NKHOPHELE HOLDINGS

Core to earth's sustainable development

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED UMNOTHO MEWS RESIDENTIAL COMPLEX DEVELOPMENT WITH ASSOCIATED INFRASTRUCTURE ON ERF 2495 & ERF 2496 ERASMUS EXTENSION 20 AND PORTION 11 AND PORTION 12 OF FARM KLIPEILAND 524 JR, IN BROKHORSPRUIT WITHIN THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE.

APPLICANT: UMNOTHO WE AFRIKA GROUP (PTY) LTD.

DATE: FEBRUARY 2020

EXECUTIVE SUMMARY

Nkhophele Holdings as an independent environmental consultancy and has been appointed by Umnotho We Afrika to undertake the required Environmental Impact Assessment (EIA) process for the proposed development of a residential complex with associated infrastructures, as required by the NEMA EIA Regulations, 2014 (amended on 7 April 2017).

The proposed residential complex development with associated infrastructures will be undertaken on an area of approximately 5 hectares in total with a developmental footprint of approximately 4 hectares. The proposed project will provide approximately 45 jobs during the construction phase and approximately 8 jobs during the operational phase. This will contribute to the growth of the economy in the local area by ensuring employment.

The proposed project will trigger listed activities (detailed in the table below) in terms of the Environmental Impact Assessment (EIA) Regulations as promulgated under the National Environmental Management Act (No. 107 of 1998) (NEMA). Therefore, the proposed development requires Environmental Authorisation in terms of the EIA Regulations prior to commencement of construction and operation phases.

Table 1: Triggered listed activities

Activity	Description
Activity No 27, Listing notice 1(GNR 327)	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Activity 12, Listing Notice 3(GNR 324)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. C. Gauteng

	ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans;

This Environmental Management Report to ensure that undue or reasonably avoidance of adverse impacts of the conduction, operation and decommissioning of the project are prevented and that positive benefits of the project are enhanced. In the opinion of the Environmental Assessment Practitioner (EAP), the project does not pose a detrimental impact on the receiving environment and its inhabitants. The impacts that have been identified and addressed through the impact assessment can be mitigated significantly with the use of this Environmental Management Programme (EMP). The applicant should be bound to stringent conditions to maintain compliance and responsible executions of the project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

BAR	Basic Assessment Report
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
HSE	Health and Safety officer
NEMA	National Environmental Management Act
OHSA	Occupational Health and Safety Act
PHRAG	Provincial Heritage Resources Authority Gauteng
SAHRA	South African Heritage Resources Agency

1. SCOPE OF WORK

This EMPr prescribes and directs the management of all aspects associated with the planning, construction, operations and decommissioning of the proposed residential complex development. The EMPr has been developed as set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualized to provide clear guidance in terms of the on-site implementation of mitigation measures.

Nkhophele Holdings has been appointed by Umnotho We Afrika to compile Environmental Management Programme for the proposed project in order to assist the identification of possible impacts, assess impacts and provide possible mitigation measures to minimise the identified impacts. This is done to ensure that there are measures to manage the identified negative impacts that may result from the proposed project.

The proposed project is anticipated to operate within the correct standards. The process of construction is anticipated to be conducted by an experienced contractor and Umnotho We Afrika is anticipated to work closely with the appointed Environmental Control Officer (ECO). The project phases will include the following:

- Planning phase
- Construction phase
- Operational phase

2. PROJECT BACKGROUND

The South African Economy requires innovative people who can identify the challenges the country is facing in economic development and job creation. On a socio-economic forefront, the proposed development will facilitate the decrease in unemployment and thus improving the community livelihoods. The site is located in a town which is currently experiencing high population growth and the development of residential complex will assist in providing a safe and modern living apartment for the rapidly growing population.

Nkhophele Holdings (Pty) Ltd, have compiled the Environmental Management Programme (EMPr) for the proposed development. This document considers the impacts that are likely to arise from the implementation of the project and the mechanisms recommended to minimise the severity of these impacts. The EMPr covers the principles, responsibilities and requirements applicable in order to implement effective environmental management, throughout the project.

2.1 Objectives and purpose of the EMPr

The main driving force behind the compilation of this EMPr is to outline measures that are to be implemented in order to minimise adverse environmental impacts that are either direct, indirect or cumulative impacts associated with the development of the proposed residential complex development. This is done by encouraging good management practices through planning and commitment to environmental issues and complying all applicable laws, regulations, standards and guidelines for the protection of the environment. The EMPr serves as a guide for contractors and employees on their roles and responsibilities concerning environmental management on site. Furthermore, it provides a framework for environmental monitoring throughout the development life cycle.

This document provides appropriate mitigation measures designed to minimise or eliminate the significant adverse impacts that may be caused as a result of the proposed project and to also enhance positive impacts

2.2 The objectives of the EMPr

- Identify feasible and cost-effective mitigation measures to reduce significant negative environmental impacts of the proposed residential complex and legal levels;
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment;
- Provide a standard for management of environmental issues pertaining to the execution of civil and other construction work with specific reference to issues raised through the Environmental Impact Assessment (Basic Assessment) undertaken for the proposed residential complex development.

- To prevent long-term or permanent environmental degradation; and reduce the environmental impact of civil and any other construction work through the proactive employment of sound and effective working practices.

2.3 The EMPr seeks to highlight the following

- Avoiding impacts by not performing certain actions.
- Minimizing impacts by limiting aspects of the action.
- Rectifying impacts through rehabilitation, restoration of the affected environment. etc.
- Compensation for impacts by providing substitute resources or environments.
- Minimizing impacts by optimizing processes, structural elements and other design features.
- Provide ongoing monitoring and management of environmental impacts of a development and documenting of any digressions/good performances.
- The EMP is a legally binding document that all parties involved in the project must be made of.

3. TRAINING AND AWARENESS

3.1 Training of construction workers

The construction workers must receive the basic training in environmental awareness, including the storage and handling of hazardous substances, management of waste, and prevention of water pollution. They must be informed of how to recognize historical/archaeological artefacts that may be uncovered during excavation. They must also be apprised of the EMPr's requirements.

3.2 Contractor Performance

The contractor must ensure that the conditions of the EMPr are adhered to. Should the contractor require clarity on any aspect of the EMPr, the contractor must contact the Environmental Control Officer for advice.

3.3 Structure of the EMPr

The EMPr is the over-arching administrative and institutional document from which other documents take their authority. It is intended to be an overview document that specifies the on-site environmental management philosophy of the site and the organisational structure necessary to achieve that vision. In addition, it specifies common environmental management and monitoring principles that will be applied to all aspects of the project. The EMPr provides mitigation and management measures for the following phases of the project:

- Planning phase.
- Construction phase.
- Operational phase.

