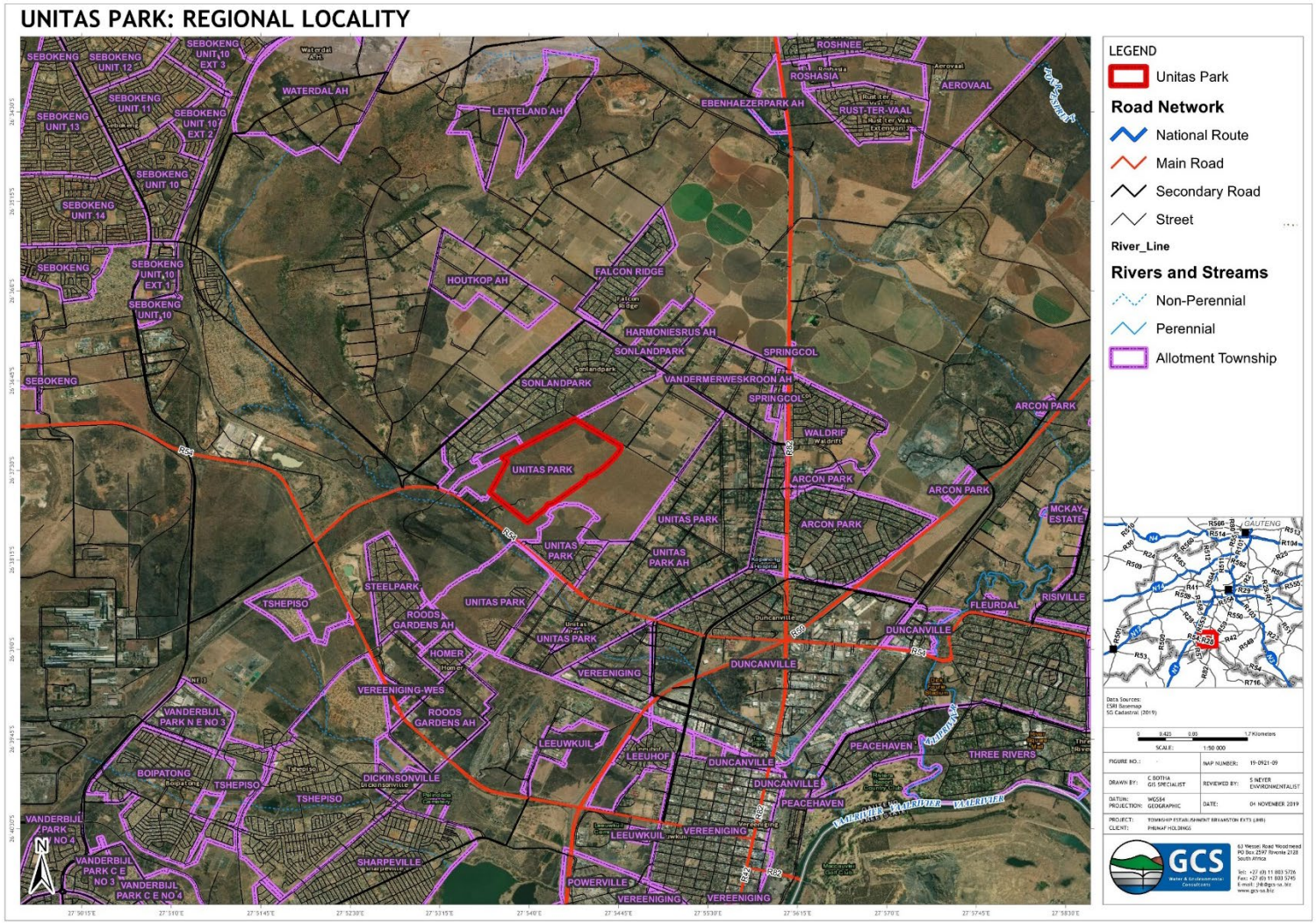

Figure 2-1: Regional Locality of Unitas Park Ext. 16

Figure 2-2: Locality of Unitas Park Ext. 16

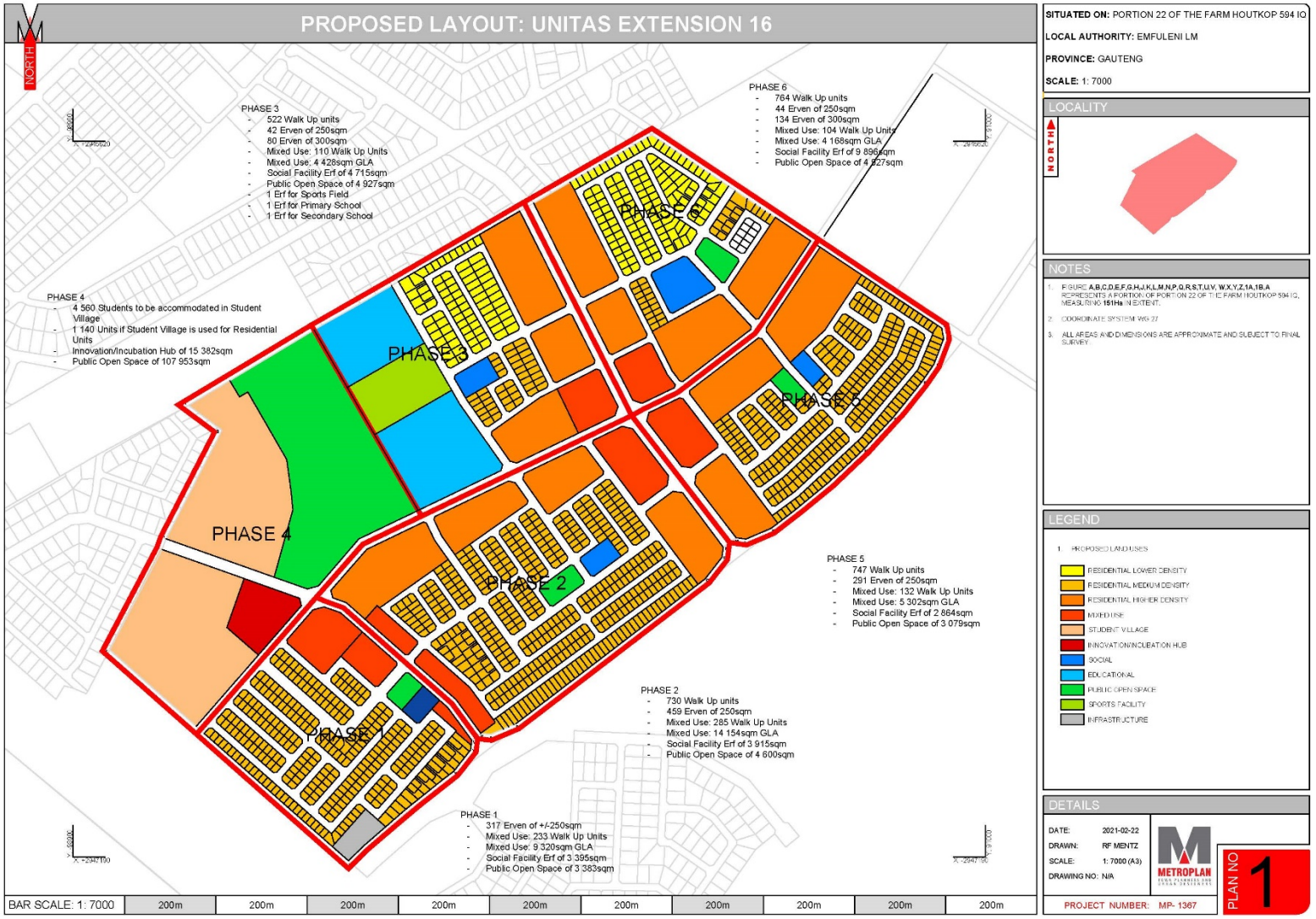

Figure 2-3: Proposed Draft Layout

3 IDENTIFICATION OF ENVIRONMENTAL IMPACTS

A number of environmental aspects and impacts related to the construction of the proposed mixed use residential development Unitas Park Ext 16 have been identified as follows (Table 3-1).

Table 3-1: Identified Negative Environmental Impacts

CONSTRUCTION PHASE	OPERATIONAL PHASE
• Impacts on Geological Stability • Loss of current land capability • Loss of agricultural production and agricultural-related employment • Loss of soil ecosystem services and soil fertility in areas where topsoil is stripped • Soil contamination with hydrocarbons and solid waste • Soil compaction and surface sealing • Contamination of watercourses / wetlands via sedimentation • Loss / degradation of instream habitat and aquatic biota • Change in aquatic fauna communities • Change in ecological health and functioning of the wetland • Impaired surface water quality • Impaired groundwater quality • Change in hydrodynamics of the project area • Alteration of stormwater flow regime • Noise disturbance from increased traffic • Noise disturbance from construction activities • Dust pollution from earth-moving activities • Air pollution from vehicular emissions • Pollution arising from poor waste management • Pollution arising from poor management of excess soil • Loss of vegetation communities • Spread of alien invasive vegetation • Contamination of soil reducing vegetative health • Disturbance to faunal habitat and habitat loss • Changes in hydrology • Catchment and surrounding terrestrial habitat modification impacts • Direct flow modification impacts • Water pollution impacts • Traffic congestion and increased heavy vehicle traffic • Change in visual / aesthetic character • Erosion of sense of place • Potential loss of cultural / heritage resources • Safety risks to pedestrians and motorists • Potential increase in crime from construction workers • Safety risks to construction workers • Creation of temporary jobs • Stimulation of the local and regional economy	• Soil pollution of soil outside the site boundaries, including agricultural fields Soil Erosion and Sedimentation • Contamination of watercourses / wetlands via sedimentation • Reduction in groundwater baseflow • Alteration of stormwater flow regime • Noise disturbance from increased traffic • Air pollution from vehicular emissions • Pollution arising from poor waste management • Spread of alien invasive vegetation • Disturbance to faunal habitat and habitat loss • Introduction and spread of alien and domesticated animals and vegetation • Pollution of faunal habitats • Changes in hydrology • Catchment and surrounding terrestrial habitat modification impacts • Direct flow modification impacts • Water pollution impacts • Rehabilitation and management impacts • Traffic congestion • Change in visual / aesthetic character • Erosion of sense of place • Creation of sustainable employment opportunities • Stimulation of the local and regional economy • Service delivery and infrastructure upgrades • Cumulative Traffic Impact • Cumulative impact of increased pressure on municipal services

4 IMPLEMENTATION INSTRUCTIONS

4.1 Duty of Care and Remediation of Damage

The Department of Human Settlements (DHS), as the developer and applicant, is responsible for compliance with the provisions of duty of care and remediation of damage in accordance with Section 28 of NEMA and its obligations regarding the control of emergency incidents in terms of Section 30. Failure to comply with this EMPr will constitute an offence and Investec and/or their Contractor/s may be liable to penalties and/or legal action. Therefore, it is important for all the responsible parties to understand their duties and undertake them with duty and care.

4.2 Compliance with Other Policies and Legislation

The EMPr has been developed in line with South Africa's environmental legislation so as to ensure that reasonable measures are taken to warrant environmental protection and to promote sustainable development. The adherence of the contractors to the stipulations outlined in this EMPr will ensure compliance with the applicable legislation outlined below:

- The Constitution of the Republic of South Africa (No.108 of 1996).
- National Environmental Management Act (NEMA) (No.107 of 1998) (as amended).
- National Environmental Management Waste Act (NEM:WA) (No. 59 of 2008) (as amended).
- The National Water Act (NWA) (No. 36 of 1998).
- National Environmental Management: Biodiversity Act (No. 10 of 2004).
- The National Heritage Resources Act (No. 25 of 1999).
- Conservation of Agricultural Resources Act 43 of 1983.
- Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013).

4.3 Approvals

The project requires an Integrated Water Use License (IWUL) from the Department of Human Settlement, Water and Sanitation (DHSWS) for the establishment of the proposed development and the proposed discharge of treated effluent. Section 21 of the National Water Act (Act No. 36 of 1998) (NWA) lists water uses which can only be legitimately undertaken through the water use authorisation issued by DHSWS.

In addition, the removal of stone artefacts from site, if needed, will require a permit from Amafa aKwaZulu-Natali (Amafa), the provincial authority for heritage resources in KwaZulu-Natal. This permit is required in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act, 1997 (Act No. 4 of 2008).

4.4 Environmental Awareness and Compliance

The philosophy adopted in this EMPr is derived from the principles of the NEMA which states that development must be socially, economically and environmentally sustainable. Sustainable development requires that:

- The disturbance of ecosystems and loss of biodiversity are avoided (minimised or remedied).
- Pollution and degradation of the environment are avoided or minimised and remedied.
- Waste is avoided or minimised and re-used or re-cycled where possible and otherwise disposed of in a responsible manner.
- A risk averse and cautious approach is applied.
- Negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot altogether be prevented, are minimised and remedied.

NEMA makes provision that anyone who causes pollution or degradation of the environment is responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment.

4.5 Proposed Mechanisms for Monitoring Compliance

Appropriate monitoring and review of the EMPr is required to ensure effective implementation of the EMPr and to identify and implement corrective measures in a timely manner.

- DHS is to appoint an independent ECO to undertake audits on a regular basis during the construction phase, at predetermined intervals deemed necessary by the ECO and Project Manager (PM) (fortnightly basis recommended during periods of construction activity on site; monthly basis in periods of no activity). Should the EA stipulate the frequency of ECO visits and submission of reports, these requirements must be adhered to.
- In the event where discrepancies are identified during site visits, the problem must be investigated and attended to. All the results obtained during environmental monitoring must be documented for audit purposes.
- The EMPr will be an item of the monthly site meetings, and the ECO must attend these meetings in order to provide input with respect to compliance with the EMPr and the implementation of corrective measures.
- A monthly audit report is to be compiled following site visits, and submitted to the site manager, relevant members of the project team and the GDARD Compliance

Officer.

- The letter of appointment and terms of reference for the Contractors' SHE Officer and Fire Officer must be given to the ECO.
- The ECO must consult with the Project Engineer (PE) and PM regarding instructions pertaining to contravention, corrective actions, and penalties or working methods. Except in an emergency situation, where instructions may be given directly to the Contractor's employees and sub-contractors, all formal instructions given by the ECO shall go through the PM.
- EMPr training will be required for both management staff and contractors.
- Upon completion of construction and rehabilitation, it is recommended that a close-out audit report be compiled which summarises EMPr compliance during construction and stipulates final measures to ensure minimal environmental impact. The close-out report is to be submitted to the project team and the GDARD Compliance Officer.
- No compliance monitoring is deemed necessary for the operational phase, but it is recommended that annual environmental performance audits are undertaken by an independent EAP for the life of the project as a best practice measure. This will be part of the Estate Owners Association responsibilities.

Note – The above monitoring and reporting actions apply to all Environmental Specifications for the Construction Phase of the project.

