GA Environment

DRAFT ENVIRONEMNTAL MANAGEMENT PROGRAMME (EMPR) FOR THE THE BASIC ASSESSMENT FOR THE PROPOSED DECOMMISSIONING (CLOSURE) OF THE SHAKAVILLE LANDFILL, KWADUKUZA LOCAL MUNICIPALITY, KWAZULU NATAL PROVINCE

EDTEA REFERENCE NUMBER: DC29/0025/2017

KWADUKUZA MUNICIPALITY

ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR THE

DECOMMISSIONING (CLOSURE) OF THE SHAKAVILLE LANDFILL

Prepared for:

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ABBREVIATIONS

DWS.....Department of Water and Sanitation
EA ..... Environmental Authorisation
EAP ..... Environmental Assessment Practitioner
ECO..... Environmental Control Officer
EIA ..... Environmental Impact Assessment
EMPr.....Environmental Management Programme
EO..... Environmental Officer
ESO ..... Environmental Site Officer
I&AP .....Interested and Affected Parties
NEMA..... ... National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA .....National Water Act, 1998 (Act No. 36 of 1998)
OHS Act .....Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
OHS ..... Occupational Health and Safety
SHEQ ..... Safety, Health, Environment & Quality
IEM.....Integrated Environmental Management

DEFINITIONS

Aspect - Element of an organisation's activities, products or services that can interact with the environment.

Auditing - A systematic, documented, periodic and objective evaluation of how well the Environmental Management Programme (EMPr) is being implemented and is performing with the aim of helping to safeguard the environment by facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems, while keeping track of their compliance with the Environmental Authorization.

Contamination - Polluting or making something impure. The presence of a minor and unwanted constituent, contaminant or impurity in a material or natural environment.

Corrective (or remedial) action - Response required in addressing an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.

Degradation - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Developer– Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the EA (Environmental Authorisation) and EMPr.

Environment - The surroundings within which humans exist and that are made up of land, water and atmosphere of the earth, micro-organisms, plant and animal life: or any part or combination of the two and the interrelationships among them, the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact Assessment (EIA) - An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.

Environmental Management System (EMS) - Environmental Management Systems (EMS) provide guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Organisation for Standardisation.

Environmental Policy – A statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

Habitat - A habitat is an ecological or environmental area that is inhabited by a particular species of animal, plant, or other type of organism. It is the natural environment in which an organism lives, or the physical environment that surrounds a species population.

Impact - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time, space, magnitude and intensity.

Indigenous species - Flora and Fauna species that are naturally found in an area.

Infrastructure - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage, etc.

Integrated Environmental Management- This is a philosophy used in the assessment of and management of the environment, during all actions, plans, activities, etc. that could affect the environment. Its aim is to ensure sustainability.

Mitigation - Measures designed to avoid, educe or remedy adverse impacts. Actions that limit, stop or reverse the magnitude and/or rate of long-term effect on the environment.

Natural environment - Encompasses all living and non-living things occurring naturally on Earth or some region thereof. It is an environment that encompasses the interaction of all living species. Climate, weather, and natural resources that affect human survival and economic activity.

Policy - A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people or an organisation's values and goals.

Process - Development usually happens through a process - a number of planned steps or stages.

Recycling - A process where waste is reclaimed for further use, which process involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material. Collecting, cleaning and re-using materials.

Rehabilitation**', as defined by the United States National Research Council (1974)**, implies that the disturbed land will be returned to state and productivity level in accordance with an approved land use plan, ensuring that the system a stable ecological state; that it does not contribute to further environmental deterioration and is consistent with the surrounding aesthetic values (Wali, 1992).

Resources - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Stormwater Management – Strategies implemented to control the surface flow of stormwater such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments are mitigated. This is specifically important during the construction and Operation phases of a project.

Waste Management – Classifying, recycling, treatment and disposal of waste generated during construction and operational activities. Generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes.

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

GA Environment (Pty) Ltd are independent Environmental Assessment Practitioners appointed by the Department of Environmental Affairs (DEA) on behalf of the KwaDukuza Local Municipality to compile an Environmental Management Programme (EMPr) for the Basic Assessment for the proposed decommissioning of the disused Shakaville landfill.