4. PROJECT OVERVIEW

4.1 Project location

The residential complex is proposed to be developed on ERF 2495 and ERF 2496 Erasmus extension 20 and the remaining extent of portion 11 and 12 of the farm Klipeiland 524 JR. The site is located at Erasmus Township in Bronkhorstspruit, approximately 55 km east of Pretoria. The central co-ordinates of the site are: 25°48'51.44" S, 28°45'00.36"

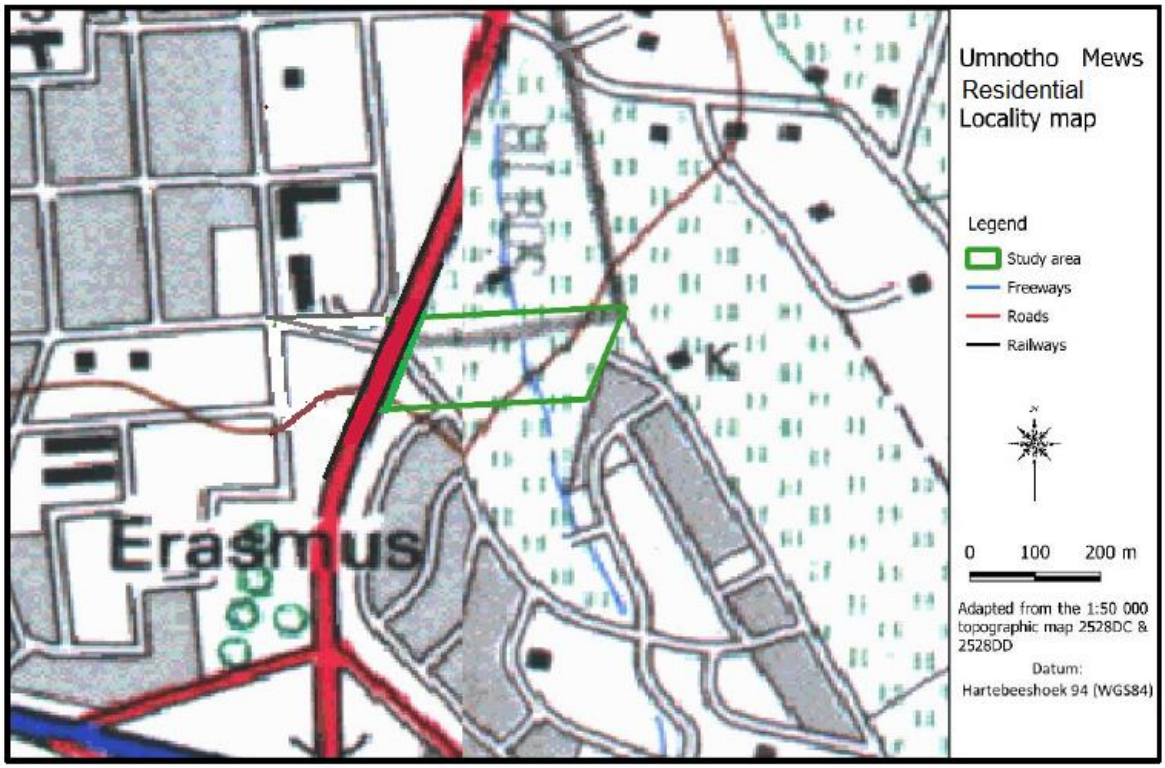

Figure 1: Locality map of the site

4.2 Project Description

The site will be designed to have a green park area along the Western Boundary, next to the existing stream. There will be 4 north facing main blocks with landscaped courtyard areas in between. Each block is double story with 12 apartments. The proposed layout design consists of a multi-purpose clubhouse with a swimming pool and 48 residential apartments. These residential apartments will each have an open plan kitchen & living area, two bedrooms and a bathroom. Size of the apartments vary between 60 - 70 m² per unit,

Access to the proposed site

Road access to the study area is via the R25 which is a provincial road linking Bronkhorstspruit in Gauteng Province to Groblersdal in Limpopo Province. The R25 within the vicinity of the site is in a good condition and well maintained. The residential complex may be accessed through Platina & Koper Streets

Municipal infrastructure.

a. Water

City of Tshwane Metropolitan Municipality is the sole provider of potable water to the Bronkhorstspruit town. Water is sourced via dam extraction from the Bronkhorstspruit dam and treated at the Bronkhorstspruit water purification plant located near the dam. Potable water is then pumped from the water purification plant to the Zithobeni and Nooitgedacht reservoirs with a combined storage capacity of 14 655 kℓ from where it supplies the town and surrounding townships via a water reticulation network of varying pipe diameters.

Bulk water supply to infrastructure to the Erasmus Ex 20 is via a 160mm ø pipe extending from Erasmus Ex 17 to the west.

b. Stormwater Drainage

Bronkhorstspruit receives an average of ± 570 mm of rain annually with most of the rain falling during the first and last quarters of the year (i.e. mid spring to mid-summer months). The site has an average height of 1403m above sea level and has a flat slope (1:60) a northerly direction. According to the 1:50 000 cadastral maps from the Surveyor General and physical site observations of the study area, there is a dug-out storm water channel traversing the site in a northernly direction and draining into the Bronkhorstspruit River located 1.5 km north west of the site.

c. Sewer & Solid waste

Sewerage disposal to Erasmus Ex 20 is provided by the municipality via an internal gravity reticulation system draining to the Bronkhorstspruit pump station from where the waste water is pumped to the Godrich Waste Water Treatment Plant (WWTP) which has a capacity of 5 mℓ /day.

There is a 150mm ø pipe traversing the site from the south to the north along the R25 and along eastern boundary of the site which may be used as a connection point for the proposed development. The sewer line is currently blocked and in need of maintenance.

Solid waste collection to Bronkhorstspruit is provided by the City of Tshwane Metropolitan Municipality which has confirmed enough capacity to service the proposed development.