4.6 Complaints Register and Environmental Incident Book

The Contractor must record any complaints received from the community in a complaints register kept on-site. The lodged complaint must be brought to the attention of the PM who will respond accordingly. An investigation must ensue and a response to the complainant must be provided within seven working days. The following information must be recorded:

- Time, date and nature of the complaint
- Response and investigation undertaken
- Actions taken and by whom

All environmental incidents occurring on the site will be recorded by the contractor and submitted to the PM and copied to the ECO. The PM or PE, in conjunction with the ECO, will identify and authorise remediation action where necessary. The following information will be documented:

- Time, date, location and nature of the incident.
- Actions taken and by whom.
- Close out actions.

4.7 Non-Compliance with the EMPr

Difficulties may be encountered with carrying out mitigation measures that could result in future non-compliance. Penalties for non-compliance need to be agreed in writing with the Contractor on appointment. The Contractor must make every effort to motivate staff members to comply with the EMPr and enforce non-compliance penalties. It is the Contractor's responsibility to rectify all non-compliances. Should rectification not be undertaken to the satisfaction of the ECO, it will be the responsibility of Investec to issue penalties to the Contractor. Failure to comply with the stipulations above will be considered a breach of the contract by the contractor.

4.8 Contractual Obligation

In order to ensure that the EMPr is enforced and implemented, this document must be given legal standing. This will be achieved through incorporating the EMPr as an addendum to the contract documents as conditions of the contract that must be met. This will ensure that the obligations are clearly communicated to Contractors and that submitted tenders have taken into account, and budgeted for, the environmental requirements specified in the EMPr. The successful tender ultimately becomes the signed contract, thereby ensuring that the included EMPr becomes a legal agreement between the Developer and the appointed Contractor. A copy of the EMPr, signed by both the Developer and the Contractor, must be kept on site, with any approved amendments thereof. In the case where completed stands are sold, the EMPr will form part of the sale agreement and is therefore passed on to the new owner, who will be responsible for the implementation thereof.

4.9 Amendments to the EMPr

Amendments to the EMPr may be required as the project proceeds. Any proposed amendments to the EMPr will be confirmed with the PM and ECO prior to being issued as a formal amendment to the DEDTEA Compliance and Enforcement Sub-Directorate. Copies of the approval amendments will be issued to the PM, PE, Contractor and ECO.

5 ROLES AND RESPONSIBILITIES WITH REGARD TO ENVIRONMENTAL MANAGEMENT

The Contractor and/or its agents will be responsible for environmental management on site during the construction period. Key roles and responsibilities of each party are outlined in more detail in the sections below. It is important to note that, while parties are assigned various environmental roles and responsibilities, parties are severally and jointly responsible to ensure compliance with all environmental legislation and best practice.

5.1 Roles and Responsibilities of the Project Manager (PM)

- A representative of DHS will act as the Project Manager (PM).
- Ensure adherence to all laws and standards relevant to the project.
- Appoint appropriately qualified Contractors to co-ordinate, supervise and expedite the different tasks.
- Ensure that the Contractor/s has a copy of the EMPr and all agreed Method Statements (must be included in all contractual documentation and in the Environmental File on site). All parties involved in the construction of the facility are to be made aware of, and be familiar with the EMPr and mitigation measures contained therein.
- Ensure that the contractor has reflected and provided sufficient resources (cost, and personnel) for implementation of the EMPr requirements.
- Ensure implementation of all aspects and specifications of the EMPr and approved Method Statements.
- Designate and manage the working areas as per approved construction site layout, including sensitive environments.
- Notify surrounding tenants or landowners in advance of any potentially disturbing activities outside normal operations or working hours.
- Maintain an environmental register to record environmental incidents involving Contractor employees and/or the public.
- Report and record all accidents and incidents resulting in injury or death or significant environmental liability immediately to the Health and Safety Office and PE.
- Record all public complaints received and immediately inform the PE and ECO thereof.
- Report progress towards implementation of and non-conformances with the latest EMPr version and approved Method Statements at site meetings with the PE and ECO.
- Ensure that suitable records are kept of all compliance status/feedback reports, incident reports and complaints register and that these documents are available for

auditing by the PM or ECO at all times.

- Communicate to the Contractor employees and Sub-contractors, verbally and in writing, the advice of the ECO and the content of the ECO reports.
- Take action to address all EMPr, Method Statement and/or environmental legislation non-compliances.
- Issue fines, penalties or 'work suspend' orders for contravention of the EMPr and give instructions regarding corrective action to the Contractor.
- Suspend part or all of the works if the contractor and/or any sub-Contractor, suppliers, etc. fail to comply with both the EMPr and establishment procedures supplied (which are to be agreed upon between the contractor and PM prior to construction).

5.2 Roles and Responsibilities of the Project Engineer (PE)

- A representative / appointee of Investec will act as the Project Engineer (PE).
- Ensure that all designs incorporate the required environmental provisions as discussed in the EMPr.
- Ensure that the EMPr specifications are included in all tender documents issued to prospective engineering consultants/contractors for the development works and activities on site.
- Review and where necessary, revise the 'incident and associated penalty values list' and include the list in the tender document.
- Ensure that the EMPr is fully implemented and remains so, and when necessary is revised and updated.
- Ensure that the Contractor develops and provides all required Method Statements.
- Review the Method Statements, with the assistance from the ECO, to confirm their conformance with EMPr as well as with reasonable practicality and financial feasibility and provide relevant feedback to the Contractor. Approve acceptable Method Statements and inform the ECO of such approval. Keep record of all Method Statements and the associated review and approval status.
- Review and approve drawings produced by the Contractor in connection with, e.g. construction site layout, access/haul roads, construction stormwater management plan, etc.
- Establish and maintain proactive communications with the PM, Contractor and ECO.
- Undertake periodic audits, site visits and inspections to ensure that the environmental requirements are implemented.
- Review and comment on environmental compliance assessments and/or reports. Review the Complaints Register.

- Report any significant environmental incidents or impacts to the relevant environmental authorities.
- Instruct the Contractor on the requirements and procedures in terms of environmental non-compliance 'near misses', incidents and public complaints recording, investigation and reporting.
- The PE, in consultation with the ECO, may order work to be stopped in the event of significant infringements of the Project Environmental Specifications until the situation is rectified in compliance with the specifications. In this event, the Contractor shall not be entitled to claim for delays or incurred expenses.

5.3 Roles and Responsibilities of the Contractors and Sub-Contractors

- Review management actions stipulated in the EMPr and ensure that financial and resource provisions are made. Provide for full compliance with the EMPr and all its relevant specifications in the submitted Tender. Provide Investec with written confirmation of intent to comply with the EMPr.
- Notify the PE and ECO of the anticipated programme of works and fully disclose all details of activities involved (includes off-site activities associated with the project).
- Prepare all the required / agreed Method Statements for submission to the PE and ECO.
- Study all relevant EMPr sections, specifications and approved Method Statements carefully and gain a full understanding of the implications thereof.
- Provide appropriate training on the latest version of the EMPr and all approved Method Statements to all employees and sub-contractors and keep record of such training (e.g. keep record of the date of training, version of the EMPr the training was for, the employee/sub-contractor trained).
- Ensure that weekly tool box talks are conducted to employees on site for the duration of construction.
- Ensure that the EMPr environmental specifications and all approved Method Statements are effectively implemented. Ensure that all employees and sub-contractors employed comply with the requirements and provisions of the EMPr at all times.
- Record and report any environmental incidents, impacts or complaints to the PE/PM and ECO.
- Report progress towards implementation of and non-conformances with the relevant sections of the latest EMPr version and approved Method Statements to the PM.
- Notify the PM of any and all 'near misses', incidents, accidents and transgressions on site with respect to environmental management and non-compliance with the

latest EMPr version and approved Method Statements and seek advice from the PM for required corrective actions and/or site remediation.

5.4 Roles and Responsibilities of the ECO

- Check that all relevant parties are in possession of an up-to-date EMPr.
- The appointed ECO shall conduct a pre-construction site inspection to identify all sensitive environments, habitats, and No-Go areas. The ECO shall prepare a pre-construction audit report, which will include a photographic record of the site and will report on the key features of the site. The photographic record of the site serves as a measuring staff against which rehabilitation will be measured later.
- Conduct an environmental awareness training programme for all key personnel which will be working on site, covering the environmental requirements of the project and the conditions contained in the EMPr. A register must be signed confirming that attendees understand the requirements of the EMPr, and that they will undertake to comply with the conditions therein.
- Provide support and advice to the contractor and all subcontractors in the implementation of environmental management procedures and corrective actions (where possible).
- Review and comment on all Method Statements relevant to environmental management and make recommendations to the PE on whether or not to accept the Method Statement and/or any amendments or revisions required.
- Undertake site inspections and liaison with the PE and/or Contractor (meetings) to monitor, audit and verify that all works comply with environmental legislation and the EMPr compliance; that environmental impacts are kept to a minimum; and ascertain the level of such compliance and impact minimisation. The first audit must be undertaken no later than one month after construction commences.
- Prepare monitoring/audit reports which reflect the EMPr compliance status, findings, issues and recommended actions for addressing non-compliances and submit these to the project team.
- Keep record of site photographs, EMPr implementation, monitoring and audits.
- Review environmental ‘near miss’ reports, incident reports and complaints register and recommend corrective actions.
- Report any serious environmental incidents or environmental impacts immediately to the PM and PE.
- Advise the PM on the removal of person(s) and/or equipment not complying with the specifications. Make recommendations to the PE and PM on the issuing of fines for transgressions of site rules and penalties for contravention.

- Undertake a post construction audit within one month after the Contractor has moved off site. This is to ensure that the Contractor has met all his environmental obligations in terms of the EMPr.

6 ENVIRONMENTAL SPECIFICATIONS

6.1 Planning and Design Phase

The following section details the minimum range of constraints, controls, procedures and standards that are required during the planning and design phase of the mixed use residential development. The key activities undertaken during this phase involve:

- Additional specialist studies and/or investigations (as required).
- Final planning and design of the mixed use residential development.
- Finalisation of the proposed WWTW and associated infrastructure design and layout in line with DWS requirements.
- Ensuring all related permissions, authorisations and licenses are in place for the development.
- Development of a set of site management master plans, e.g. for stormwater, water supply, facilities, waste, remediation, management of no-go areas, rehabilitation etc.
- Tendering, adjudication and induction of Contractor/s.
- Addressing certain environmental requirements, concerns, roles and responsibilities in preparation for the construction phase; e.g. through contract negotiation.
- Develop and implement an environmental awareness programme.

6.2 Project Layout and Access Plan

Determine the site for the construction camp in collaboration with the PM and ECO before the moving onto site, such that it is effectively isolated from the surrounding environment and takes into consideration:

- The need to be more than 50 meters away from a water body in a position that will facilitate the prevention of storm water runoff from the site from entering a water body.
- The need to be more than 50 meters away from no-go areas specified by the ECO.
- The risk of public nuisance through, for example, noise generation, visual intrusion, light pollution or disruption to access. The construction camp must therefore be well positioned, close to access but not intrusive to adjacent residential areas (i.e. at least 100m away) and at least 100m away from the edge of the nearest watercourse

to prevent any pollution to the watercourse.

- Security implications and the need to fence off the construction camp and the entire project site (as soon as practically possible / feasible).

A project layout and access plan must be developed to show the intended use of the construction area. The plan must clearly indicate and/or describe the location and details of the following, including the method of establishment:

- Areas and routes to be reworked, including the size (dimensions) of the stripped areas.
- The construction camp site and rest areas to be used during construction.
- All Contractor's buildings, and/or offices.
- Temporary on-site waste disposal areas to be used during construction.
- Designated areas for on-site storage of construction materials.
- Vehicle and plant storage areas, including wash areas.
- Workshops.
- Fuel storage areas (including filling and dispensing from storage tanks).
- Designated area of Hazardous chemical substances.
- Designated flammable goods store.
- Cement/concrete batching areas (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete).
- Other infrastructure required for the running of the project.
- Designated areas for portable latrines (beyond 100m from watercourses or wetlands).
- Sources for water provision on site.
- Areas designated for power supply during construction.
- Existing roads and tracks to be used as transportation routes, and routes to gain access to construction areas.
- The footprint area of construction.
- Designated no-go areas.

The layout plan must be provided to the ECO for review prior to approval by the PE and prior to the commencement of construction activities on site. The ECO should be consulted when the Contractor is unsure of the placement of any of the items listed above.

6.3 Method Statements

The contractors / sub-contractors must prepare Method Statements detailing how each of the following issues will be managed. The Method Statements must be submitted to the PE, PM and ECO for review and approval. All Method Statements must be in place at least five (5)

working days prior to the relevant activity beginning.

6.3.1 Road Upgrades and Traffic Control

- Road access needs to be constructed to the erven for the development as well as a number of road improvements are required, as specified in the Traffic Impact Assessment included as **Appendix B8** of the Final EIA. The method statement for road upgrades and traffic control must specify procedures for implementing required upgrades, including specifications of traffic and access control, working hours, phasing of upgrades, and timeframes for completion of road works.

6.3.2 Waste Management and Pollution Control

- Expected solid waste types, quantities, methods and frequency of collection and disposal.
- Details of any hazardous substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.
- Methods of minimising, controlling, collecting and disposing of contaminated water.
- Procedures for minimisation of waste (general, construction and hazardous).
- Procedures for collection, storage, transport and disposal of solid and liquid waste.
- Details of any service provider(s) appointed to manage this task.

6.3.3 Stormwater and Erosion Control

- These must include for a Site Specific Stormwater Management Plan (in report format with accompanying sketch details, layouts and calculations). These plans will be reviewed for compliance with the Phumaf Holdings Stormwater Management Plan (**Appendix C1 of the Final EIR**) and its requirements for design and implementation of the stormwater control measures.
- All Stormwater Management Plans must have details regarding both the "during construction" management of storm water on site in addition to the "permanent control measures". All specifications must be noted in detail and sketch form, The recommendations as set out in the *Guidelines for Human Settlement Planning and Design (Red Book) and the SANRAL Drainage Manual 5th Edition* must be adhered to.
- Specify details of any service provider(s) appointed to manage this task. The designated responsible person on site, as indicated in the Stormwater Management Plans (usually the contractor) shall ensure that no construction work takes place before the Stormwater Control measures are in place.
- Site-specific stormwater management plans shall consider the need for stormwater quality control and are required to provide sand, oil and grease traps. The onus rests on the developer of each site to assess the planned operations and allow for any water quality controls that may be required.

6.3.4 Protection of Fauna and Flora

- Procedure for identifying protected plants and trees. Any protected plants or trees in proximity to the construction footprint that will remain or be relocated, must be marked clearly and must not be disturbed, defaced, destroyed or removed, unless otherwise specified by Investec and the ECO, in consultation with the Department of Forestry and Fisheries (DAFF), with the required permits in place.
- Procedure for clearing of vegetation ensuring minimal damage to indigenous fauna and flora.
- Procedure for alien vegetation removal and control, to be implemented throughout the construction phase.