1.2 Site Location and Status Quo

The Shakaville landfill occupies an area of approximately 80 000m² (8 Ha) and is located on Erf 3595 Stanger within the KwaDukuza Local Municipality. The 21-digit Surveyor General Code for the property is N0FU03200000359500000. Direct access to the site is available from Mbozambo Street which is located to the north west of the site. The site centre co-ordinates are 29°19'48.62"S; 31° 18' 171.19"E. The boundaries of the site are within the riparian area of a tributary of the Mbozamo River. Refer to **Figure 1** for the Locality map of the site.

Current land use on some sections of the landfill, particularly close to the gate and on the western sections of the landfill, includes pockets of informal housing infrastructure. Refer to **Figure 2** for examples of the informal housing. The occupants are regarded as historical reclaimers of waste that have since occupied this land when the disposal of waste ceased on the site. Other infrastructure on site includes a water tap, monitoring boreholes, manholes and illegal electrical connections.

Figure 1: Examples of informal dwellings within the boundaries of the Shakaville Landfill

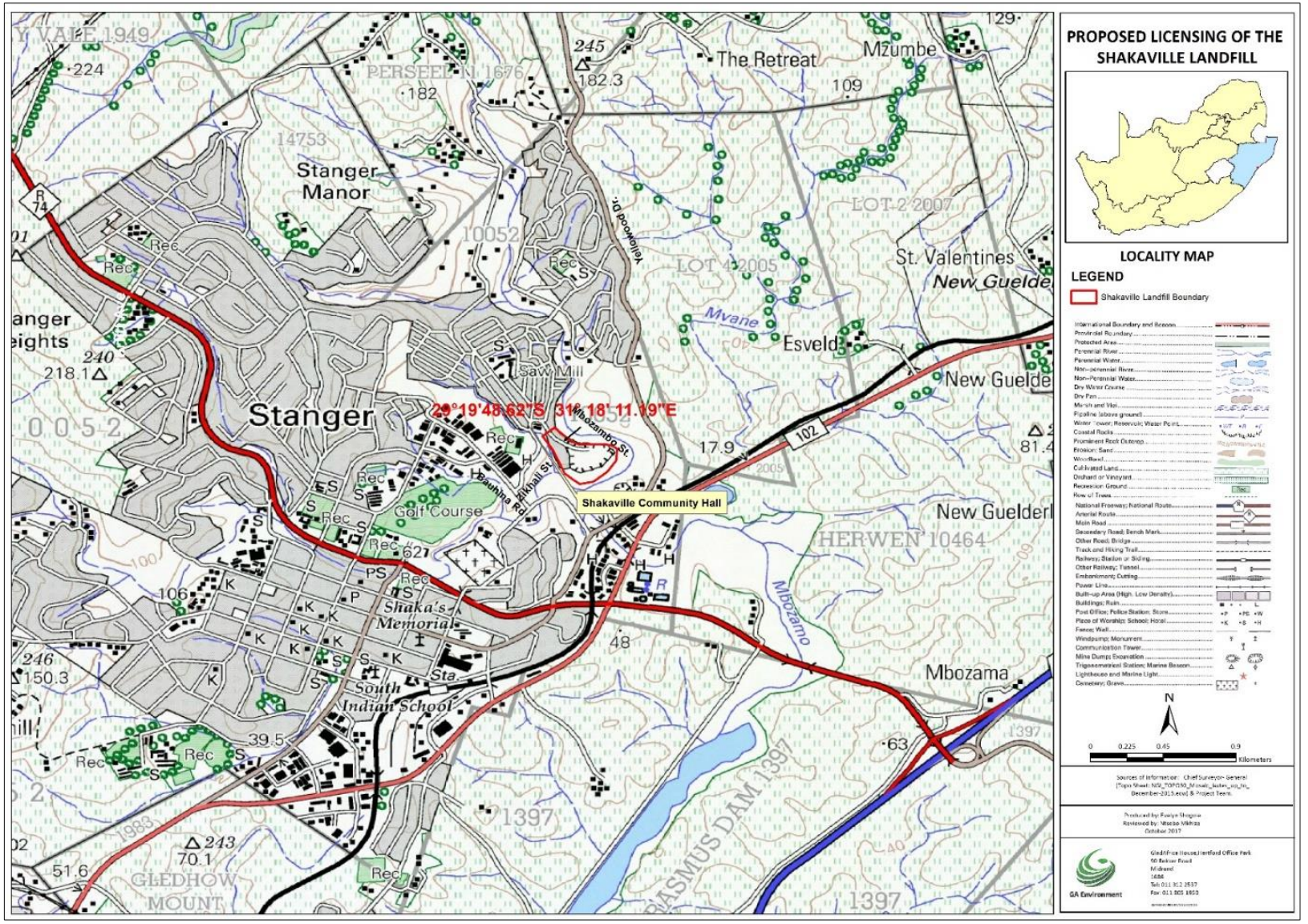

Figure 2: Locality Map of the Shakaville Landfill

Although the Shakaville landfill was noted to have naturally rehabilitated (Refer to **Figures 3** and **4** for the 2006 and 2017 Aerial Images), vegetation comprising both indigenous species as well as invasive was noted on site as shown in **Figure 5,** it remains crucial that the landfill is rehabilitated to meet legislative requirements and in turn ensure environmental protection.

Figure 3: Shakaville landfill aerial Image dated 06/02/2006 (Google Earth)

Figure 4: Shakaville landfill aerial image dated 06/04/2017 (Google Earth

Figure 5: Indigenous vegetation (A) and invasive (B) noted on site

1.3 Purpose of the EMPr

The purpose of this EMPr is to provide management measures that must be implemented by Developers (in this case the KwaDukuza Local Municipality), Engineers and Contractors alike to ensure that the potential impacts of the proposed activities are identified and measures put in place to ensure that they are minimised if negative and enhanced if positive.

IEM is a key instrument of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended [NEMA, 2013]. NEMA promotes the use of IEM for activities that may have a significant effect on the environment. IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all the stages of the development process. NEMA advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an EMPr. This EMPr has been compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992).

1.4 Objectives of the EMPr

- To ensure compliance with applicable legislation and/or guidelines;
- To ensure that the roles and responsibilities of the various parties involved in the implementation of the EMPr are clearly outlined;