5. APPLICABLE LEGISLATION

Table 2: Applicable legislations

Title of legislation, policy or guideline	Administering authority:	Promulgation Date:
National Legislations/ Policies/ Plans		
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	27 November 1998
The Constitution of the Republic of South Africa 1996, (Act No. 108 of 1996)	National & Provincial	1996
National Water act 1998 (Act No. 36 of 1998)	National & Provincial	1998
National Road Traffic Act, 1996 (Act No. 93 of 1996)	National & Provincial	1996
Hazardous Substances Act 1973 (Act No.15 of 1973)	National & Provincial	1973
National Environmental Management: Waste Act 2008, (Act No. 59 of 2008)	National & Provincial	01 July 2009
National Environmental Management: Air Quality Act 2004, (Act No. 39 of 2004)	National & Provincial	2004
National Environmental Management: Biodiversity Act (No 10 of 2004)	National & Provincial	2004
Occupational Health and Safety Act (No 85 of 1993)	National & Provincial	01 July 2009
Promotion of Access to Information Act, 2000 (Act No 2 of 2000):	National & Provincial	2000
National Heritage Resources Act (Act No. 25 of 1999)	National & Provincial	1999

National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)	National & Provincial	1998
Provincial Acts / Regulations / Policies/ Plans / Programmes / Norms and Standards		
Gauteng Provincial Environmental Management Framework	Provincial	May 2015
Gauteng Noise Control Regulations, 1999	Provincial	1999
City of Tshwane Metropolitan Municipality Waste Management By-Law	Local	2016

Description of compliance with the relevant legislation, policy or guideline:

Legislation, policy of guideline	Description of compliance
National Legislations/ Policies/ Plans	
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	The proposed development will not temper with the rights of humans to a clean and safe environment. The communities' well-being and safety shall be put into consideration and impacts on the receiving environment will be mitigated to ensure sustainability for the future generations.
The Constitution of the Republic of South Africa 1996, (Act No. 108 of 1996)	The National Environmental Management Act (Act No. 107 of 1998) (NEMA) is the principal framework for environmental legislation as well as the Regulations for Environmental Impact Assessment. It sets out the principles that assist as a general framework for environmental planning, as guidelines by reference to which organs of state must exercise their functions and guide other laws concerned with the protection or management of the environment. The application takes into account the environmental and socioeconomic conditions in compliance with the NEMA principles

National Water act 1998 (Act No. 36 of 1998)	The general use of water in the construction and operational phase and possible drilling of water from an aquifer (borehole).
National Road Traffic Act, 1996 (Act No. 93 of 1996)	Road safety as the development of the project may lead to traffic jam as vehicles move in and out of the facility
Hazardous Substances Act 1973 (Act No.15 of 1973)	Hazardous Substances Act No. 15 of 1973 gives provision for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxicity, strong sensitizing or flammable nature and the generation of pressure thereby in certain circumstances. It further provides for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation sale, use, operation, application, modification, disposal or dumping of such substances and products; and to provide for matters connected therewith.
National Environmental Management: Waste Act 2008, (Act No. 59 of 2008)	Only a partial amount of solid construction waste will be stored and handled on the site, before being hauled away and dumped at the nearest registered landfill site. During operational phase, waste will be collected and disposed at the nearest registered landfill.
National Environmental Management: Air Quality Act 2004, (Act No. 39 of 2004)	The NEMA: AQA provides the framework for addressing air quality issues. The Act sets norms and standards for air quality management. During the construction phase, dust and the generation of noise can become a substantial factor, especially to the surrounding communities. Nevertheless, the mitigating measures for these potential impacts can be successfully implemented the proposed development's contribution to air pollution and the generation of air and noise pollution can become less substantial.
National Environmental Management: Biodiversity Act (No 10 of 2004)	The objectives of the National Environmental Management: Biodiversity Act (NEM: BA) inter alia include management and conservation of biological diversity, use of biological resources in a

	sustainable manner etc. The site has been heavily modified by human activities and there will not be any harm made biological resources.
Occupational Health and Safety Act (No 85 of 1993)	The Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work. The EMPr provides for measures to ensure that objectives of the Act are met on this site
Promotion of Access to Information Act, 2000 (Act No 2 of 2000):	The act gives effect to constitutional right to access of information held by the state and any information that is held by another person and that is required for the exercise or protection of any rights; and to provide for matters connected therewith. Legislation that allows the public access to information about activities that influence their well-being and to make contributions to decision making and will apply during public participation process of the project.
National Heritage Resources Act (Act No. 25 of 1999)	Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development. There are no heritage features found on site and if by any chance these features are discovered during construction, the activities will temporarily cease and SAHRA will be notified.
National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)	This act aims to prevent and combat veld, forest and mountain fires throughout the Republic and provides for a variety of institutions, methods and practices for achieving the purpose. As fuel is flammable, it is important that this Act is adhered to
Provincial Acts / Regulations / Policies/ Plans / Programmes / Norms and Standards	

Gauteng Provincial Environmental Management Framework	The purpose of the Framework is to assist environmental impact management including EIA processes, spatial planning and sustainable development. Its objectives includee efficiency in urban development, optimal use of land, to protect Critical Biodiversity Areas (CBAs as defined in C-Plan 3.3) within urban and rural environments and to use ESAs as defined in municipal bioregional plans in spatial planning of urban open space corridors and links within urban areas. The development site is located within special zone and does not have any environmental sensitivities.
Gauteng Noise Control Regulations, 1999	Construction and operational activities may result in noise pollution. Noise will be controlled according to these regulations. Mitigation measures have been included in the EMPr
City of Tshwane Metropolitan Municipality Waste Management By-Law	Since there will be waste created during all the phases of the proposed development, this by-law has to be adhered to.

6. MANAGEMENT STRUCTURE

Table 3: Management Structure

Role	Responsibilities
Authority	The authority has a duty to visit the facility at any given time to audit compliance to the Environmental Management Plan and provide any feedback and comments for the purpose of continuous environmental management.
Developer	• The developer of the facility has the duty to ensure that all resources are provided to ensure Environmental Management Programme is always complied with. • Shall ensure that anyone who does business with the company or entering the company premises is aware of any environmental requirements within the site to ensure that there is always compliance. The developer will ensure there is continuous monitoring of compliance in the form of both first- and second-party audits. • May appoint Environmental personnel who can be responsible for overseeing this policy, • Report to the environmental committee and keep them appraised on all matters pertaining to this policy • Formalise communications to reflect current operational activities and actions and ensure that this policy is implemented and managed accordingly. • Ensure that this policy' procedures, instructions and guidance are regularly reviewed and amended as necessary • Actively promote a positive environmental culture throughout all areas of responsibility
Contractor	Implement, manage and maintain the construction elements of the EMPr for the duration of his/her contract; • Provide appropriate resources – budgets, equipment, personnel and training – for the effective control and

	management of the environmental risks associated with the construction of the project; • Ensure that all sub-contractors and other workers appointed by the contractor are aware of their environmental responsibilities while on site or during the provision of their services off site; • Ensure that all sub-contractors and other workers appointed by the contractor are complying with, and implementing the construction EMPr during the duration of their specific contracts and assign appropriate authority, accountability and responsibility for these personnel to carry out their duties
The project Manager	• Be familiar with the contents of the EMPr, the recommendations and mitigation measures of this EMPr, and implement these measures; • Monitor the contractor's compliance with the environmental specifications daily, through the site diary, and enforce compliance; • Communicate to the contractor in writing to inform the contractor regarding the contents of the report; • Review and approve design sketches produced by the contractor in connection with, for example, the construction site layout, access / haul roads and so forth; • Designate and manage the working areas as per the approved construction site layout, including sensitive environments and "no-go" areas; • Advise on materials that may be used to designate working areas and materials to be used for the works as and when necessary; • Undertake damage assessments where incidents, accidents and serious infringements have occurred on or a relevant distance off site; • Review and approve all areas that have been rehabilitated by the contractor;