6.3.5 Protection of Wetlands and Watercourses

- Procedures for activities within the wetlands and riparian zones and methodology for reducing impacts and preventing any surface / groundwater contamination, stream flow reduction, habitat or biodiversity loss.
- Identification of no-go areas, including wetland / watercourse areas identified for protection and rehabilitation.
- Procedures for implementing the rehabilitation of wetlands and the watercourses on site, in line with the Ecological Assessment (GCS, 2021).

6.3.6 Existing Services and Infrastructure

- The method statement must provide a drawing of all known services (both above and below ground), to be updated as construction services (either temporary or permanent) are added. All services will also be required to be proved by excavating pilot trenches under supervision of relevant authorities prior to construction of works to ensure no underground services are damaged.
- Conform to requirements of relevant service providers (e.g. Telkom, Transnet, Eskom, water, sewerage, roads) when working within servitudes of existing services.
- Ensure that existing services are not damaged or disrupted unless required by the contract and with the permission of the PM and the relevant service providers.
- Immediately notify service providers of disturbance to services. Rectify disturbance to services, in consultation with service providers. Maintain a record of all disturbances and remedial actions on site.
- Notify landowners of any disruptions to essential services. The repair and reinstatement of any infrastructure that is damaged or services that are interrupted during construction will be done at the Contractor’s expense and shall receive top priority over all other activities.

6.3.7 Emergency Procedures

- Spill Contingency and Emergency Response Plan: Provide details regarding all relevant emergency procedures that will be implemented for fire control and accidental leaks and spillages of hazardous substances (including fuel and oil).
- Detail the risk reduction measures to be implemented including firefighting equipment, fire prevention procedures and spill kits.

7 CONSTRUCTION PHASE

The regulation of construction activities and the general conduct of the workforce is an essential component of this EMPr and must be carried out by the PM with the input of the ECO.

7.1 Traffic Impacts

Objectives:

- To limit vehicle congestion difficulties minimising the likelihood of traffic related incidences.

Potential Construction Phase Issues and Management Actions:

- Increased traffic volumes and congestion in the surrounding road network.
- Increase in heavy vehicles on the road network, transporting construction materials, excess excavated soils, waste and equipment.

Traffic - Management Actions	Implementation
Traffic Calming / Management: 1. Erect traffic warning signage indicating construction works ahead on strategic locations along the site access road(s), clearly observable to all road users by day and night. Warning signs must comply with the applicable municipal and provincial specifications. This is applicable to roads used by construction vehicles in a 30 m radius of the site boundary. 2. All temporary or permanent traffic calming measures, if required, must be erected according to the appropriate municipal and provincial specifications governing road works. 3. The transport of machinery or materials onto the site must where possible be done at off peak hours, i.e. from 9:00 to 15:00, so as to prevent unnecessary interruption of traffic flow and access along roads within the project vicinity. 4. Construction activities and storage facilities must not obstruct roads or traffic flow. 5. Construction vehicles must keep to the speed limits on public roads. 6. All material or equipment transported on public roads must be appropriately secured on the vehicle and where necessary covered, to prevent any load falling off or spilling onto public roads. 7. Be responsible for any clean-up resulting from the failure by staff or supplier to properly secure materials to be transported. **Road Upgrades:** Implement required road and intersection upgrades as agreed with the relevant Municipality, and as per recommendations of the Traffic Impact Assessment (**Appendix B8** of the Final EIA).	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing

7.2 Safety Impacts

Objectives:

- To ensure pedestrian and motorist safety therefore minimising the likelihood of traffic related incidences.
- To limit criminal activities and improving safety of local residence.

Potential Construction Phase Issues and Management Actions:

- Safety risks to pedestrians and motorists as a result of movement of construction and earth-moving vehicles on nearby road networks.
- Increased crime associated the construction phase.
- Safety risks to construction workers on site as a result of poor training, poorly maintained machinery or human error.

Safety - Management Actions	Implementation
On-site security: 1. Safety precautions must be taken to ensure that residents in the area do not come to harm. The construction site shall be off limits to the general public at all times during the construction period and during site clean-up. 2. Installation of a secure boundary fence at the start of the project. Security of the fencing to be ensured and to implement measures to minimise any security breaches which may impact on neighbouring residential properties. 3. The site must have strict access control during the day and no access at night (i.e. locked gates) to prevent loitering from taking place on the site. It is recommended that security personnel are present on site at night to prevent theft of construction equipment / materials. 4. Do not leave large trucks and other heavy-duty machinery unattended outside the Contractor's site camp or designated parking area. 5. Where practical, labour must be sourced from local areas to prevent potential crime activities from unemployed job seekers. 6. A formal procedure for complaints must be set up and the neighbouring communities must be informed about it. **Construction safety:** 7. Clearly demarcate construction areas, trenches and other potential construction-related danger areas with barricading mesh and/or appropriate fencing. Do not use hazard tape as it contributes to littering. 8. All staff must comply with the relevant safety regulations on site and wear appropriate safety clothing and gear at all times while on site. 9. All staff must be trained and ensure that all equipment is maintained.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing

7.3 Visual and Aesthetic Impacts

Objectives:

- To prevent any visual intrusion caused by construction activities.

Potential Construction Phase Issues and Management Actions:

- Visual intrusion through sources such as untidy work site, careless storing of construction materials, ineffective waste management, etc.
- Visual and aesthetic impact of construction of large scale industrial warehouses in close proximity to residential suburbs.

Visual and Aesthetic - Management Actions	Implementation
Visual screening of construction activities: 1. Indigenous vegetation, where possible, must be retained on the site during construction. 2. Install a 30% shade cloth (green colour recommended) along the perimeter fence of the site where necessary to create a visual screen, in consultation with the ECO. 3. Ensure implementation of good housekeeping practices on site, including waste management, neat storage of construction materials and equipment, and dust control. **Aesthetic design:** 4. Plant indigenous trees and shrubs, as required, at same level as buildings to screen buildings/soften visual impact – trees to grow to height of at least 11m and shrubs that grow 2m tall. The planting of vegetation should start during the construction phase if possible to reduce the period during which buildings will be unscreened. 5. Use building materials and natural colours in the design of facilities and buildings, in order to minimise visual impact. 6. External surfaces and roofing of the large buildings should be matte to increase the interplay of light and shade in order to reduce the amount of glare exposed to surrounding viewers from reflective surfaces. 7. Where required, use shade cloth carports to minimise vehicle glare. 8. Aesthetically attractive perimeter fencing (not concrete palisade). 9. External signage to be kept to a minimum and where possible attached to existing buildings to avoid free-standing signs in the landscape. **Lighting:** 10. Night lighting of the construction sites must be of the minimum required to provide for safety and efficiency. All lights to be installed must be full cut-off light fixtures, which shield bulbs and angle light down onto the ground and prevent light from shining away from the work area. 11. Lighting installed for the purposes of the operational phase must be orientated down to the ground to prevent light pollution, and bulbs must be shielded. 12. The lighting design shall consider measures that ensure that the lighting installation is resistant to vandalism and can be readily maintained throughout its intended life. Energy efficiency must be included in the design.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing

7.4 Noise

Objectives:

- To minimise the noise generated by construction activities.

Potential Construction Phase Issues and Management Actions:

- Noise generated from a variety of construction related sources can result in nuisance to nearby residents and sensitive receptors.

Noise - Management Actions	Implementation
Noise generated by construction activities: 1. Keep noise level within acceptable limits in compliance with all relevant guidelines, regulations and the relevant Municipal Noise By-Laws. Keep a record of any complaints lodged by members of the public or employees of the contractor. Should any complaints be received, the PM and ECO must be notified and the issue investigated. 2. Establish actions that should be undertaken following a reported non-compliance with eThekwini Municipal Noise By-Laws. 3. Construction activities must be limited to weekdays (Monday – Friday) during working hours (7:00am – 5pm), and Saturday mornings (7:00am – 2pm), wherever possible. 4. Good work practice instructions that consider minimising noise whilst working must be promoted. 5. On-site access roads must be maintained and kept free of potholes, ruts and bumps in order to reduce vehicle rattle and body slap. 6. Large generators and other noisy equipment to be situated, where possible, within an enclosure for noise screening (e.g. purpose built shed, building or localised noise screening), and to be properly maintained at all times. Small portable generators need not be situated within enclosures. 7. All noise generating equipment and vehicles must be maintained to a good state of repair at all times with particular attention paid to lubrication of moving parts and bearings, integrity of silencers and acoustic covers. 8. All servicing of vehicles to be undertaken at on off-site workshop. In the case of a breakdown only such work that prevents environmental or human safety issues shall be allowed. As soon as the vehicle is rendered safe it is to be removed to the offsite workshop. 9. Design on site access roads and the location of material storage areas so that reversing of construction vehicles is limited and therefore reverse sirens are limited. 10. Reverse hooters of heavy earthmoving vehicles must be set at recommended levels to comply with safety requirements. **Design of buildings for noise screening:** 11. Commence with the re-vegetation of open spaces as soon as possible in the construction phase to reduce the time period for which the site will be unscreened for both noise and visual pollution. 12. Where possible, design layout of buildings to act as noise screens with openings/ access facing away from receptors.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing

7.5 Air Quality

Objectives:

- To minimise the release of vehicular emissions and dust from the site during construction.
- To minimise disturbance to nearby sensitive receptors.

Potential Construction Phase Issues and Management Actions:

- Generation of dust and vehicle emissions due to construction activities resulting in nuisance factor to sensitive receptors.

Air Quality - Management Actions	Implementation
Dust Control: 1. Take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing of vegetation clearing and earth-moving activities). 2. No erodible materials may be excavated, handled or transported under high wind conditions. 3. Dust suppression measures or temporary stabilising mechanisms must be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including, but not limited to construction servitude, access roads, borrow pits, construction camp, etc. 4. Spraying of working/ exposed areas with water at an application rate that will not result in soil erosion. This must be done during windy conditions and during times where there is excessive dust. Frequency of spraying must be discussed with the PM. 5. A dedicated source of water for dust suppression purposes must be determined during site establishment, and must not be extracted from the river or groundwater sources without prior approval from the Department of Water and Sanitation. 6. Seed longstanding topsoil stockpiles and exposed areas of the site that are not part of the marked footprint for the platforms. 7. Soil stockpiles must be wetted and/or sheltered from the wind. **Vehicular Emissions:** 8. Speed limits to be strictly adhered to. 9. Vehicles to be well maintained to reduce emissions. **Smoke:** 10. No fires will be permitted on site.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing and Immediately in hot and windy conditions

7.6 Chemical Storage and Spill Prevention

Objectives:

- To prevent contamination of the soils, surface and groundwater on and around the site as a result of construction activities.

Potential Construction Phase Issues and Management Actions:

- Localised release of contaminants due to spills or leaks on site and subsequent contamination of soil, surface and groundwater.
- Inadvertent contamination of soil, surface and / or groundwater resulting from temporary storage of contaminated soils, wastes or hazardous materials.

Chemical Storage and Spill Prevention - Management Actions	Implementation
Storage, handling and disposal of potential contaminants: 1. If potentially hazardous substances are to be stored on site, provide a Method Statement detailing the substances/materials to be used together with the procedures for the storage, handling and disposal of the materials in a manner which will reduce the risk of pollution that may occur from day to day storage, handling, use and/or from accidental release of any hazardous substances used. 2. Adhere to all requirements of the Occupational Health and Safety Act and associated Regulations and any amendments thereto that are relevant for management of hazardous substances. 3. Spill response equipment must be accessible on site. 4. Suitable spill containment must be provided for transfer points outside of bunded areas. 5. Ensure that there is always a supply of absorbent material readily available to absorb/break down any hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill. This material must be approved by the PM prior to any refuelling or maintenance activities. 6. A Spill Prevention and Management Plan must be drawn up in the form of a Method Statement (responsibility of the Contractor) and must include the following actions that need to be taken into account in the event of a spill: a. Stop the source of the spill. b. Contain the spill. c. All spills must be reported to the Department of Human Settlement, Water and Sanitation (Water Quality) and other relevant authorities and the appropriate mitigation measures must be employed. d. Clean up spillages immediately and ensure that contaminants are properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil from the construction site must be removed and disposed of as hazardous waste within one week to the satisfaction of the ECO. e. Determine if there is any soil, groundwater or other environmental impact. f. If necessary, remedial action must be taken in consultation with the Department of Water and Sanitation. g. Any pollution spills must be documented, reported to the ECO and recorded in the Environmental Incident Book by the RE. 7. The following must documented and kept on site as part of the spill prevention and response procedures: a. A chemical inventory that includes all hazardous chemicals their location on site and volumes. b. Material and safety data sheets (MSDS). Procedures detailed in the MSDS must be followed in an emergency situation.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing and Immediately in the case of a spill or pollution incident

Chemical Storage and Spill Prevention - Management Actions	Implementation
c. Standard operating procedures for storage and container handling. 8. Establish a routine inspection schedule for fuel, oil or chemical containers as well as pipelines, hoses, pumps and other fluid-transfer equipment. 9. Obtain all necessary approvals regarding storage and dispensing, where fuel is to be stored on site, from the appropriate authorities. 10. All potentially hazardous raw and waste materials are to be handled by the Contractor's trained staff and stored on site in accordance with manufacturer's instructions and legal requirements. 11. Provide appropriate training for the handling and use of such materials. This includes providing for any spills and pollution threats that may occur. Appropriate personal protective equipment (PPE) must be worn by employees within the working areas or construction camp at all times (the required PPE will depend on the type of work being undertaken and must be determined by the PM, e.g. earplugs must be worn by workers handling noisy machinery). 12. Ensure that alien vegetation control and spraying with herbicides is undertaken by a trained and experienced qualified professional. 13. Safeguard hazardous substances from being stolen, vandalised, catching fire or spilling on open ground. 14. Any cement batching activities must occur outside of the delineated wetland boundaries using cement batching boards. Do not dispose of cement products/wash into the wetlands/natural environment. 15. Provide suitable overnight facilities for vehicles, away from any areas of channelled flow. 16. Vehicles and machinery are to be well maintained to ensure that they do not leak (oil, hydraulic fluids and diesel). All servicing must be done at a workshop and not on site. If on site re-fuelling is required, machinery will be re-fuelled and serviced in an area with an impermeable surface and that will contain any fuel/oil spilled. Drip trays or fuel sumps are to be placed under vehicles or machinery that is parked overnight. 17. <u>Chemical and Fuel Storage:</u> a. Storage of material, chemicals, fuels, etc. must not pose a risk to the surrounding environment and this includes surface and groundwater. Such storage areas must be located outside the 1:100 year floodline of any watercourse and must be fenced to prevent unauthorised access into the area. b. The ECO should be consulted when establishing the location of the fuel and chemical stores. c. All liquid fuels and oils to be stored in tanks with lids and kept firmly locked at all times. The design and construction of the storage tanks must be in accordance with a recognised SANS code and as approved by the PM. d. Situate the tanks in a locked, roofed and bunded area that has a volume of at least 110% of the volume stored. The floor of the bunded area must be impermeable and the bunds must be without leaks. Weekly inspections must be undertaken to detect any potential leaks. e. Chemicals must be stored in labelled, closed containers within designated roofed areas, with sealed floors away from drains or watercourses. f. No smoking must be allowed within 50m of the chemical and fuel store. g. Areas for the storage of fuel and other flammable materials to comply with standard fire safety regulations. Provide firefighting equipment at or close to the stores. h. Keep fuel and chemical stores under lock and key at all times. **<u>Ablutions:</u>** 18. The use of chemical/ temporal toilet facilities during the construction phase must be provided and must not cause any pollution to any water resources as well as pose a health hazard. In addition, these toilets must be situated out of the 1: 100 year floodline of any watercourse or wetland.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing and Immediately in the case of a spill or pollution incident

Chemical Storage and Spill Prevention - Management Actions	Implementation
The ECO must be consulted on the location of toilet facilities throughout the construction phase. 19. No pit latrines, french drain systems or soak away systems must be allowed. 20. All temporary / portable / mobile toilets must be secured to the ground. **Clean and dirty water separation:** 21. Stormwater drainage must be kept separate from the wastewater system. **Monitoring:** 22. Should any surface water quality issues be identified during the construction phase, it is recommended that ongoing groundwater monitoring be initiated. Such a monitoring programme must be confirmed with the local Department of Water and Sanitation. **Waste Management:** 23. See Section 10	

7.7 Stormwater Management

Objectives:

- To manage any potentially contaminated stormwater or suspended solids from the site during the construction phase.
- To prevent pollution and erosion to the natural watercourses through retention of runoff.
- To reduce local flood risk.