- To reduce adverse environmental impacts as a result of the project activities; and
- To ensure continuous improvement in terms of the environmental performance of the project.

1.5 Review and Monitoring of the EMPr

In order to ensure that the EMPr is being correctly implemented and remains relevant to site activities, the following must be undertaken:

1.5.1 Environmental Auditing

Both Internal and External Auditing of the EMPr will need to be undertaken at periods and as procedures outlined below:

- *Internal Audits* - these will be undertaken at periods and according to procedures prescribed by the Developer/Project Manager (if applicable). Records associated with this auditing must be kept. The Contractor shall undertake their own Internal Audits and will communicate their procedure to the ECO.

- *External Audits* – if required by the Competent Authorities, these will be undertaken by a suitably qualified and experienced Environmental Control Officer (ECO). Similar to the Internal Audits, these will entail the checking of Environmental Compliance based on the EMPr and other requirements. In order to undertake the external audits, the ECO will adopt the following methods and approaches:
    - Review of background information to acquaint the ECO with various aspects of the project;

- Document review;
- Observations during site walkabout. Photographs will be undertaken during the walkabout;
- Interviews and Questioning (open-ended questions will be asked); and
- Completion of checklists to report and discuss the findings of each of the areas within the construction site.

Audit reports will be compiled and submitted to the relevant parties within the project. These will include the KwaDukuza Local Municipality as the Project Developer, the Project Manager and the Contractor.

1.5.2 Corrective Actions

The Contractor must compile an Environmental Action Plan to ensure that the non-compliances are addressed and ensure that the issues are addressed within a certain target date set by the ECO. The Contractor must ensure that corrective actions arising as a result of non-compliances are undertaken and recorded accordingly. These records must be kept for review by the ECO and/or any other party with authority to undertake this exercise.

1.5.3 EMPr Review

The EMPr must be reviewed by and with the Project Team, should the need arise. The discussion of this item must preferably be led by the ECO. The frequency of the review of the EMPr must be decided between the ECO and the KwaDukuza Local Municipality. All records of this review must be kept by the ECO on behalf of the Project Manager and the KwaDukuza Local Municipality.

1.5.4 Plan for informing site/project team of changes

Any amendments to the EMPr will be communicated to the Project Team by the ECO. Proof of the communication must be kept.