	• Review complaints received and issue instructions as necessary; • Implement temporary work stoppages where serious environmental infringements and non-compliances have occurred; • Maintain a record of complaints from the public and communicate these to the contractor; and • Facilitate proactive communication between all role-players in the interests of effective environmental management
The Design Engineer	• Be familiar with the contents of the EMPr; • Monitor the contractors' compliance with the environmental specifications daily, through the site diary, and enforce compliance; • Communicate to the contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports; • Request for, review and approve any method statements prepared by the contractor in consultation with the ECO • Advise designate and manage the working areas as per the approved construction site layout, including sensitive environments and „no-go" areas; • Communicate to the ECO, verbally and in writing, at least 10 working days in advance regarding any proposed actions which may have negative impacts on the environment, with specific reference to blasting • Facilitate proactive communication between all stakeholders in the interests of effective environmental management; • Maintain a record of complaints from the public and communicate these to the contractor and the ECO; and • Accompany the ECO during site inspections and/or inform the ECO in writing, of any infringements of the

	EMPr and to issue instructions to the Contractor on the advice of the ECO.
Operations Manager	• Overseeing and agreeing contracts and providers for services including security, parking, cleaning, catering, technology and so on. • Supervising multi-disciplinary teams of staff including cleaning, maintenance, grounds and security. • Ensuring that basic facilities, such as water and heating, are well-maintained. • Managing budgets and ensuring cost-effectiveness. • Allocating and managing space between buildings ensuring that facilities meet government regulations and environmental, health and security standards. • Advising businesses on increasing energy efficiency and cost-effectiveness. • Overseeing building projects, renovations or refurbishments. • Drafting reports and making written recommendations.
The Environmental Control Officer (ECO)	The ECO is responsible for the implementation of the EMPr during the construction phase and liaison between the developer, contractor and the landowners. The following tasks will fall within his/her responsibilities: • Be conversant with the Environmental Impact Assessment; • Be conversant with the conditions of the Environmental Authorisation; • Be conversant with the Environmental Management Plan; • Be conversant with relevant environmental registration and policies and regulation; • Convey the contents of this document to the contractor site staff and discuss the contents in detail with the project manager and contractor;

	• Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr; • Take appropriate action if the specifications contained in the EMPr are not followed; • Monitor and verify that environmental impacts are kept to a minimum, as far as possible; • non-compliance or remedial measures that need to be applied.
Health and Safety Officer (HSE)	• Provide support to the ECO in monitoring the execution of the operation EMPr by maintaining a permanent presence on the site. • Undertake routine site inspections and provide information to the ECO as required. • Maintain an incident register and report regularly. Reviewing and approving the site Health and Safety Plan (HASP); Ensuring that the contractor complies with the requirements of the Occupational Health and Safety Act during construction; and Ensuring that the contractor complies with the requirements of the Engine

7 GENERAL ENVIRONMENTAL MANAGEMENT

7.1 TRAINING AND ENVIRONMENTAL AWARENESS

It is important to ensure that an appropriate level of environmental awareness is effectively communicated with all personnel involved with the project to ensure continued environmental due diligence and on-going minimization of environmental harm. Training needs should be identified based on the available and existing capacity of site personnel to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

The environmental training is aimed at: promoting environmental awareness; informing the project participants of all environmental procedures, policies and Programmes applicable; providing generic training on the implementation of environmental management specifications; and providing job-specific environmental training in order to understand the key environmental features of the site and the surrounding environment.

Training will be done in a verbal format. The training will be a once-off event. In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimised and environmental compliance maximized.

7.2 ENVIRONMENTAL MONITORING

A monitoring programme will be implemented for the duration of the development of the proposed project. This programme will include:

- Establishing a baseline through the taking of photographs of identified environmental aspects and potential impact on site prior to establishment.
- Monthly monitoring and audits will be conducted by the ECO for the remainder of the establishment phase to ensure compliance to the EMPr conditions, and where necessary make recommendations for corrective action. These audits can be conducted randomly and do not require prior arrangement with the Project Manager.
- Compilation of an audit report with a rating of compliance with the EMPr, the ECO shall keep a photographic record of any damage to areas outside the demarcated site. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the

responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractors shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the Landowner or community. All complaints/claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

7.3 MONITORING AND RECORD KEEPING

The performance of laborers should be monitored by the ECO to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended. The ECO must compile a status quo of the site prior the development and be used as a frame of reference when monitoring the impacts. The following documents will be used to monitor the impacts of the development through comparison with the predevelopment status quo.

- Incidents report – all the incidents and accidents that occurs at the site must be recorded in this document.

- Waste Generation and Management Checklist – the checklist will monitor the effectiveness of the waste management strategies implemented.

All the incidents and accidents at the site should be recorded accordingly. Photographic records must be kept for all site incidents and accidents.

7.4 COMPLIANCE WITH THE EMPR

A copy of the EMPr must always be kept on site during the establishment and operational phase of the project. The EMPr will be binding on all personnel operating on the site and must be included within the Contractual Clauses. It should be noted that in terms of the National Environmental Management Act No 107 of 1998 (Section 28) those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (The ‘polluter pays’ principle).

7.5 NON-COMPLIANCE

During the proposed project, regular monitoring will take place and audit reports should be presented to the Client, Contractor and Competent Authority (if required) on a regular basis. The outcomes of these reports should be discussed in order to identify solutions to any identified issues.

Any non-compliance with the EMPr will be treated as serious offence. The liability for non-compliance with the EMPr rests with the Contractor.

Application of a penalty clause will apply for incidents of non-compliance. The contractor will be allowed one offense and a written warning will be issued by the ECO. Failure to rectify the offense within one (1) working week of the issue of the warning or a repeat offence will result in a fine. This fine will be issued by the ECO. The penalty imposed will be per incident. Unless stated otherwise in the project specification, the penalties imposed per incident or violation will be:

Offence	Amount
Failure to demarcate working areas.	R 2 000
Working outside of the demarcated areas.	R 5 000
Hazardous chemical/oil spill and/or dumping in non-approved sites.	R10 000
Failure to stockpile topsoil correctly.	R 10 000
Failure to stockpile materials in designated areas.	R 5 000
Failure to take measures to control dust dispersion on site.	R 5 000
Washing of vehicles on site.	R 2 000
Contamination or pollution of water bodies and/or groundwater.	R 10 000
Failure to erect temporary fences around trenches.	R 2 000
Failure to provide adequate waste disposal facilities and services.	R 2 000
Cutting down of a tree.	R 10 000
Uncontrolled exposer of soil leading to soil erosion.	R 5 000
Any other contravention of the project specific specification.	R 10 000

Such fines will be paid by the Contractor / Engineer to the Project Manager and will be used in rehabilitation and/ or landscaping.