Potential Construction Phase Issues and Management Actions:

- Inadvertent disturbance of soils due to inter alia movement by windblown dust, entrainment in stormwater run-off and subsequent erosion, attachment to vehicles, inappropriate handling / management of soils.
- Release of turbid stormwater from earthworks and poor soil handling and storage.
- Off-site entrainment of sediment or contaminants due to generation of additional pathways through stormwater runoff.

Stormwater - Management Actions	Implementation
Stormwater Management: 1. Compile site specific Stormwater Management Plans (as per Section 6.3.3 of this EMPr), in line with the specifications of the Phumaf Holdings Stormwater Management Plan, included as **Appendix C1** of the EIA Report. 2. Cognisance must be taken, and applicable mitigation measures adhered to as detailed within the Ecological & Wetland Assessment, included as **Appendix B4** of the EIA Report. 3. Adequate controls to reduce stormwater run-off velocities and potential erosion damage are to be implemented and kept in place throughout the construction phase and the contractor must ensure that all control measures are continually maintained in good effective working order. 4. The contractor is to install all downslope sandbagging and other controls (i.e. silt fencing, strip sodding, earth deflection berms, etc.) required before earthworks operations and building works are commenced. 5. All stormwater controls must be in accordance with the Site Specific Stormwater Management Plan approved by the relevant Municipality. Where necessary and/or under instruction from local authority, additional controls must be implemented immediately. 6. Any external parking area, yard or other paved area should, where possible, be designed to attenuate stormwater run-off. The overland flow routes must be protected from erosion and scour damage in the event of an excessive storm event. 7. Any construction, structure or area providing attenuation function should be designed to ensure that such disposal does not cause slope instability, or areas of concentrated saturation or inundation. As such no infiltration into the surrounding soil of bulk earthwork platforms is permissible. 8. All areas that incur damage during rainstorms are to be rehabilitated as soon as the area in question has dried out sufficiently to allow work to take place (within 24 hours). All remedial fill is to be adequately benched into the existing competent soil mass and compacted to 95% Mod AASHTO. 9. All stormwater temporarily channelled off the site must be directed in such a manner as not to cause damage to common / neighbouring grounds and must have controls in place to trap any sediment from getting into the major stormwater system. Where applicable, this can be achieved by forcing run-off through a succession of silt catches e.g. Silt fences. 10. The permanent stormwater control reticulation should be installed as early as possible in the construction phase. All precautions must be taken	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing, with checks to be undertaken by Contractor or PM immediately following rainfall events **Responsible Person:** PM and Contractor **Timeframe:** Ongoing, with checks to be undertaken by

Stormwater - Management Actions	Implementation
to ensure sediment / run-off does not end up in common ground and neighbouring properties, the main reticulation system or riverine areas. 11. It is essential that all completed embankments and large open areas are topsoiled and planted with vegetation as soon as practical on completion. In this instance, the banks are to be shaped as required by the owner/developer and then handed over to the landscape contractor to carry out the planting. It is recommended that a full coverage of sods staked to the relevant embankment is implemented. 12. The contractor is to take note of vulnerable points after all precipitation events and reinforce the stormwater control measures in these areas. 13. Stormwater must not be allowed to pond in close proximity to building foundations. 14. At the end of each working day the access route onto the site must be protected by sandbagging, to prevent the flow of stormwater and silt onto or off the site. 15. All owners/developers and contractors shall ensure that no materials, fluids or substances are allowed to enter the stormwater system that could have a detrimental effect on the environment. 16. The Site Specific Stormwater Management Plans must be considered "live" documents and as conditions on site evolve, so to must the control measures.	Contractor or PM immediately following rainfall events

7.8 Earthworks and Soil Handling

Objectives:

- To minimise soil erosion and sedimentation of natural habitat.
- To manage and control subsoil drainage.

Potential Construction Phase Issues and Management Actions:

- Siltation of the stormwater system and natural drainage system due to erosion and sedimentation impacts.
- Erosion and sedimentation impacts burying seedlings and plants.
- Soil erosion leading to a loss of nutrients, scouring of soil and loss of topsoil, as well as ground instability.
- Spilled hazardous substances transported in eroded soils polluting wetlands and watercourses.
- Subsoil saturation impacting on soil stability and groundwater seepage.
- Geological instability of platforms or embankments.

Earthworks and Soil Handling - Management Actions	Implementation
Earthworks: 1. The large scale earthworks will need to be overseen by an experienced Geotechnical Professional. 2. Implement recommendations of the Dolomite Stability Investigation undertaken by GCS (Pty) Ltd (**Appendix B1**) of the EIA Report). **Materials Management:** 3. Use a level area for the storage of construction materials and stockpiles. 4. Where temporary stockpiling of soil is necessary, standing time must be kept to a minimum. Stockpiled soil must be protected by erosion-control berms if exposed for a period of greater than 14 days during the wet season. 5. Any stockpiling of gravel, cut, fill or any other material including spoil must be in areas approved by the ECO within the defined working area. 6. Stockpiles (all materials, including soil stockpiles) must be positioned at least 50m away from any water body and away from steep slopes, to prevent soil from eroding directly in natural drainage systems. 7. Rocks and debris are to be stockpiled separately within the immediate construction site, and used as fill where necessary. 8. All soil excavated during construction must be separated into top- and subsoil. Where possible subsoil must be used for backfilling and topsoil for landscaping and rehabilitation of disturbed areas. 9. All accumulated and surplus excavated material must be disposed of in a suitable place and manner to prevent translocation of invasive plant species, modification of drainage and contamination of surface water. 10. Clear areas from which the topsoil is to be removed of any foreign material which may come to form part of the topsoil during removal including rubble, any waste material, litter, excess vegetation and any other material which could reduce the quality of the topsoil. 11. Topsoil stockpiles will either be vegetated with indigenous grass / covered by a suitable fabric or other measure approved by the PM and ECO to prevent erosion and invasion of weeds. If necessary, herbicides must be applied (by a qualified trained specialist) to reduce the abundance of seeds of weeds present in the soil before the soil is spread and planted in rehabilitation. Consideration should be given to regularly watering and turning stacks in order to promote frequent germination of the seeds of such species.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing

Earthworks and Soil Handling - Management Actions	Implementation
12. Stockpiled topsoil will not be compacted and shall not exceed 2 m in height. **Erosion Control:** 13. Soil erosion measures listed below must be undertaken for the duration of the construction and post-construction (rehabilitation) phases. Prior to commencement of construction, the PM, contractor and ECO must identify and mark areas sensitive to erosion and requiring specific protection. 14. Exposed soils and open trenches must be protected with the appropriate erosion prevention measures (as per recommendations of the ECO) during the wet season to reduce the risk of soil loss and resulting sedimentation of the watercourses. 15. Construction activities must be scheduled to minimise the duration of exposure to bare soils on site, especially on steep slopes. Stripping and storing of topsoil should not be undertaken during high wind / rain days where possible, in order to minimise erosion by wind or runoff. 16. Minimise erosion by reducing the flow velocity of stormwater within the camp and construction site using appropriate attenuation measures. 17. Silt fences and sandbags must be established across all preferential flow paths and bare slopes at regular intervals to reduce surface runoff energy and capture sediment. 18. Erosion control measures to be implemented in areas sensitive to erosion such as near water supply points, edges of slopes etc. These measures must include the use of sand bags, hessian sheets, retention or replacement of vegetation, as deemed appropriate by the ECO (the most appropriate erosion control measures will be determined on a case by case basis). 19. A combination of berms, sandbags and silt fences must be established along the edge of all bare and exposed surfaces above the wetland/riparian buffers. 20. The berms, sandbags and/or silt fences must be monitored for the duration of the construction phase and repaired immediately when damaged. The berms, sandbags and silt fences must only be removed once vegetation cover has successfully re-colonised the embankments. 21. Install sediment barriers (e.g.: silt fences/sandbags/hay bales) immediately downstream of active work areas as necessary to trap any excessive sediments generated during construction. 22. After every rainfall event, the contractor must check the site for erosion damage and rehabilitate this damage immediately. Erosion rills and gullies must be filled-in with appropriate material and silt fences or fascine work must be established along the gulley for additional protection until grass has re-colonised the rehabilitated area. 23. Areas exposed to erosion due to construction should be vegetated with species naturally occurring in the area. 24. Soil stockpiles and open trenches must be protected / stabilised in case of storm events to prevent excessive runoff from causing collapse of trenches or erosion of soil stockpiles. 25. Silt fences (or similar) must be installed around the perimeter of the storage areas for excavated and fill materials or any sediment bearing material. 26. Sediment bearing material to be stored for a prolonged period of time to be covered to prevent wash-off of suspended solids. 27. Where excavation or disturbance has occurred, structures must be installed to stabilise locally steepened slopes. 28. Topsoil removed must be stockpiled for rehabilitation work and maintained in a weed-free state and is not to be compacted. 29. Soils that have been compacted must be loosened to an appropriate depth to allow seed germination to occur. Rip the area once construction has been completed to reduce the bulk density of compacted areas. 30. Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion. 31. Re-instate disturbed/destroyed indigenous vegetation (grasses and	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing for life of construction **Responsible Person:** PM and Contractor **Timeframe:** Ongoing

Earthworks and Soil Handling - Management Actions	Implementation
indigenous trees) within two weeks of completion of the construction phase, so as to stabilise erosion-prone areas.	

7.9 Wetlands and Watercourses

Objectives:

- No adverse effects to the wetland / watercourses may occur as a result of construction activities.

Potential Construction Phase Issues and Management Actions:

- Direct disturbances to the wetlands and stream channels (and riparian zones), including vegetation clearing and flow and channel modification.
- Indirect disturbances arising from these direct impacts include erosion, sedimentation and alien plant encroachment.

Wetlands and Watercourses - Management Actions	Implementation
1. Detailed method statements for all activities within the wetlands and riparian zones must be submitted to the ECO by the contractor for approval prior to construction commencing. 2. All construction to remain outside of the wetland buffer zone. 3. No building rubble or soil removed during the levelling process must be allowed to fall/be disposed of into any drainage line or wetland and riparian habitat or associated buffer zones. 4. No re-routing of flows should be allowed in the riparian zone. 5. Water must NOT be abstracted from any river, dam lake or stream without prior permission from the Department of Human Settlement, Water and Sanitation. 6. Soil required for construction purposes must not be derived from the riverine area. 7. Natural water sources must not be used for any purposes including swimming, personal washing and the washing of machinery or clothes. 8. The extent of damage must be minimised by ensuring that the ECO is present on site while construction activities are underway in close proximity to watercourses and wetlands. 9. Topsoil and excavated material must be stored outside of all watercourse and wetland areas and away from steep slopes. It must not cause damming up of water, erosion gullies or wash away. The ECO must be consulted in terms of locating positions for storage of all material and soil. 10. Areas to be utilized by heavy machinery, etc. must be clearly demarked, using bonnox fencing, with and a responsible person must be appointed to ensure that there is a full compliance with the EMPr. 11. Under no circumstances must hazardous liquids be allowed to enter the riparian zone. 12. No contaminated runoff or grey water is allowed to be discharged from the construction camp. **Specifications of the SWMP, to be implemented, including:** 13. All stormwater runoff generated by the proposed development during rainfall must be attenuated within the development footprint prior to discharge to the freshwater environment. 14. All stormwater runoff generated by the proposed development during rainfall should be directed into open, impermeable swales, stone-filled infiltration ditches and/or grassed swales rather than underground pipe systems. 15. If stormwater runoff cannot be fully attenuated, then it must be conveyed and released in a controlled manner that minimises energy when discharged to the freshwater environment. 16. Smaller regular spaced stormwater outlets must be favoured to spread out the flow. 17. All outlets must be designed to dissipate the energy of outgoing flows to levels that present a low erosion risk.	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing with monthly checks and maintenance **Responsible Person:** PM and Contractor **Timeframe:** Ongoing with monthly checks and maintenance

Wetlands and Watercourses - Management Actions	Implementation
18. The outlet reno-mattresses must be established to reflect the natural slope of the surface and located at the natural ground-level. 19. A level spreader should also be established where possible to prevent erosion. 20. Appropriate energy dissipation structures must be installed, at major flood flow route outlets, to reduce the erosion risks below the outlets. 21. Regular maintenance must be performed on the onsite stormwater system (silt and litter clearing). 22. Curb inlet/inlet drain grates and/or debris baskets/bags must be used to capture solid waste and debris 23. Oil-water separators and sand filter traps must be installed at parking areas, light industrial platforms, commercial/retail platforms to filter and treat the water before it is released to the freshwater environment. **Sewage infrastructure** 24. No new crossings of watercourses by sewer pipes should be created across the remaining wetland or riparian areas. 25. If new sewer pipe crossings are unavoidable, the new pipelines should be aligned at right angles to the watercourse and along areas that is already disturbed or where pipe bridges are already in existence. 26. No sewer pipes (except at crossings or tying into an existing pipeline) and manholes may be established within 30m of the edge of the wetland or riparian areas. 27. Where possible, pipe bridge piers/plinths should span the width of the watercourse. Where piers are required the minimum number of piers must be placed in the watercourse. 28. If a manhole needs to be located within the vicinity (15m) of any wetland area, the manhole must be elevated to 1m above ground level to increase storage volume during potential surcharge events. **Wastewater Treatment Works** 29. The footprint of the WWTPs must be kept to a minimum, to ensure there is no unnecessary intrusion into surrounding habitats. 30. A construction method statement is required to be compiled by the applicant/contractor for all activities associated with the proposed WWTPs. This method statement must include the phases of the WWTP, activities associated with the WWTP and all mitigation measures stipulated within this report, all specialist reports and the project-specific EMPr. The applicant, engineer, contractor and ECO must agree and approve the statement as this will become a binding document to be implemented on-site. The independent ECO must ensure this document is continuously implemented on-site to ensure no unnecessary disturbance to the surrounding environment. 31. The pipeline from the WWTP to the wetland must be encased in concrete or constructure using appropriate technology to prevent leaks or damage during flood events. 32. Routine inspections of the infrastructure must be undertaken during the construction and operation phases. If any leaks or system failures are identified, these must be repaired immediately. 33. All personnel operating and maintaining the WWTP must be appropriately trained. 34. The downstream stormwater infrastructure must be upgraded where possible to compensate for increased flows and floodpeaks.	

7.10 Impacts on Fauna

Objectives:

- To minimise the destruction / disturbance of habitat and fauna within and around the site.

Potential Construction Phase Issues and Management Actions:

- Site establishment resulting in destruction or disturbance to areas containing natural faunal habitat and possible disturbance to individuals of protected species.
- Introduction of alien or domestic animals within and in the vicinity of the site as a result of construction works.
- Pollution of areas containing natural faunal habitat.

Fauna - Management Actions	Implementation
Faunal Habitat Protection: 1. Prior to construction, the layout plan must be defined and construction area must be clearly demarcated (keeping the construction footprint to a minimum). This may be done either by means of markers (not hazard tape) tied to trees or bushes, or by means of pegs with conspicuous flags on them. This must be undertaken in consultation with the ECO. 2. Given, the low quality of adjacent terrestrial habitats to wetland areas, buffers that follow the 45m wetland buffer recommendations are largely adequate in this case. 3. Specially demarcated areas must be indicated for areas to be utilised by heavy machinery. 4. These areas must be monitored by a designated individual on site, so as to ensure that sensitive areas outside of the construction area are not damaged. 5. Provide a site traffic and pedestrian plan prior to construction so that additional vehicular and worker access routes are kept to a minimum. 6. An appropriate and detailed Stormwater Control Plan must be designed and implemented to ensure that the hydrology of the receiving aquatic ecosystems is not detrimentally changed. 7. In the event of destruction of any derelict buildings within the footprint, these should be checked for the presence of bat colonies, and if found, a bat expert should be contacted for appropriate instruction on how to proceed. 8. Avoid access routes through drainage lines and riparian zones wherever possible. Where access through drainage lines and riparian zones is unavoidable, keep roads to an absolute minimum, constructed perpendicular to the drainage line. No vehicles are permitted within the wetland buffer zones. 9. Culverts and bridges must not restrict the movement of fauna. 10. Avoid constructing broad hard surfaces or canalisation within the drainage line that may cause the drowning of fauna. 11. If hard surfaces cannot be re-vegetated then steps or ledges should be incorporated to aid fauna in climbing or as a path for dispersal. 12. Should any protected faunal species be encountered on site during the construction phase, a suitably qualified specialist must be consulted to determine further actions required. 13. Removal and relocation of any species protected under the NEM:BA (Act 10 of 2004: Threatened or Protected Species regulations will require a permit granted by the provincial MEC. 14. Removal and relocation of any species protected under the Natal Nature Conservation Ordinance No. 15 of 1974, will require a permit. 15. No wild animal may under any circumstance be handled, hunted, snared, captured, injured, killed, removed or be interfered with by construction workers. Checks of the surrounding open space areas must be undertaken regularly to ensure that no traps have been set. Any snares or traps found	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing. **Responsible Person:** PM and Contractor **Timeframe:** Ongoing.

Fauna - Management Actions	Implementation
on or adjacent to the site must be removed and disposed of. Anyone caught poaching on site will be liable for penalties as determined by the ECO and PM. 16. To prevent possible collisions with animals, drivers of construction vehicles must remain vigilant to the possibility of animals crossing their paths and a strict speed limit should be adhered to. 17. An alien plant control programme (including monitoring) should be designed and implemented for conservation and other open space areas **Pest Animal Control:** 18. No domesticated animals must be allowed on site. 19. Stray animals must be reported to the local SPCA for control measures to be implemented. 20. All food should be securely stored away to prevent attraction of faunal species and all rubbish should be disposed of away from the site. Specific eating areas/facilities shall be established for construction staff and no eating in the construction areas shall be allowed. 21. Waste bins must have tight fitting lids to prevent faunal species raiding the bins. **Pollution Prevention:** 22. During construction, all efforts must be made to minimise pollution and disturbance to conservation zoned areas - no waste or materials of any kind must be allowed to enter the surrounding areas during construction. 23. Vehicles used during the construction phase must be parked in a designated area and containers should be used to prevent any oil leaks. 24. Waste management and sewerage systems must be put in place.	

7.11 Impacts on Flora

Objectives:

- To minimise the destruction / disturbance of indigenous vegetation within and around the site.
- To minimise the proliferation of alien vegetation within the project site.
- To prevent the loss of individuals of protected flora on site.

Potential Construction Phase Issues and Management Actions:

- Site establishment resulting in destruction or disturbance to areas containing indigenous flora.
- Loss of indigenous tree species.
- Loss of protected or Red Data List flora species.
- Change in hydrological conditions affecting flora in the wetlands due to construction works.
- Proliferation of alien vegetation.
- Vegetation affected by the contamination of soil with chemicals or nutrients.

Flora - Management Actions	Implementation
Site clearing and earth-moving: 1. Only clear vegetation that is absolutely necessary immediately before site establishment commences. This minimises the project footprint by disturbing the smallest possible area for the least amount of time. Indigenous trees, shrubbery and grass species must be retained wherever possible. 2. Construction should not alter hydrological conditions that sustain the hygrophytic plants outside built areas. 3. Should indigenous protected trees in terms of the National Forest Act (No. 84 of 1998) be encountered within the proposed construction footprint and there is need to disturb / cut / remove the tree, a license application must be submitted to the Department of Agriculture, Forestry and Fisheries (DAFF) offices. 4. No trees to be felled for fuel purposes. 5. Cleared vegetation must either be mulched and used for composting on site, or disposed of at a garden refuse facility, and not burned. 6. Hard standing must be kept at a minimum where possible in order to promote natural infiltration. 7. Avoid access routes through drainage lines and riparian zones wherever possible. Where access through drainage lines and riparian zones is unavoidable, ensure that roads are constructed as per the approved layout plan, and constructed perpendicular to the drainage line. 8. Following construction, any soil within open space areas which has been compacted by vehicles or machines must be lightly ripped or raked so as to loosen it. 9. Rehabilitation of areas must be done with indigenous plant species. **Rehabilitation and Alien Vegetation Control:** 10. Rehabilitation of the remaining open space requires the control of alien plants. For most of these use of herbicides will be essential. 11. Methods for the management and control of alien must be agreed upon with the ECO. 12. During the entire construction process, the contractor must monitor all bare soil areas and stockpiles for alien plant encroachment. Any alien plants found within the construction footprint and immediate surrounds must be removed immediately by uprooting and disposed of appropriately	**Responsible Person:** PM and Contractor **Timeframe:** Ongoing with fortnightly follow up in the case of alien vegetation control. **Responsible Person:**

Flora - Management Actions	Implementation
to avoid proliferation beyond the site boundaries. 13. Given that vegetation in dryland parts of open space outside of developed areas is so poor, establishment of good vegetation cover requires introductions. Where grass cover is very poor, or comprises undesirable species incompatible with other plant diversity (such as *Pennisetum clandestinum* or *Stenotaphrum secundatum*), new grass cover should be established in its place using indigenous species, but not those that are indigenous but also aggressive (such as *Eragrostis curvula*). Plantings of woody and herbaceous plants should draw from species occurring in better dryland vegetation elsewhere on the site (such as those indigenous species found in the Mixed Indigenous and Alien Thicket) or which were found elsewhere excluding those that flourish in conditions of disturbance. 14. An indigenous planting scheme for landscaped parts of the development would also make some contribution to mitigating loss of indigenous vegetation and habitat. **<u>Pollution Prevention:</u>** 15. Vehicles used during the construction phase must be parked in a designated area and containers should be used to prevent any oil leaks. 16. Formal waste management and sewerage systems must be put in place.	PM and Contractor **Timeframe:** Ongoing with fortnightly follow up in the case of alien vegetation control.

7.12 Cultural and Heritage Resources

Objectives:

- To prevent any damage to / disturbance of cultural or heritage resources.

Potential Construction Phase Issues and Management Actions:

- Loss of or damage to archaeological resources located on site.

Cultural and Heritage Resources - Management Actions	Implementation
Site clearing and earth-moving: 1. Attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose additional archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency. Should any additional heritage elements (graves, archaeological artefacts etc.) be uncovered during the construction phase, SAHRA must be contacted, and construction approved in writing, prior to works commencing. 2. An Archaeological and Palaeontological "Chance Find Protocol", as described within the Heritage Impact Assessment and Palaeontological Impact Assessment, as included in **Appendix B5 and B6** to the EIA Report, must be implemented on site. 3. A Monitoring Programme for Palaeontology as described within the Heritage Impact Assessment and Palaeontological Impact Assessment, as included in **Appendix B5 and B6** to the EIA Report, must be implemented and must commence once the excavations activities begin. 4. Should the contractor be unsure of the above, the ECO must be contacted immediately.	**Responsible Person:** PM and Contractor **Timeframe:** Prior to construction and immediately following any further discovery of heritage resources

7.13 Emergency Preparedness and Response

Objectives:

- To ensure suitable preparedness and efficient response in case of environmental emergency situations.

Potential Construction Phase Issues and Management Actions:

- Emergency, fire or environmental contamination incidents.

Emergency Preparedness and Response - Management Actions	Implementation
Emergency Procedures: 1. Prior to the commencement of construction activities the contractor shall compile environmental emergency procedures to ensure an appropriate response to unexpected or accidental incidents that may cause environmental impacts. These are to be maintained during construction and amended as necessary. 2. Activities that may be addressed in the environmental emergency procedures include, for example, accidental exposure of employees to hazardous substances, veld fires and accidental spillage of hazardous substances. The contractor, in consultation with the ECO, shall conduct a pre-construction risk assessment to establish the required procedures. Any risks identified during construction that were not identified during this process will require additional procedures should the ECO feel it necessary. 3. Comply to emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act (Act No 85 of 1993), the National Environmental Management Act (Act No 107 of 1998), the National Water Act (Act No 36 of 1998) and the National Veld and Forest Fire Act (Act No 101 of 1998) as amended and/or any other relevant legislation. 4. Maintain an environmental incidents register to record incidents that occur on site as a result of the activities associated with the contract. Environmental incidents constitute all those activities and incidents that may have a negative impact on the surrounding natural environment. 5. Each environmental incident must be reported to and investigated by the ECO and forward an environmental incident report to the Contractor, Proponent and relevant authority, including details on the manner in which the incident was remedied. 6. Ensure that each environmental incident report contains as a minimum, a description of the incident, a statement on the severity and significance of the impact, and actions taken to remediate the resultant damage. **Fire Prevention and Management:** 7. Construction activities must be undertaken in such a manner as to prevent fires from being started as a result of the project (i.e. correct management and storage of fuels, a hot works permitting system, availability of fire-fighting equipment, training of staff to use fire-fighting equipment, no fires permitted on site or at the construction camp, designated smoking areas, correct disposal of cigarette ends, etc.). 8. Basic fire-fighting equipment must be available on site at all times. Fire-fighting equipment must be in working order and serviced regularly. 9. Appoint a Fire Officer who must be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed. 10. Flammable materials must be stored under conditions that will limit the potential for ignition and the spread of fires. 11. Smoking must not be permitted in those areas where there is a fire hazard, e.g. fuel storage areas and areas susceptible to the rapid spread of fires. Only use designated smoking areas on site where risk of fires is eliminated by the strict use of ash trays. 12. Hold fire prevention talks with staff to create an awareness of the risks of fire.	**Responsible Person:** PM and Contractor **Timeframe:** Immediately following incidents or emergencies with weekly checks

8 POST-CONSTRUCTION

The post-construction (rehabilitation) phase is an essential component of this EMPr and must be carried out in consultation with the ECO who must be notified when construction is complete and rehabilitation is about to commence. The requirements for the control of soil, water, air and noise pollution stipulated in this EMPr still apply during the site post-construction phase of the project.

8.1 Infrastructure

- All remaining building materials must be removed from the site.
- Residual stockpiles must be removed.
- Disassemble all infrastructure from the working areas and Contractors' camp, including temporary office and storage structures, containers, water pipes, water storage containers, etc.
- Disassemble all fencing around the Contractors' camp and remove to the Contractors depot.

8.2 Contaminated Substrates and Pollution Control Structures

- The following must be disassembled, removed and appropriately disposed of:
  - Contaminated substrate.
  - Plastic linings used for pollution/contamination control.
  - Temporary concrete structures that have been created.
  - Break up all concrete structures that have been created (e.g. working and parking surfaces) and remove concrete waste to a permitted disposal site.
- Drain all collection sumps and dispose of the contaminated liquid and solids at a registered hazardous landfill site.
- Remove the tanks or plastic linings or similar and transfer to a permitted landfill site for disposal.

8.3 Stormwater Management

The permanent stormwater control measures implemented on site must be in compliance with the details contained in the Site Specific Stormwater Management Plan as submitted to the relevant Municipality for approval.

- No permanent stormwater is to be channelled and concentrated onto a neighbouring property.
- All terraces and open areas must be shaped to ensure that there are no localized low spots where water can concentrate and cause damage or present health hazards.
- All temporary stormwater controls should be kept in place until such time as they are

made redundant by the final constructed features and/or until such time that the vegetation has established itself to an extent where the soil is bound in matrix. The building contractor must maintain the control measures during his construction process.

- The reticulation must be maintained in a clear open state to allow run-off to flow unhindered. All vegetation is to be maintained in such a manner that stormwater entrances do not become overgrown and blocked. Grass cuttings are to be removed from the site to prevent them entering the system.
- The designers are to take cognisance of the requirements of the National Building regulations Part R – Stormwater Disposal SABS 0400 – 1990 as well as the various guidelines mention in this report.