7.6 EMERGENCY PREPAREDNESS

The Contractor shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the establishment period. Such activities may include, inter alia:

- Accidental discharges to water and land.
- Accidental exposure of employees to hazardous substances.
- Accidental fires.
- Accidental spillage of hazardous substances.
- Accidental toxic emissions into the air.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans shall include:

- Emergency organisation (manpower) and responsibilities, accountability and liability.
- A list of key personnel and contact details.
- Details of emergency services available (e.g. the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

The site personnel shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), the NEMA, 1998 (Act No 107 of 1998), the National Water Act, 1998 (Act No 36 of 1998) and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) as amended and/or any other relevant legislation.

7.7 Incident Reporting and Remedy

If a leakage or spillage of hazardous substances occurs on site, the area must be contained immediately. The source of the leak must be identified as soon is the leakage is noticed. The

contaminated soil must be removed and be remediated. All the chemicals and equipment must be contained within the development footprint and access by animal to contaminated areas should be fully restricted. Where the spills or leakages effect would expand beyond the site footprint local emergency services must be immediately notified of the incident. The following information must be provided:

- The location;
- The nature of the load;
- The extent of the impact; and
- The status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

7.8 Penalties

Where environmental damage is caused or a pollution incident, and/or failure to comply with any of the environmental specifications contained in the EMPr, the project manager and/ or contractor shall be liable.

The following violations, and any others determined during the course of work, should be penalised:

- Hazardous chemical/oil spill and/or dumping in non-approved sites.
- Unauthorised removal/damage to indigenous trees and other vegetation, particularly in identified sensitive areas.
- Uncontrolled/unmanaged erosion
- Pollution of water

8. ENVIRONMENTAL MANAGEMENT MEASURES

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- Nature: A brief written statement of the environmental aspect being impacted upon by a particular action or activity.

- Extent: The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- Duration: Indicates what the lifetime of the impact will be;
- Intensity: Describes whether an impact is destructive or benign;
- Probability: Describes the likelihood of an impact actually occurring; and
- Cumulative: In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Table 4: Impact Assessment Methodology

Criteria	Description			
Extent	**National (4)** The whole of South Africa.	**Regional (3)** Provincial and parts of neighbouring provinces.	**Local (2)** Within a radius of 2 km of the construction site.	**Site (1)** Within the construction Site.
Duration	**Permanent (4)** Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.	**Long-term (3)** The impact will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter. The	**Medium-term (2)** The impact will last for the period of the construction phase, where after it will be entirely negated.	**Short-term (1)** The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase.

		only class of impact which will be non-transitory.		
Intensity	**Very High (4)** Natural, cultural and social functions and processes are altered to extent that they permanently cease.	**High (3)** Natural, cultural and social functions and processes are altered to extent that they temporarily cease.	**Moderate (2)** Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way.	**Low (1)** Impact affects the environment in such a way that natural, cultural and social functions and processes are not Affected.
Probability of Occurrence	**Definite (4)** Impact will certainly occur.	**Highly Probable (3)** Most likely that the impact will occur.	**Possible (2)** The impact may occur.	**Improbable (1)** Likelihood of the impact materializing is very low.
Impact Reversal	**Highly Impossible (4)** Impact reversal will certainly be Impossible.	**Moderate (3)** Impact can be reversed to some extent with loss of natural resources.	**Possible (2)** High possibility of impact reversal.	**Definite (1)** Impact can be totally reversed.
Loss of irreplaceable resources	**Definite (4)** Resources will definitely be lost.	**Highly Probable (3)** Most likely that resources will be lost.	**Possible (2)** Resources may be lost.	**Improbable (1)** Loss of resources is highly unlikely.

Significance is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore

indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

The formula for calculating the Significance of the Impacts is as follows:

Significance = Extent + Duration + Intensity x Probability

Table 5: Significance rating

Low impact/ Minor (3 -10 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium impact/ Moderate (11 -20 points	Mitigation is possible with additional design and construction inputs.
High impact (21 -30 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact/ Major (31 - 48 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.
Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed.	

Table 6: Planning phase environmental specifications

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Compliance	Failure to comply to relevant legislations may result in offense and hazards and may lead to imprisonment or fines.	The project Manager shall ensure that all relevant permits, consent obtained from all necessary regulatory bodies and also ensure that all subsequent permits and written authorisations have been issued early in the planning phase. The project should be conducted in accordance with the natural environmental management act and associated applicable legislation. No unauthorized access to the site.	project manager/contractor	Project manager	Prior to start of clearance and throughout the project

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		The project manager or contractor shall obtain on all relevant information and documentation before commencing with the proposed activity. It is the duty of the responsible person to ensure that the Minimum Requirements for the operation of orchard are applied to the degree equal with its class. There must be sufficient facilities and resources to ensure that the orchard operation can conform to both the permit conditions and relevant minimum requirements. For example, there should be sufficient trained staff to monitor, control and record incoming waste where required.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Method Statements	Policy and legal impacts	The Contractor shall submit written Method Statements for the activities identified by the ECO. Activities that will require method statements include: • Emergency procedures • Materials, equipment and staffing requirements • Transporting the materials and/or equipment to, from and within the site • The storage provisions for the materials and/or equipment • The proposed construction procedure designed to implement the relevant Environmental Specifications	Contractor	ECO & HSE	Prior to start of clearance and throughout the project

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		• Other information deemed necessary by the ECO. Method Statements shall be submitted prior to the proposed commencement of work on an activity to allow the ECO time to study and approve the method statement.			
Environmental Incidents.	Policy and legal impacts.	The contractor must take corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves.	Contractor	Project manager, HSE and/or ECO	Prior to start of clearance and throughout the project.
Recruitment of labour.	Employment for local people.	The contractor and/ project manager must make use of local labour where possible in order to stimulate the local economy.	Contractor	Project Manager	Once off

Table 7: Construction phase environmental specifications

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Site Establishment	Demarcation of unnecessarily large site.	The contractor must establish a construction camp at a specific area as agreed with the ECO if required. The area must be properly demarcated prior to establishment to prevent the construction camp from being unnecessarily large. The camp must be properly fenced. The ECO must liaise with surrounding parties to ensure that the construction camp is not located in an area where it will cause a nuisance.	Contractor and/or ECO	HSE and/or ECO	Prior to start of clearance and throughout the project

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Clearing vegetation	Dust generation that may cause nuisance and respiratory problems.	Avoid site clearing during dry and windy periods Wetting down the sit to suppress dust where there has been clearance of plants. Erection of shade netting to prevent off site dust migration. Dust control and management should be undertaken in terms of National Dust Control regulations promulgated on 1 November 2013. Site clearing should be limited at the actual footprint where the construction activities will take place. Regular manual sweeping of the surrounding roads and sidewalks.	Contractor	HSE and/or ECO	Once-off