8.4 Alien Vegetation Control

The following are specifications for control of alien plants on site, to be implemented:

- ONLY herbicides which have been certified safe for use in wetlands by independent testing authority to be used in the wetland buffer zones.
- Care must also be taken to ensure that the surfactant i.e. the chemical which may either already have been added to the herbicide or which must be added to the herbicide to make it stick to the plant, has been approved by testing authorities as being safe for use in wetland habitats.
- Felling, pruning and use of herbicides to be done only by a suitably experienced and certified contractor and work-force.
- No form of fertilizer, or soil ameliorant such as lime, should be used in the planting of any wetland and neither should any fertilizer or soil ameliorant be allowed to enter any wetland from any adjacent area which is being prepared for or is in the process of being re-vegetated.
- Spraying of herbicides to be undertaken on days where risk of a herbicide being spread by wind is negligible.

<u>Re-vegetation – Open Space Areas</u>

- Landscaping in the area must be done with local indigenous species only.
- Biodegradable geofabrics (such as GEOJUTE) to be used on steep slopes to facilitate establishment of plugs or sprigs or sods.
- On steep slopes it would be preferable to use sods i.e. blocks of living grass with a short closed canopy and a shallow root system, to provide instant cover.

<u>Additional recommendations</u>

- If possible undertake planting – especially on steep slopes where a dense vegetation

cover is required to develop as rapidly as possible – early in the growing season i.e. normally mid to late September.

- Land preparation to include ripping, de-clodding, removing boulders and stones and discing and possibly rotovating i.e. breaking up large chunks of soil, shaping the land surface. Shaping the land surface will involve levelling ground and then making the soil soft and uniform enough to be able to plant into. This usually to a depth of ca. 30cm.

9 OPERATION AND MAINTENANCE

9.1 Traffic Impacts

Objectives:

- To limit vehicle congestion difficulties and minimising the likelihood of traffic related incidences.
- To ensure pedestrian and motorist safety therefore minimising the likelihood of traffic related incidences.

Potential Operational Phase Issues and Management Actions:

- Increased traffic volumes and congestion in the surrounding road network.

Traffic - Management Actions	Implementation
Traffic Management: 1. Implement required road and intersection upgrades as agreed with the relevant Municipality, and as per recommendations of the Traffic Impact Assessment (**Appendix B8** of the EIA).	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing

9.2 Air Quality

Objectives:

- To minimise the release of vehicular emissions from the site during operations.
- To minimise disturbance to nearby sensitive receptors.

Potential Operational Phase Issues and Management Actions:

- Release of emissions from i the dispersal of vehicular emissions from increased traffic.

Air Quality - Management Actions	Implementation
Air Emissions Management: 1. Speed limits to be strictly adhered to. 2. No fires will be permitted for the control of alien vegetation, due to associated safety and smoke nuisance risks.	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing and Immediately in hot and windy conditions

9.3 Wastewater Treatment plant and Spill Prevention

Objectives:

- To prevent contamination of the surface and groundwater on and around the site as a result of operational activities of the wastewater treatment plant.

Potential Operational Phase Issues and Management Actions:

- Localised release of sewerage due to spills or leaks from equipment of treatment plant on site and subsequent contamination of soil, surface and groundwater.

Chemical Storage and Spill Prevention - Management Actions	Implementation
Management of Potential Contaminants: 1. All potentially hazardous raw and waste materials are to be handled by trained staff and stored on site in accordance with manufacturer's instructions and legal requirements. 2. WWTW and associated machinery are to be well maintained to ensure that they do not leak and remain in working condition. 3. Stormwater drainage must be kept separate from the wastewater system. 4. Spill response equipment must be accessible on site. 5. Suitable spill containment must be provided for transfer points outside of bunded areas. **Waste Management:** 6. See Section 10	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing and Immediately in case of a spill or pollution incident

9.4 Stormwater Management

Objectives:

- To manage any potentially contaminated stormwater or suspended solids from the site during the operational phase.
- To prevent pollution and erosion to the natural watercourses through retention of runoff.
- To reduce local flood risk.

Potential Operational Phase Issues and Management Actions:

- Off-site entrainment of sediment or contaminants due to generation of additional pathways through stormwater runoff.

Stormwater - Management Actions	Implementation
Stormwater Management: 1. No building works, earthworks, walls or fences may obstruct or encroach on a watercourse inside or outside the site without approved plans that do not compromise the objectives of the Stormwater Management Plan. 2. The developer/owner shall ensure that the flow path of the stormwater on his site is adequately protected against erosion. 3. Lined and unlined channels may be constructed to convey stormwater to a natural watercourse where deemed necessary and unavoidable. The velocity in these channels must be checked for scour potential and suitable linings specified where required. All incursions into the wetland unit and associated buffers are to be done in accordance with the wetland specialist requirements. 4. It should be noted that the required site specific attenuation will be in excess of that which is typically required by the local authority. The reason for this is that no attenuation measures have been provided for roadways throughout the precinct, and on-site attenuation in excess of the normal pre-development levels will thus cater for the shortfall in attenuation on the roads infrastructure. 5. The proposed attenuation measures must be acceptable to both the relevant Municipality a and comply with their respective guideline documents. 6. The overland flow routes must be protected from erosion and scour damage in the event of an excessive storm event. 7. Any construction, structure or area providing attenuation function should be designed to ensure that such disposal does not cause slope instability, or areas of concentrated saturation or inundation. As such no infiltration into the surrounding soil of bulk earthwork platforms is permissible. 8. Driveways/access roads must not concentrate run-off onto the main road and care must be taken not to obstruct the flow in side drains found along road edges when tying into the main road system. 9. All hardstand areas must be provided with suitable first flush filtration systems to remove pollutants such as grease and oil before discharge into the attenuation structures and then into the municipal reticulation system. No substances that could have a detrimental effect on the environment may be allowed to enter the stormwater system. 10. Where appropriate, inlets to the stormwater system should have grates/grids that trap rubbish and prevent it from entering the system. 11. All the rules and regulations as stipulated by the Lot owners Association from time to time must be adhered to. 12. The reticulation must be maintained in a clear open state to allow run-off to flow unhindered. All vegetation is to be maintained in such a manner that stormwater entrances do not become over grown and blocked. Grass cuttings are to be removed from the site to prevent them entering the system.	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing, with checks to be undertaken by Contractor or PM immediately following rainfall events

9.5 Soil Erosion

Objectives:

- To minimise soil erosion and sedimentation.
- To manage and control subsoil drainage.
- To prevent geological instability.

Potential Construction Phase Issues and Management Actions:

- Siltation of the stormwater system and natural drainage system due to erosion and sedimentation impacts.
- Subsoil saturation impacting on soil stability and groundwater seepage.

Soil Erosion - Management Actions	Implementation
Erosion Prevention: 1. Erosion control measures to be implemented in areas sensitive to erosion such as near water supply points, edges of slopes etc. 2. Immediately fill any erosion gullies/channels which may form on steep banks to ensure silt does not drain into the wetland. **Subsoil Drainage:** 3. Ensure maintenance of the subsoil drainage structures in accordance with the Geotechnical Investigation (**Appendix B1** of the EIA).	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing

9.6 Wetlands and Watercourses

Objectives:

- No adverse effects to the wetland / watercourses may occur as a result of operational activities.

Potential Operational Phase Issues and Management Actions:

- Indirect disturbances arising from operation of WWTW, erosion, sedimentation and alien plant encroachment, leading to a loss of wetland / watercourse functionality.

Wetland and Watercourses - Management Actions	Implementation
Wetland / Watercourse Management: 1. Install a gully trap to reduce risk of sewer manholes surcharging onsite and downstream. 2. Undertake regular water monitoring as described below. 3. Biannual water quality monitoring of the wetland system takes place. It is suggested that one (1) water quality sample be collected at a point upstream of the activity area in order to serve as a control point. One (1) water quality sample would also need to be collected downstream of the activity area to serve as comparison to the control point. 4. The pipeline from the WWTP to the discharge point must be encased in concrete or constructure using appropriate technology to prevent leaks or damage during flood events. 5. Routine inspections of the infrastructure must be undertaken during the construction and operation phases. If any leaks or system failures are identified, these must be repaired immediately. 6. All personnel operating and maintaining the WWTP must be appropriately trained. **Sewage infrastructure** 7. No new crossings of watercourses by sewer pipes should be created across the remaining wetland or riparian areas. 8. If new sewer pipe crossings are unavoidable, the new pipelines should be aligned at right angles to the watercourse and along areas that is already disturbed or where pipe bridges are already in existence. 9. No sewer pipes (except at crossings or tying into an existing pipeline) and manholes may be established within 30m of the edge of the wetland or riparian areas. 10. Where possible, pipe bridge piers/plinths should span the width of the watercourse. Where piers are required the minimum number of piers must be placed in the watercourse. 11. If a manhole needs to be located within the vicinity (15m) of any wetland area, the manhole must be elevated to 1m above ground level to increase storage volume during potential surcharge events. **Road infrastructure** 12. The construction of roads must be designed as minimise the extent of freshwater habitat directly impacted by operational activities.	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing with monthly checks and maintenance

9.7 Impacts on Fauna

Objectives:

- To minimise the destruction / disturbance of habitat and fauna within and around the site.

Potential Operational Phase Issues and Management Actions:

- Disturbance to fauna / on site habitats.
- Introduction of alien or domestic animals within and in the vicinity of the site.
- Pollution of areas containing natural faunal habitat

Fauna - Management Actions	Implementation
Habitat Management: 1. Ensure ongoing clearing of alien invasive vegetation and monitoring of the establishment of indigenous vegetation. 2. Culverts and bridges must not restrict the movement of fauna. 3. It is recommended that bat and owl nesting boxes be erected to encourage these species to reside in the area, which will result in environmentally friendly insect and rodent control. **4.** No wild animal may under any circumstance be handled, hunted, snared, captured, injured, killed, removed or be interfered with. 5. Stray animals must be reported to the local SPCA for control measures to be implemented. **Waste Management:** 6. See Section 10	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing

9.8 Impacts on Flora

Objectives:

- To minimise the destruction / disturbance of indigenous vegetation and fauna within and around the site.
- To minimise the proliferation of alien vegetation within the project site.

Potential Operational Phase Issues and Management Actions:

- Alien vegetation proliferation.
- Vegetation affected by the contamination of soil with chemicals or nutrients.

Flora - Management Actions	Implementation
Vegetation Management: 1. No indigenous trees are to be felled during the operational phase, except for maintenance purposes and where the species is not protected by legislation. 2. Ensure ongoing clearing of alien invasive vegetation and monitoring of the establishment of indigenous vegetation. 3. No fires will be permitted for the control of alien vegetation, due to associated safety and smoke nuisance risks. **Waste Management Plan:** 4. See Section 10	**Responsible Person:** Property Management and Tenants **Timeframe:** Ongoing with fortnightly follow up in the case of alien vegetation control.

9.9 Emergency Preparedness and Response

Objectives:

- To ensure suitable preparedness and efficient response in case of environmental emergency situations.

Potential Operational Phase Issues and Management Actions:

- Emergency / Environmental Incidents.
- Sewerage spill from wastewater treatment plant.

Emergency Preparedness and Response - Management Actions	Implementation
Emergency Procedures: 1. Compile and maintain environmental emergency procedures to ensure an appropriate response to unexpected or accidental incidents that may cause environmental impacts. 2. Activities that may be addressed in the environmental emergency procedures include, for example, accidental exposure of employees to sewerage. 3. Comply to emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act (Act No 85 of 1993), the National Environmental Management Act (Act No 107 of 1998), the National Water Act (Act No 36 of 1998) and the National Veld and Forest Fire Act (Act No 101 of 1998) as amended and/or any other relevant legislation. 4. Maintain an environmental incidents register to record incidents that occur on site as a result of the activities associated with the contract. Environmental incidents constitute all those activities and incidents that may have a negative impact on the surrounding natural environment. 5. Ensure that each environmental incident report contains as a minimum, a description of the incident, a statement on the severity and significance of the impact, and actions taken to remediate the resultant damage.	**Responsible Person:** Property Management and Tenants **Timeframe:** Immediately following incidents or emergencies with weekly checks

10 WASTE MANAGEMENT PLAN

This Waste Management Plan (WMP) is a key management tool that will contribute towards achieving sustainable waste management throughout the construction and operation of the mixed use residential development. The objective of this WMP is to:-

- Formalise waste handling, transfer and disposal activities associated with waste from the development.
- To prevent inappropriate management of waste and associated risk of pollution of the environment.
- To facilitate waste minimisation entailing avoidance, reduction, reuse, recycling or treatment before disposal.
- To streamline and control waste segregation, storage, and disposal and promote resource recovery from waste.

10.1 Waste Streams

- ***Construction Phase***

Anticipated Waste Streams generated during the Construction Phase are as follows:

- Construction Waste:
  - Excess construction materials, rubble, concrete, wood, etc.
- General Waste:
  - General waste refers to waste classified as non-hazardous and can be defined as waste that does not pose an immediate threat to public health or the environment if properly managed.
  - Food waste, plastic, paper, scrap metal, cardboard, etc.
- Green Waste:
  - Cleared vegetation, including invasive plants and felled trees / branches.
- Hazardous Waste:
  - Hazardous Waste is defined as waste that has the potential, even in low concentrations, to have significant adverse effects on public health and the environment because of its inherent toxicological, chemical and physical characteristics.
  - Unwanted, expired or contaminated chemicals including cleaning agents and detergents, disinfectants, oils, greases, solvents and solvent based paints, herbicides and pest control substances.
  - Collected waste oils / fuels from drip trays and bunded areas / chemical stores.
  - Materials used to clean spills of chemicals, fuels or oils.
  - General items such as batteries, fluorescent lamps and cement bags.

- Excess Spoil Material:
  - Excess excavated soils or rock from platform levelling activities.
- Sewage Waste:
  - Untreated sewage from temporary chemical ablutions presents a biological / pathogenic health risk and is therefore categorised as a hazardous waste.

- ***Operational Phase***

Anticipated Waste Streams generated during the Operational Phase are as follows:

- General Waste:
  - General waste refers to waste classified as non-hazardous and can be defined as waste that does not pose an immediate threat to public health or the environment if properly managed.
  - Food waste, plastic, paper, scrap metal, cardboard, glass, etc.
- Green Waste:
  - Cleared vegetation as part of ongoing landscaping, including alien invasive vegetation and felled trees / branches.
- Hazardous Waste:
  - Hazardous Waste is defined as waste that has the potential, even in low concentrations, to have significant adverse effects on public health and the environment because of its inherent toxicological, chemical and physical characteristics.
  - Untreated sewage.
  - Materials used to clean spills of sewage and chemicals.

10.2 Construction Phase Waste Management

Objectives:

- Ensure waste generation is minimised (i.e. avoided, reduced, re-used and recycled) and that waste is disposed of responsibly.
- To ensure no direct or indirect environmental impacts as a result of waste management, handling or disposal.
- No forms of secondary pollution should arise from the disposal of sewage and refuse. Any pollution problems arising from the above development are to be addressed immediately by the applicant.

Potential Construction Phase Issues and Management Actions:

- Waste generation from the construction activities (e.g. concrete, scrap metal, waste building materials, oil and diesel contamination) may result in localised pollution and soil contamination, and an increased load of hazardous waste at disposal sites.

Construction Waste - Management Actions	Implementation
Waste Management: 1. All aspects and regulations of the NEM: Waste Act No. 59 of 2008 (as amended) must be adhered to. 2. Implement appropriate training and induction procedures to ensure all sub-contractors adopt best practice waste minimisation procedures. 3. Recycling of waste must be included in the training and induction procedures and appropriate bins for recyclable waste provided. 4. Recycling of specific waste types (e.g. glass, plastic etc.) must be undertaken with the waste service provider (depending on volume). 5. Minimise littering - provision of suitable waste disposal containers at the temporary construction camp. These receptacles will be clearly marked as "rubbish" in both English and most prevalent additional language. The bins will be emptied on a daily basis into a waste skip stored at the permanent site camp. The applicant will be responsible for the weekly removal of the general waste from the collection area to a permitted waste disposal site. 6. Sufficient vermin / weatherproof bins must be present in the construction camp for all waste material. 7. The contractor shall ensure that concrete transportation does not result in spillage. 8. Water containing waste must not be discharged into the natural environment. Measures to contain the water containing waste and to safely dispose of it must be implemented. 9. Cleaning of equipment and flushing of mixers must not result in pollution, with all contaminated wash water entering the waste water collection system. 10. To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable lined sump prior to leaving the site. 11. All contaminated water and fines from exposed aggregate finishes must be collected and stored in sumps for disposal at an approved waste disposal site. 12. No burning, burying or dumping of any waste materials (construction, domestic, liquid, green or hazardous waste) is permitted. Should evidence of this be found, the PM must enforce penalties on the responsible person. 13. Green waste must not contain any seeds of alien plants or weeds. 14. The working areas and storage sites must be cleared of litter on daily basis. 15. Store timber, metal, oil, paper, bricks, tyres, batteries and any other major recyclable wastes in bunded areas away from drains or watercourses prior to re-use or collection for recycling. 16. Construction rubble must be disposed of at a municipal disposal site; alternatively it can be removed from site by the contractor should it be of value. 17. Waybill certificates for all waste loads removed from the site must be kept on	**Responsible Person:** PM and Contractor **Timeframe:** Waste removal weekly / as necessary when bins are full **Responsible Person:** PM and Contractor

Construction Waste - Management Actions	Implementation
file. 18. Waste from ablution facilities must be regularly removed by an accredited service provider and handling and removal must be undertaken on an impermeable surface to reduce the potential for soil / water contamination. Ablutions must not be situated within the 1:100 year floodline. 19. Load and unload any solid or liquid hazardous materials on an impermeable surface to reduce the potential for soil / water contamination. 20. Store waste oil and grease away from watercourses in a bunded roofed and sealed area and this must be collected by a licenced waste contractor. 21. Do not bury material from bunded areas (this must be treated as hazardous material). 22. Hazardous waste disposal must be undertaken by an approved waste contractor. 23. Contaminated materials, hazardous substance containers, contaminated soil, clean-up materials, etc., must be transferred to a permitted hazardous landfill site. 24. Disposal certificates for each waste removal event must be issued and kept in the site environmental file for auditing purposes. **Monitoring and Performance Assessment:** 25. Regular visual assessment of the working areas and construction camp to assess potential for leakage, spillage or pollution arising from the site. Inspection of storage containers, waste storage areas, waste recycling, and the chemical / fuel store for evidence of pollution. 26. Weekly internal monitoring of waste management by the contractor, and practical measures implemented to ensure correct and timeous disposal of waste according to site requirements. 27. General housekeeping of the site will be examined to ensure stormwater runoff does not contain refuse or contaminants.	**Timeframe:** Waste removal weekly / as necessary when bins are full

10.3 Post-Construction Waste Management

- Remove all leftover construction materials from the storage area and construction site and either sell, auction, donate to the local community or transfer to the Contractor's base.
- Remove all construction debris, litter and domestic waste from the construction site and transfer to an appropriate disposal site. Remove all waste receptacles from the camp and working area and either donate to the local community, auction, or transfer to Contractor's base.
- Drain all wastewater and sewerage associated with temporary ablution facilities and transfer the waste to an appropriate permitted disposal site.
- Do not burn or bury any waste at the construction site – all waste is to be transferred to a permitted disposal site.

10.4 Operational Phase Waste Management

Objectives:

- Ensure waste generation is minimised (i.e. avoided, reduced, re-used and recycled) and that waste is disposed of responsibly.
- To ensure no direct or indirect environmental impacts as a result of waste management, handling, disposal or discharge of treated effluent.
- No forms of secondary pollution should arise from the disposal of treated sewage and refuse.

Any pollution problems arising from the above development are to be addressed immediately by the applicant.

Potential Operational Phase Issues and Management Actions:

- Waste generation from the operational activities may result in localised pollution and soil contamination, and an increased load of hazardous waste at disposal sites.

Operational Waste - Management Actions	Implementation
Waste Management: 1. Implement appropriate training and induction procedures to ensure all employees at the WWTW adopt best practice waste minimisation procedures. 2. Property management will be responsible for the weekly removal of all waste from the central waste storage area to a permitted waste disposal site (licensed to accept general / hazardous / recyclable waste, as appropriate). 3. Water containing waste must not be discharged into the natural environment without approval from DWS. 4. Hazardous waste (such as sewerage sludge) disposal must be undertaken by an approved waste contractor. 5. Contaminated materials, hazardous substance containers, contaminated soil, clean-up materials, etc., must be transferred to a permitted hazardous landfill site. 6. Disposal certificates for each waste removal event must be issued and kept in the site environmental file for auditing purposes. 7. In the event of a spillage that cannot be contained, and which poses a serious threat to the local environment, the following Departments must be informed of the incident in accordance with Section 30 of the National Environmental Management Act (Act no. 107 of 1998) within forty-eight (48) hours: a. The Local Authority; b. Department of Water and Sanitation; c. The Department of Environmental Affairs and Development Planning; d. The Local Fire Department when relevant; and e. Any other affected departments. **Monitoring and Performance Assessment:** 8. Routine inspections of the WWTW infrastructure must be undertaken during the operation phase. If any leaks or system failures are identified, these must be repaired immediately.	**Responsible Person:** Property Management and Tenants **Timeframe:** Waste removal weekly / as necessary when bins are full

11 DECOMMISSIONING PHASE

It is expected that the proposed project will be operational for the foreseeable future. Prior to decommissioning of the project at some future date, a comprehensive Decommissioning Plan must be prepared that can reassess the potential environmental and socio-economic impacts at the time. This Decommissioning Plan must be based on the Construction section of the EMPr as the impacts and mitigation measures will be very similar. In addition to all management measures described in the Construction Phase, specific rehabilitation activities are required to address decommissioning of structures, soil, land capability, and vegetation establishment.

7 UNDERTAKING

As part of the proposed Environmental Management Programme, the applicant is required to provide an undertaking that it will be executed as approved and that the provisions of all applicable legislation and regulations thereto will be complied with.

The signed undertaking is provided on the next page.

UNDERTAKING

I, _____. , the undersigned and duly authorised thereto by Phumaf Holdings, have studied and understand the contents of this Environmental Management Programme (EMPr) and duly undertake to adhere to the conditions as set out therein, unless specifically or otherwise agreed to.

Signed at _____, on this _____, day of _____ 201__

. _____.
Signature of Appointed Engineering Representative

I, _____. , the undersigned and duly authorised thereto by the Department of Human Settlement, have studied and understand the contents of this Environmental Management Programme (EMPr) and duly undertake to adhere to the conditions as set out therein, unless specifically or otherwise agreed to.

Signed at _____, on this _____, day of _____ 201__

. _____.
Signature of Applicant

I, . _____, the undersigned and duly authorised thereto by the DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT, have studied and approved the contents of this Environmental Management Programme (EMPr).

Signed at _____, on this _____, day of _____ 201__

. _____.
Signature of Designated Signatory (GDARD)

8 CONCLUSION

The implementation of this EMPr will ensure that negative environmental impacts resulting from the proposed project are minimised or prevented. It is the responsibility of the applicant to enforce the implementation of the EMPr by the contractor and platform users by means of including the EMPr in contract documentation. The contractor must thoroughly familiarise himself with the requirements of the EMPr and appoint a suitable environmental officer to oversee the implementation of the EMPr on a day-to-day basis. EMPr training will be required for both management staff and contractors (see Appendix A: Awareness Training). Examples of the Site Complaints Register and Environmental Incident Book are provided in Appendix B.

APPENDIX A: AWARENESS TRAINING

ENVIRONMENTAL EDUCATION AND AWARENESS

It must be ensured that all site personnel have a basic level of environmental awareness training. This should include:

- What is meant by 'environment'?
- Why the environment needs to be protected and conserved.
- How construction activities can impact on the environment.
- What can be done to mitigate against such impacts.
- Awareness of emergency spill response provisions.
- Social responsibility during construction (being considerate to residents etc.).
- Translators are to be used if necessary, to ensure that all staff understands what is required of them in terms of the EMPr.
- A copy of the Environmental Authorisation (EA) must be kept at the site where the activity will be carried on. The EA must be produced to any authorised official of the department who requests to see it and must be made available for inspection by any employee or agent of the holder of the EA who works or undertakes work at the premises.
- The Project Manager (PM and Project Engineer (PE) must be on hand to explain any technical issues and to answer questions.
- Environmental awareness posters must be placed on notice boards throughout the site.
- The need for a 'clean site' policy needs to be explained to everyone working on site.

WORKER CONDUCT ON SITE

A general regard for the social and ecological well-being of the site and surrounding areas is expected of the site staff. Workers need to be made aware of the following rules:

- No alcohol / drugs to be allowed on site.
- No firearms allowed on site or in vehicles transporting staff to / from the site.
- Prevent excessive noise.
- Construction staff is to make use of the facilities provided for them, as opposed to ad hoc alternatives.
- Trespassing on private / commercial properties adjoining the site is forbidden.
- Driving under the influence of alcohol is prohibited.

APPENDIX B: COMPLAINTS REGISTER AND ENVIRONMENTAL INCIDENT BOOK

SITE COMPLAINTS REGISTER					
Date	Time	Nature of Complaint	Response and Investigation Undertaken	Actions taken	Person in charge

ENVIRONMENTAL INCIDENT BOOK					
Date	**Time**	**Location**	**Nature of Incident**	**Actions taken**	**Person in charge**

APPENDIX C: EAP CV

Gerda Bothma

Senior Environmental Consultant

CORE SKILLS

- Project Management
- Technical & Impact Assessment Guidance
- Environmental Assessment
- Water Use Licencing
- Waste Management Licencing
- Environmental & Waste Auditing and Compliance Monitoring

DETAILS

Qualifications

- B.Sc. Microbiology (Honours) University of Pretoria 1996
- B.Sc. Biological Sciences University of Pretoria 1994

Memberships

- International Association for Impact Assessors of South Africa (IAIA)
- Institute of Waste Management of South Africa (IWMSA)
- SACNASP (No.117348) (South African Council for Natural Scientific Professionals)

Languages

- Afrikaans
- English

Countries worked in:

South Africa, Zambia, Namibia

PROFILE

Gerda has over 20 years' experience within the environmental and waste management field and strives to deliver custom environmental services to clients.

Gerda began her career in the environmental field within the government sector, managing environmental aspects and impacts as well as reviewing environmental assessments with the view of authorizing or declining authorization of the developments.

After six years within the government sector she joined a consulting engineering firm where she was ultimately responsible for the Management of the Environmental Sub-Division. Gerda has experience in project and client management, financial management and the compilation and costing of project proposals and tenders. She has been involved in several engineering projects as the Environmental Assessment Practitioner as well as the Environmental Control Officer during construction working closely with the Occupational Health and Safety Officer. Gerda has also been involved in projects where waste licensing as well as water use licensing processes formed an integral part of the services offered. Environmental auditing and compliance monitoring of waste disposal sites also forms part of her experience gained. She also has experience in dealing with projects which involve NEC3 Contracts.

Gerda has specialist skills in the following areas:

- Project proposals, planning, costing and timing
- Project and Client Management
- Authority Liaison
- Basic Assessments & Scoping/EIA Processes
- Compilation
- Amendment of EA's & EMP's
- Facilitation of Public Participation Processes & stakeholder engagement
- IWULA & IWWMP Applications
- Environmental Control Officer (ECO) duties
- Environmental Compliance Auditing (IFC Performance Standards & Equator Principles)
- Mentorship & Guidance

Year	Client	Project Description	Role/ Responsibility
Strategic and Environmental Guidance Projects			
1999 to 2003	Gauteng Department of Agriculture, Conservation & Environment	Development of a Health Care Risk Waste Management Strategy for Gauteng.	Part of Development Team
2001 to 2003	Gauteng Department of Agriculture, Conservation & Environment	Development of Minimum Domestic Waste Collection Standards for Gauteng Province.	Part of Development Team
2002	Gauteng Department of Agriculture, Conservation & Environment	Development of new EIA guidelines and regulations for the Gauteng Province.	Part of Development Team
2005	Gauteng Department of Agriculture, Conservation & Environment	GDACE Green Procurement Project: Development of the GDACE Green Procurement Policy, Gauteng	Project Manager & Reviewer
2008	GAUTRAIN Project Engineers (i.e. KV3 Engineers)	Environmental Assistance for the Gautrain Project: Environmental Evaluation of various documentation and engineering designs in terms of their environmental compliance.	Project Manager & Reviewer
2009	Department of Environmental Affairs	Alignment of MIG Project Process with EIA Process: Evaluation of the EIA process as well as the MIG process in order to produce a process alignment guideline to the municipalities to streamline the two processes.	Part of Development Team
Environmental Feasibility and Screening			
2008	Nu Way-property Developments	Management of Environmental Screening and Due Diligence Assessment for several proposed Nu Way-property Developments, Gauteng.	Project Manager
2008	Department of Water Affairs	Mokolo Croc WAP Environmental Feasibility and Screening, Limpopo.	Project Manager & Senior Environmental Assessment Practitioner (EAP)
2016	Kwadukuza Municipality	Environmental Feasibility for Civil Engineering Project Foxhill Road Alignment and Construction, Tongaat, Kwa-Zulu-Natal.	Environmental Project Leader
2016	King Sabata Dalindyebo Local Municipality (C/O OR Tambo District Municipality)	Environmental Screening Investigation of six proposed development corridors for the Mthatha Bulk Water Infrastructure Presidential Intervention – Phase 2: Secondary Bulk Infrastructure project.	Environmental Project Leader
Development Environmental Assessments			
2003 to 2005	ABSA DevCO	Environmental Impact Assessment for a change of land-use from agricultural to Residential and Town Development of the farm Brakfontein 399 JR, Centurion, Gauteng.	Project Manager & Senior EAP
2005 to 2010	Air Traffic Navigation Services	The project entails the upgrading of existing, and the provision of new air navigation	Project Manager & Senior