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Construction activities- Earthworks excavation.	Soil disturbances and loss of top soils.	Excavated soil material must be correctly located and preferably covered to prevent erosion of the soil. The trench routes and associated working areas must be clearly demarcated before excavation takes place. Trench lengths shall be kept as short as practically possible before backfilling and compacting. Trenches should be re-filled to the same level as, or slightly higher (to allow for settlement) than the surrounding surface to minimise erosion. After trenches are refilled, the trenches and associated working areas must be planted with	Contactor	ECO	Through-out the construction phase

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		suitable indigenous vegetation and regularly watered and monitored. During and after construction of the infrastructure, ensure effective storm water management around permanent infrastructure, rehabilitate disturbed areas using indigenous vegetation, protect topsoil and avoid sensitive soils on steep slopes. This will reduce the possibility of soil erosion.			
Concrete mixing.	Soil pollution	Dedicated concrete mixing area. Limit concrete mixing activities when wind speed is high.	Contractor	HSE and/or ECO	Throughout the construction phase.
Storing of stockpiles.	Inappropriate stock piling that may result in	All stockpiles must be restricted to designated areas and are not to exceed a height of 2 metres.	Contractor and/or project manager	ECO	Throughout the construction phase.

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
	nuisance and generation of dust.	Stockpiles created during the construction phase are not to remain during the operational phase. The contractor must be limited to clearly defined access routes to ensure that sensitive and undisturbed areas are not disturbed. Avoid translocating topsoil stockpiles from one place to another or importing topsoil from other sources that may contain alien plant propagules.			
Waste generation.	Pollution of water body and the environment.	Litter generated by the construction workers must be collected in rubbish bins and disposed of weekly at registered waste disposal sites.	Contractor and/or project manager.	ECO	weekly
		All building rubble, solid and liquid waste etc. must be disposed of as necessary at an appropriately licensed refuse facility.	Contractor.	ECO	As often as necessary.

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Ensure that no refuse wastes are burnt on the premises or on surrounding premises. The construction site must always be kept in a clean and orderly state. Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project are disposed of at dumping site as approved by the Council. Waste is to be collected and disposed of in accordance with municipal waste management system.	Contractor	ECO	Daily

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Separate dry and wet waste on site by demarcating separate bins for that as far as possible. Manage waste generated during construction activities by ensuring that the design of the development includes adequate facilities for the temporary storage of waste, in terms of volume, location and storage containers. Ensure that waste handling, storage and collection is undertaken in accordance with the relevant legislation, practices and procedures. All hazardous waste that may be produced on site must be stored in closed containers until removal to registered landfill.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		The disposal of materials must be monitored and recorded by the ECO. The contractor should ensure that recyclables are stored separately on site and recycled (wherever possible) e.g. paper, cardboard, plastic, glass, metals, concrete, etc.			
Fire prevention and control.	Fire outbreaks that can spread to neighbouring properties.	The Contractor shall take all reasonable and precautionary steps to ensure that uncontrolled fires are not started as a consequence of his activities on site.	Contractor	HSE and/or ECO	Daily.
		The Contractor shall ensure that there is basic fire-fighting equipment available on site as per requirement of the local Emergency Services.	Contractor	HSE and/or ECO	Daily

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		The Contractor shall ensure that all site personnel are aware of the fire risks and how to deal with any fires that occur. This shall include, but not be limited to: • Regular fire prevention talks • Posting of regular reminders to staff.	HSE and/ or contactor	HSE and/or ECO	Monthly
Emergency Procedures	Potential spillage of hydrocarbons that may result in soil contamination.	The Contractor shall ensure that his employees are aware of the procedure for dealing with spills and leaks. The relevant Material Safety Data Sheets (MSDS) shall be available on site. Procedures detailed in the MSDS shall be followed in the event of an emergency situation	Contactor	HSE and/or ECO	As necessary

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		The Contractor shall also ensure that the necessary materials and equipment for dealing with the spills and leaks is always available on site. The source of the spill shall be isolated and the spillage contained using sand berms, sandbags, sawdust, absorbent material and/or other materials. The area shall be cordoned off and secured. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown the spill. The Contractor shall notify the relevant authorities of any spills that occur.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Handling of hazardous Substances.	Potential contamination of water, soil and fire outbreaks.	The Contractor shall assemble and clearly list the relevant emergency telephone contact numbers for staff and brief staff on the required procedures of handling hazardous 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. No hazardous materials must be store next to the stream on site.	Contactor	HSE and/or ECO.	Throughout the construction phase.
		The Contractor must ensure that all hazardous chemical substances are labelled, packed,	Contactor	HSE and/or ECO.	Daily

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		transported and stored in order to avoid the spread of contamination.			
		All hazardous chemical substance waste must be disposed of in accordance with the Hazardous Chemical Substances Regulations, 1995 (Regulation 15) Contractor Daily-Weekly	Contactor	HSE and/or ECO	Daily
Air pollution	Dust and gaseous emissions as a result of construction activities.	Avoid site clearing during dry and windy periods as far as possible. Water browsers or equivalent must be used in order to suppress dust around site. Wetting down the silt to suppress dust where there has been clearance of plant.	Contractor	ECO	Daily or as necessary.

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Erection of shade netting to prevent off site dust migration. Site clearing should be limited at the actual footprint where the construction activities will take place. Regular manual sweeping of the surrounding roads and sidewalks.			
		All areas disturbed during construction that are not required for a specific activity must be re-vegetated.	Contactor	ECO	Upon completion of the construction phase.
		Machinery should be serviced regularly to ensure that there is no excessive gaseous emission.	Contractor and/ or Engineer	ECO	Monthly or as necessary.

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Surface (storm water) and ground water.	Possible contamination of ground and surface water.	No plant machinery may be stored or left near the stream, when not in use.	Contractor and/ or Engineer	ECO	Daily
		Should surface water in the surrounding area be polluted, and indigenous flora show signs of deterioration or death, specialist hydrological or ecological advice must be sought for the appropriate treatment and remedial procedures to be followed. To prevent erosion of material that is stockpiled for long periods, the material must be retained in a bunded area with agreement of the ECO. Sub-surface disposal of storm water should be avoided;	Contractor and/ or Engineer	ECO	As necessary

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		All natural and unlined channels should be inspected for adequate binding of soil to reduce erosion.			
		Construction vehicles and equipment must be serviced regularly to avoid the spills of oil, fuel or grease.	Contractor and/ or Engineer	HSE and/or ECO.	Monthly or as necessary.
		Storm water reticulation design and construction of storm water infrastructure should ensure that overall development of the site does not increase the rate of storm water runoff above that which the natural ground can safely accommodate at any point in the sub-catchments. The stream area should be fenced off during the construction phase to prevent any human activity from encroaching onto these areas. The strands of	Contractor and/ or Engineer	HSE and/or ECO.	Once-off

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		the fence should be smooth and allow movement of wildlife.			
Noise generation.	Increased noise volumes caused by construction activities.	The construction contractor must use modern equipment, which produces the least noise. Any unavoidably noisy equipment must be identified and reasonably located in an area where it has least impact. The operation of machinery must be restricted to when it is actually required. No noise generating work is to be conducted outside of normal working hours as approved by the local authority.	Contractor and/ or Engineer.	HSE and/or ECO.	Daily

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Neighbouring land occupiers must be notified when noise producing activities are planned at least 2 weeks before. All construction activities should be undertaken during daylight working hours between the hours of 07:00 – 17:00. No construction activities may be undertaken on Sunday. Provide all equipment with standard silencers as far as possible. Maintain silencer units in vehicles and equipment in good working order.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Construction staff working in the area where the 8-hour ambient noise levels exceed 60 dBA must have the appropriate Personal Protective Equipment (PPE). All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No. 85 of 1993).			
		Inform residents of nearby residential areas of planned noisy activities outside the timeframes stated above.	Contractor and/ or Engineer.	HSE.	As necessary.
Health, safety and security	Loss of material and site equipment.	Ensure that only suitably qualified personnel use construction vehicles.	Contractor.	HSE.	Daily

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
	A construction site can be a dangerous place and thus could result in harm to workers and surrounding community.	Ensure that the contact details of the police or security company and ambulance services are available on site. Only allow access to the site to only authorised personnel. The construction site to be fenced off to prohibit unauthorized entry. Health and Safety Officer to be appointed to continuously monitor the safety conditions during construction.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		If any valuable materials are to be left over night on site, a security guard must be hired to guard the materials. All construction staff must wear all the appropriate PPE i.e. gloves, helmets, dust masks, gloves etc. Signs must be erected to warn people of construction activities. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act (Act No. 85 of 1993) and the National Building Regulations.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		An environmental awareness training programme for all workers shall be put in place by the Contractor before commencing with any work, all workers shall be appropriately briefed about the EMPr and relevant Occupational health and safety issues. No unauthorized firearms will be permitted on site. Workers must not be allowed to work under the influence of drugs. Adequate emergency tools (first aid kit) must be provided or the treatment of any emergency on the site.			Prior commencement of work

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		An environmental awareness training programme for all workers shall be put in place by the Contractor before commencing with any work, all workers shall be appropriately briefed about the EMPr and relevant Occupational health and safety issues.			
Traffic congestion	Increase in construction and material delivery vehicles moving to and from the site resulting in an increase of traffic on nearby roads especially the R25.	The contractor must provide a Traffic Marshal for situations where construction traffic may impede normal traffic flows on R25 adjacent to the site. Construction vehicles are not to be parked on the roads thereby blocking the way. Clear signs should be displayed and entrance to the site indicating a construction site and turning construction vehicles.	Contractor	HSE.	Daily

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Construction vehicles must preferably move in and out of site during off traffic peak hours (10am to 3pm).			
Energy use	Reckless use of energy can contribute to increased greenhouse emission through the use of coal electricity.	Install high-efficiency equipment that provide energy and operational savings. Check the efficiency of electrical equipment and machinery regularly. Regularly check compressed air system for leaks. Switch off lights and equipment when they are not required. Install energy-efficient lighting, fridges and other equipment.	Developer, Contractor and/ or Engineer.	ECO and/ or project manager.	As necessary

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		If possible, use other energy alternatives such as solar power.			
Fauna	Possible harm to fauna found on site.	The stream area should be fenced off during the construction phase to prevent any human activity from encroaching onto these areas. The strands of the fence should be smooth and allow movement of wildlife. Ensure that all new structures are marked with bird flips along the entire site to avoid bird mortalities. Fencing around the property should allow movement of herpetofauna at certain points.	Developer, Contractor and/ or Engineer.	HSE and/ or ECO	Once-off
		No animal may be hunted, trapped, snared or captured for any purpose whatsoever.	Developer, Contractor and/ or Engineer.	HSE and/ or ECO	Once-off

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Speed of vehicles should be limited to allow for sufficient safety margins. Monitoring of the fences is of importance to ensure no animals are trapped. Proper toilet facilities must be located outside the sensitive ecological areas; the impact of human waste on the system is immense. Chemical toilets must be provided which should always be well serviced and spaced as per occupational health and safety laws, construction regulations and placed outside the buffer.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Flora	Removal and loss of conservation important species.	Areas designated for vegetation clearing should be identified and visibly marked off. The laying out of the buffer line must not result in a significant loss of any large indigenous trees. Obtain the necessary permits and licenses from DAFF for the relocation or destruction of any protected trees, plants before site clearance. Maintain a buffer zone of 32 meter between the development and streams/ drainage lines as they consist of sensitive ecosystem. No large tree shall be cut down unnecessarily.	Developer, Contractor and/ or Engineer.	ECO	Once-off

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Sparsely vegetated areas should be cleared first, with densely vegetated areas being cleared last. All vegetation not required to be removed will be protected against damage.			

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Heritage resources	Construction activities could result in irreversible damage to heritage resources and depletion of the archaeological record of the area.	Known sites should be clearly marked in order that they can be avoided during construction activities. The contractors and workers should be notified that archaeological sites might be exposed during the construction activities. Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section	Project manager, contractor and/ or engineer.	ECO	Once-off

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible. All discoveries shall be reported immediately to a heritage practitioner (Provincial Heritage Resources Authority Gauteng (PHRAG) and/ or South African Heritage Resources Agency (SAHRA)) so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken.	Contractor.	ECO	As necessary.

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
		Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site.	All employees, Contactor, Engineer, Developer and /or Project manager.	ECO and/ or Project manager	Throughout the construction phase.

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Visual impacts	Alteration of aesthetic properties of the site due to construction activities and construction of permanent structure.	Vehicles must be parked in one specific area whilst materials placed on site must be placed in neat piles in specified sections of the site prior to use. The site must be managed properly and all rubbish and rubble removed to a registered waste disposal facility. Excess soil and bedrock should be disposed of at an appropriate facility. Refuse bins must be provided on site and these must be emptied regularly. Vehicles and machinery must be parked in a specific area away from the main road.	Contractor and/ project manager	ECO	Daily and/ or as necessary.

Table 8: Operational phase environmental specification.