Year	Client	Project Description	Role/ Responsibility
	(ATNS)	sites (27 in total) throughout South Africa. Civil and electrical infrastructure to the sites needed to be upgraded to accommodate the equipment. Various Environmental Impact Assessments for various individual projects in various provinces within South Africa.	EAP
2006 to 2009	Amathole District Municipality	Elliotdale Rural Sustainable Human Settlement Pilot Project Environmental Impact Assessment. Responsible for the environmental assessment process which was based on a strategic approach for the Elliotdale Rural Housing Project, Elliotdale, Eastern Cape.	Project Manager & Senior EAP
2007	Elkem Ferroveld	Environmental Basic Assessment for the upgrading and expansion of the Ferroveld Plant in Ferrometals, Emahlaheni, Mpumalanga.	Project Manager & Senior EAP
2008	ABSA DevCO	Environmental Impact Assessment for a change in land use from agricultural to Residential and Town development of Montana X40, Pretoria, Gauteng.	Project Manager & Senior EAP
2012	Transnet Capital Projects	Environmental Basic Assessment and technical environmental investigations for the proposed expansion of the existing tug jetty and construction of a new tug jetty for Transnet Capital Projects in the Port of Durban, KwaZulu-Natal.	Project Manager & Senior EAP
2014 to 2016	Dube TradePort	Environmental Impact Assessment for the proposed construction of the Dube TradePort TradeZone 2 in La Mercy, KwaZulu-Natal.	Project Manager & Senior EAP
2014 to 2017	Dube TradePort	Environmental Impact Assessment for the proposed Support Precinct 2 Development in La Mercy, KwaZulu-Natal.	Project Manager & Senior EAP
2016 to 2017	Areena Resort	Application for rectification in terms of S24G and associated Environmental Basic Assessment for the alleged unlawful construction activities at the Areena Resort, Great Kei Municipality, Eastern Cape.	Project Manager & Senior EAP
2016 to 2017	Areena Resort	Application for rectification in terms of S24G and associated Environmental Basic Assessment for the alleged unlawful construction activities on Hillsdrift Farm, Great Kei Municipality, Eastern Cape.	Project Manager & Senior EAP
2018 to 2019	Watchman Properties (Pty) Ltd	Environmental Basic Assessment for the proposed Vendome Residential Development on Portion 1 of Farm 1766 and Portion 2 of Farm 1766, Paarl, Western Cape, South Africa.	Project Manager & Senior EAP
2018 to 2019	Keysha Investments 213 (Pty) Ltd	Environmental Basic Assessment for the proposed River Farm Estate Development and associated infrastructure on remainder of farm Rivierplaas No. 1486, Erf 111 and Erf 197, Paarl, Western Cape, South Africa.	Project Manager & Senior EAP
2018 to 2019	Paarl Vallei Developments (Pty) Ltd	Environmental Basic Assessment for the proposed Paarl Valleij Retirement Village Development, Paarl, Western Cape, South Africa.	Project Manager & Senior EAP
2018 to 2019	Val de Vie Investments (Pty) Ltd	Parallel Substantive Amendment Application process for the authorised Pearl Valley II & Levendal Residential Developments, Paarl, Western Cape, South Africa.	Project Manager & Senior EAP
Renewable Energy Environmental Assessments			
2011	Farmsecure Carbon	Environmental Basic Assessment and Water Use License Application process for a proposed Biogas Waste to Energy project for a pig farm, Mooiriver, KwaZulu-Natal.	Project Manager & Senior EAP

Year	Client	Project Description	Role/ Responsibility
2018 to 2019	GPIPD – Doornfontein Solar Farm (Pty) Ltd	Environmental Impact Assessment for the proposed 230 MW Doornfontein Photovoltaic Solar Energy Facility (PVSEF) located on Remainder of Farm 118, Doornfontein, Piketberg, Bergrivier Local Municipality, Western Cape.	Project Manager & Senior EAP
2018 to 2019	GPIPD – Kruispad Solar Farm (Pty) Ltd	Environmental Impact Assessment for the proposed 150 MW Kruispad Photovoltaic Solar Energy Facility (PVSEF) located on Remainder of Farm 120, Kruispad, Piketberg, Bergrivier Local Municipality, Western Cape.	Project Manager & Senior EAP
2018 to 2019	Brandvalley Wind Farm (Pty) Ltd	Substantive Amendment Application for the authorised 140 MW Brandvalley Wind Energy Facility (WEF) located within the Karoo Hoogland, Witzenberg and Laingsburg Local Municipalities in the Northern and Western Cape Provinces.	Project Manager & Senior EAP
2018 to 2019	Copperton Wind Farm (Pty) Ltd	Non-Substantive Amendment Application to update the information of the Holder of the Environmental Authorisation & an EMPr Amendment Process to update the Airstrip Alignment and to provide an updated "outcomes based" EMPr for the Copperton Wind Energy Facility near Copperton in the Northern Cape.	Project Manager & Senior EAP
2018 to 2019	WKN Windcurrent SA (Pty) Ltd	Environmental Impact Assessment for the proposed 150 MW Haga Haga Wind Energy Facility (WEF) & Environmental Basic Assessment for the associated Haga Haga Overhead Powerline (OHPL) in Haga Haga, Great Kei Local Municipality, Eastern Cape.	Project Manager & Senior EAP
Mining Environmental Assessments			
2007	Chris Hani Municipality	Environmental Assessment and DME Licence Application on behalf of Chris Hani Municipality. Responsible for exemption application from Mining Permit and Environmental Management Programmes for 17 borrow pits in Middelburg, Eastern Cape.	Project Manager & Senior EAP
2010	Samancor Chrome Limited	The Lwala Greenfields Mine and Smelter EIA and EMP. Responsible for the Environmental impact assessment and technical investigations for the waste management issues for the proposed development of a new chrome smelter project in the Steelpoort area, Limpopo.	Project Manager & Senior EAP
2011	Xtrata Alloys	Xtrata Alloys Western Mines PSV application for authorization in terms of the MPRDA. Responsible for the undertaking of the EIA and compilation of the amended EMPr and technical environmental investigations for the proposed development of an open cast mine in Rustenburg, North West.	Project Manager & Senior EAP
Waste Management Environmental Assessments			
2003	Assmang Chrome Machadodorp	Environmental Impact Assessment for the permitting of the H:H Hazardous Waste Disposal Facility at Assmang Chrome, Machadodorp.	Senior EAP
2004	Emfuleni Local Municipality	Environmental Impact Assessment for the closure of the Zuurfontein Landfill site for the Emfuleni Local Municipality, Sedibeng, Gauteng	Senior EAP
2004	Ekurhuleni Municipality	Environmental Impact Assessment for the closure of the Sebenza Landfill Site for the Ekurhuleni Municipality, Gauteng.	Senior EAP
2004	Tzaneen Local Municipality	Application for authorisation and EIA for the permitting of an existing solid waste disposal site for the Tzaneen Local Municipality, Mpumalanga.	Senior EAP

Year	Client	Project Description	Role/ Responsibility
2006	Samancor Chrome Middelburg	Environmental Basic Assessment for the permitting of the existing Slag Waste Disposal facility for Samancor Chrome Middelburg, Mpumalanga.	Senior EAP
2006	Samancor Chrome Ferrometals	Environmental Basic Assessment for the permitting of the existing Slag Waste Disposal facility for Samancor Chrome Ferrometals Witbank, Mpumalanga.	Senior EAP
2007	Steve Tshwete Municipality	Environmental Impact Assessments for four Solid waste Transfer Stations for the Steve Tshwete Municipality, Mpumalanga.	Senior EAP
2008	Assmang Chrome Machadodorp	Environmental Impact Assessment for the expansion of the existing Slag Waste Disposal Facility at Assmang Chrome. Responsible for the EIA application for authorization for the proposed expansion project in Machadodorp, Mpumalanga.	Project Manager & Senior EAP:
2010	ArcelorMittal	ArcelorMittal BOF Slag Disposal site licensing of new site and closure of old site, Newcastle, KwaZulu-Natal.	Project Manager & Senior EAP:
2010	Lekwa Municipality	Waste Management License Application for authorization and the conducting of an EIA and technical environmental investigation for the proposed development of two landfill sites for the Lekwa Municipality, Mpumalanga.	Project Manager & Senior EAP:
2015 to 2017	Umgungundlovu Municipality	Advanced Solid Waste Management Project for Umgundgundlovu Municipality for proposed Materials Recovery Facilities located in various Local Municipalities, Umgungundlovu Municipality, KwaZulu-Natal.	Project Manager & Senior EAP:
Water and Wastewater Environmental Assessments			
2004	Msukaligwa Municipality	Environmental Impact Assessment for the installation of a water reticulation system at Nganga for the Msukaligwa Municipality, Mpumalanga.	Senior EAP
2006 to 2010	eThekwini Municipality: Water and Sanitation	Proposed upgrading of the WWTW capacity in the Northern Areas of the eThekwini Municipality. Responsible for EIA application for authorization, technical environmental investigations, and waste management license application for the proposed expansion of the WWT capacity in Northern eThekwini, KwaZulu-Natal.	Project Manager & Senior EAP
2008	Johannesburg Water	Environmental Management Services for Johannesburg Water: Environmental Impact Assessment (Exemption) for various individual projects related to the upgrading of the Bryanston Water Mains, Gauteng.	Project Manager & Senior EAP
2014 to 2017	eThekwini Municipality: Water and Sanitation	Environmental Basic Assessment and Water Use License Application for the Northern Aqueduct Water Augmentation Project (Phase 5), Durban, KwaZulu-Natal.	Project Manager & Senior EAP
Electrical and Linear Environmental Assessments			
2005	Magallies Water	Application for (exemption) authorisation on behalf of Magallies Water for the installation of the Rising Main from the Roodeplaat Waterworks to the Wallmannsthal Reservoir, in Wallmannsthall, Gauteng.	Senior EAP
2010	Moloto Rail Corridor Development	EIA for the Moloto Rail Corridor Development. Responsible for the EIA application for authorization and technical environmental investigations for the proposed Moloto Rail Corridor Development, Moloto, Gauteng.	Project Manager & Senior EAP

Year	Client	Project Description	Role/ Responsibility
2010	ESKOM	Environmental Basic Assessment of for the ESKOM Honingklip 88kV & ESKOM Randjiesfontein 88kV overhead line and Sub-Stations, Johannesburg, Gauteng.	Project Manager & Senior EAP
2010	ESKOM	Environmental Basic Assessment of for the ESKOM Ubertas Strategic Servitude Sub-Station, Johannesburg, Gauteng	Project Manager & Senior EAP
2014 to 2017	Msunduzi Municipality	Environmental Impact Assessment for the proposed Msunduzi IRPTN project, Pietermaritzburg, KwaZulu-Natal	Project Manager & Senior EAP
Environmental and Waste Management Compliance Monitoring and Auditing			
2005 to 2009	Sedibeng District Municipality	Auditing of Zuurfontein and Boitshepi Landfill sites for the Sedibeng District Municipality, Gauteng.	Part of Audit Team
2006 to 2009	ABSA DevCO	Environmental Compliance monitoring in accordance with relevant authorisation conditions and environmental management plans for the Amberfield Development on the farm Brakfontein 399 JR, Centurion, Gauteng.	Project Manager & Environmental Control Officer (ECO)
2007 to 2009	ABSA DevCO	Environmental Compliance monitoring in accordance with relevant authorisation conditions and environmental management plans for the Zambezi Estate Development, Montana, Gauteng.	Project Manager & ECO
2008 to 2009	Steve Tshwete Municipality	Auditing of Middelburg Landfill Site for the Steve Tshwete Municipality, Mpumalanga.	Part of Audit Team
2008 to 2009	ABSA DevCO	Environmental Compliance monitoring in accordance with relevant authorisation conditions and environmental management plans for the Cedar Creek Development, Fourways, Gauteng.	Project Manager & ECO
2017 to 2018	Dube TradePort	Environmental Compliance monitoring in accordance with relevant authorisation conditions and environmental management plans for the construction of TradeZone 2, Dube TradePort, La Mercy, KwaZulu-Natal.	Project Manager & ECO
2017	Richards Bay Minerals	Environmental Legal Compliance Audit to determine the level of compliance of Richards Bay Minerals' to their various mining, water and waste licenses and environmental authorisations and permits, Richards Bay, KwaZulu-Natal.	Project Manager & Environmental Auditor
2017 to 2018	eThekwini Municipality	Environmental Compliance monitoring in accordance with relevant authorisation conditions and environmental management plans for the construction of the Northern Aqueduct Phase 5, Durban, KwaZulu-Natal.	Project Manager & ECO
Integrated Water Use License Applications			
2010	FOSKOR	Integrated Water Use License Application for a new storage dam for FOSKOR, Richards Bay, KwaZulu-Natal.	Part of Project Team
2014 to 2015	SANRAL	Integrated Water Use License Applications as required for the proposed SANRAL N2 Road upgrade from Mthunzini to Empangeni, KwaZulu-Natal.	Project Manager & Senior EAP
2014	eThekwini Municipality: Roads	Integrated Water Use License Application for the proposed Realignment of Inanda Arterial Road, Durban, KwaZulu-Natal.	Project Manager & Senior EAP

Year	Client	Project Description	Role/ Responsibility
2015 to 2017	SMEC (Umzimkulu Municipality)	Integrated Water Use License Application for the proposed Licensing of the existing Umzimkhulu Waste Water Treatment Works, Umzimkhulu, KwaZulu-Natal.	Project Manager & Senior EAP
2014 to 2016	eThekwini Municipality: Roads	Water Use License Application for the proposed eThekwini BRT Route C1A, Durban, KwaZulu-Natal.	Project Manager & Senior EAP
Management and Master Plans			
2005	Livingstone Municipality	Development of the Livingstone Integrated Development Plan, Zambia.	Part of the Project Team
2008	Steve Tshwete Municipality	Development of an Integrated Waste Management Plan for the Steve Tshwete Municipality, Mpumalanga.	Part of the Project Team
2008	Kungwini Local Municipality	Development of an EMP (Framework) for Kungwini Local Municipality, Mpumalanga.	Part of the Project Team
2010	KZN Department of Public Works – Southern Region	Compilation of an Environmental Management Plan for the Fort Napier sewage upgrading project, Pietermaritzburg, Kwa-Zulu Natal.	Project Manager & Senior EAP