ENVIRONMENTAL IMPACTS / ASPECT	IMPACT/ ASPECT DESCRIPTION	MANAGEMENT / MITIGATION MEASURES	RESPONSIBILITY	MONITORING	FREQUENCY OF MONITORING
Usage of appliances and electricity.	Fire may be caused by faults in appliances and negligence and well as open fire.	Fire extinguishers must be easily accessible on site. Employees must be trained on fire safety procedures. Local emergency fire brigade number should be placed at a visible area and should be known to all workers. Use the prescribed fire safety precautions in terms of the Occupational Health and Safety Act.	Developer	Operations manager	Once-off

		The residential complex development management must develop an Emergency Plan. All staff must be adequately trained in the implementation of this plan.			
General	Maintenance plan.	A maintenance plan for the project manager must be developed to ensure that good working order around the residential complex is achieved.	Developer	Developer and/ or operations manager	Once off
		Ensure good housing keeping practices.			Throughout operational phase.
Air Pollution	Dust Nuisance	All forms of dust/air pollution must be managed to ensure there are no excess emissions. This includes the control of noxious	Developer	Operations manager	Continuous

		and offensive gases, smoke, dust and vehicular emissions.			
Light and Visual Pollution	Visual intrusion	Security lights are to be angled downwards to avoid disturbance to adjoining landowners. Illumination of the buildings must take into account the possible distraction glare. Avoid stark white fluorescent lighting. Avoid high wattage flood lights. Night time light sources must be directed away from, conservation areas, naturally vegetated areas, as this may be the cause of ecological disturbance.	Developer	Operations manager	Continuous

Storm water Management.	Reduction potential of water logging on land.	Storm water, wherever possible, must be allowed to soak into the land in the area on which the water has been discharged. The storm water system, especially the discharge points, must be inspected and damaged areas must be repaired if required. Excessive quantities of silt laden runoff water must not be allowed to access the storm water system. In the event that silt runoff occurs in the development site, the cause of this must be investigated and suitable mitigation measures employed. This may include the vegetation of bare areas,	Developer	Operations manager	Continuous

		installing flow diversion channels in consultation with an engineer, installing velocity reducing structures. Discharge points must be inspected for blockages of any kind; these must be removed timeously to ensure the efficient operation of the storm water management system.			
Fire Prevention and control.	Reduction of fire breakouts.	The project manager shall take all reasonable and precautionary steps to ensure that uncontrolled fires are not started as a consequence of his activities on site.	Developer	Operations manager	Daily

		The project manager shall ensure that there is basic fire- fighting equipment available on site as per requirement of the local emergency services.	Developer	Operations manager	Continuous
		The project manager shall ensure that all site personnel are aware of the fire risks and how to deal with any fires that occur. This shall include, but not be limited to: • Regular fire prevention talks • Posting of regular reminders to staff.	Developer	Operations manager	Continuous

Emergency Procedures.	Fire outbreaks and accidents.	The project manager shall submit Method Statements covering the procedures and response plan for the main activities, which could generate emergency situations through accidents or neglect of responsibilities. These situations include, but are not limited to: • Accidental fires. • Vehicle and plant accidents.	Developer	Operations manager	As necessary
		The project manager shall assemble and clearly list the relevant emergency telephone contact numbers for staff and brief staff on the required procedures.	Developer	Operations manager	Once-off

		Ensure that there is signage to show assembly points on site in case of emergency.			
Traffic control	Possible accidents and traffic jams from the influx of vehicles and residents in the residential complex.	Relevant traffic signage must be erected on and off the site to control traffic speeds and movements (as required) All vehicles travelling on site will adhere to the specified speed limits. The movement of all vehicles will be controlled such that they remain on designated routes.	Developer	Operations manager	Once-off

		Should there be any abnormal traffic loads as a consequence of the operation phase activities, the local municipality and relevant traffic authorities should be notified. The detail design of the proposed residential complex should adhere to the prescribed specifications (and subsequent approval) of the applicable road authorities. Issues pertaining to damages and poor condition of the roads in close proximity of the site should be reported to the applicable			

		authority and custodian of the respective roads. Appropriate signage and traffic measures should be implemented at the site to ensure safe and convenient access for passing traffic volumes.			
Waste management.	Production of waste by the residents onsite.	Waste is to be collected and disposed of in accordance with municipal waste management system. Sufficient number of bins to be placed around the site. Separate dry and wet waste on site by demarcating separate bins for that as far as possible.	Operations manager.	Operations manager	Daily or as necessary

		Waste bins to be emptied at least once a week or whenever they are full and the waste to be transported to a local registered landfill.			Weekly or as necessary

Water consumption.	Reckless usage of water resulting in shortage of water.	Check for water leaks regularly. Ensure to install water saving water taps and systems in the residential complex. Drip Irrigation and Micro-Sprinklers shall be used by the project for irrigating the landscaped that shall be developed on site. The project must use only low flow and low flush – water saving plumbing fixtures, automatic level controllers at water tanks to reduce/optimize the demand side of water resource.	Residents and/ or manager	Operations manager.	As necessary

		Repairs for the damaged pipes should be carried out as soon as possible.			

Noise	Increased level of noise may cause a nuisance to the surrounding occupants resulting from the influx of residents and vehicles on site.	A noise control policy must be compiled and enforced to control the level of noise at the facility, paying particular reference to the immediate neighbours. Signs to prohibit hooting and playing of loud music should be put up.	Developer	Operations manager	Once-off

Alien plant species proliferation.		A monitoring and eradication program for all invasive and weedy plant species should be developed and implemented on site. Alien species found on site should be removed regularly. Indigenous plant species naturally growing along on the site should be used for re-vegetation. Any species of significant discovered onsite should be buffered and declared no- go areas.	Developer	Operations manager	Monthly or as necessary

Table 9: Decommissioning plan

No decommissioning is envisaged but if these measures will be taken into consideration if it happens by chance.

Impacts	Objective	Mitigation Measures	Responsibility	Phase
Waste Management	Waste collection, transportation and disposal	All solid waste generated from the demolishing must be handled according to the precautionary principle. This implies that waste (including soils, metals and other material) should be treated as hazardous unless proven otherwise	Project Manager	Decommissioning
Site Clean up	Cleaning of contaminated soils and debris	Clean-up or remediation of any contamination must be done in consultation with authority	Project manager	Decommissioning

9. CONCLUSION

It is of importance to note that issues discussed in this EMPr establish a basis for the Environmental Management and Monitoring of the residential complex development project. In order to achieve sustainable developments, mitigation measures must be discussed during the planning stage of the project and thus implemented throughout to the decommissioning stage of the project (if any). However, there may be instances where some elements of the plan may need to be excluded and some to be added in line with the National Environmental Management (Act 107 of 1998) of April 2017. The issues covered in this EMPr suffice to result in an environmentally sustainable development. Furthermore, the EMPr has provided a platform on which the planning, construction and the operational phases of the project can be founded by identifying the impacts, mitigation measures, performance indicators, responsibilities, available resources, potential schedule and verification responsibility.

Parties responsible for transgression of this EMPr should be held responsible for any rehabilitation that may need to be undertaken. Parties responsible for environmental degradation through irresponsible behaviour/negligence should receive penalties.