1.6 Amendment of the EMPr (where required)

The NEMA EIA Regulations, December 2014, as amended regulate the procedures and criteria for the submission and consideration of the EMPr including its content. It must be noted that the EMPr is a living document that can be amended should the need for this arise. The amendment must however be undertaken according to the EIA Regulations that will be relevant at the time of the required amendment. It must be noted that the NEMA EIA Regulations 2014 (Sections 34-37) (which were applicable during the compilation of this EMPr) introduce a defined process with regard the amendment of the EMPr. The first amendment applies to the amendment of the EMPr as a result of audit findings whereas the second amendment pertains to an amendment of a specific impact management action of an EMPr. The third amendment gives opportunity to the holder of the EA to amend the EMPr, and also requires the involvement of the Competent Authority (CA) and the undertaking of Public Participation (PP). It is important that the Developer and the Contractor follow these defined processes during the implementation phase as deviating from this process is regarded as a non- conformance.

In terms of the NEMA EIA Regulations 34, Government Notice No 982, of Government Gazette No 40772, Developers must ensure compliance with the conditions of the EMPr by undertaking an Environmental Audit in a structured and systematic manner. This audit will provide for recommendations regarding the need to amend the EMPr, and where applicable the Closure Plan. It is a requirement of the Environmental Compliance Audit process that risks to the environment are identified and these possible risks should be taken into account during the planning and construction phase of the development. These risks are presented in this Environmental Management Programme (EMPr). The implementation of this EMPr, through the appointed Contractor, remains the responsibility of the Developer, i.e. the KwaDukuza Local Municipality.

1.7 Proposed activities

The decommissioning of the Shakaville Landfill project will consist of the following key activities

1. Shaping and landscaping of the waste body;
2. The construction of stormwater and leachate management infrastructure;
3. Capping of the waste body in accordance with the DWAF Minimum Requirements for Waste Disposal by landfill;
4. Vegetative cover of the final landform;
6. Post closure environmental monitoring where necessary.

Further delays in implementing the closure and rehabilitation of the Shakaville landfill will mean that the impacts arising from the current status of the landfill will continue thereby causing adverse environmental problems. This initiative of the licensing of the landfill will also aid in achieving the Minister's service delivery agreement Outcome 10 (Output 1 to 4) deliverable target/indicator that serves to ensure that environmental assets and natural resources are well protected and are continually enhanced.

1.8 Details of Environmental Assessment Practitioner

This Environmental Management Programme was compiled by:

Company Name:	GA Environment (Pty) Ltd
Contact person:	Ntsebo Mkhize
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Telephone Number:	(011) 312 2537
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Ntsebo Mkhize holds a B.Sc. (Hons) Environmental Management (cum laude) degree. She has 5 years of working experience in the Environmental Management Field and a year in the field of Landscape Architecture. Ntsebo specialises in, among various environmental management tools, Integrated Environmental Management (IEM), Environmental Impact Assessments (EIAs), Basic Assessments (BAs). She also specialises in Spatial Analyses and Mapping with the use of ArcGIS. She has been involved in projects related to Waste Management, Linear Infrastructure, Mixed-Use developments as well as Conservation Planning and Biodiversity Management. She is currently an EAP at GA

Environment (Pty) Ltd. Specific to licensing of landfills, she has worked on projects in the Northern Cape, North West and KwaZulu Natal.

1.9 Details of the Proponent

The Project Proponent details are indicated below:

Company Name:	KwaDukuza Local Municipality
Contact person:	Wilson Mhlongo
Designation:	Manager: Waste Management
Postal Address:	14 Albert Luthuli Street, KwaDukuza, 4449
Telephone Number:	032 437 5215
e-mail-	WilsonM@kwadukuza.gov.za

1.10 Emergency Contacts and Response

Should the need arise, site activities may need to be stopped or directed. For this reason, contact persons and their 24 hour details for emergencies must be provided by the Developer and/or the Project Manager. These details, which must be updated should the need arise, must be kept by all parties undertaking work on the site. To date, the parties who can be contacted for emergencies are as follows:

1.11 Scope of the Environmental Management Programme (EMPr)

1.11.1 *Pre-Construction*

Activities that will form part of this phase are those that must be undertaken prior to the commencement of the construction and operational phases of the project.

1.12 Reporting on EMPr Compliance

In order to ensure sufficient levels of compliance with the EMPr, regular Environmental Monitoring has to be undertaken and the results of the monitoring be reported on regular basis. In order to control the reporting on the EMPr Compliance, it is imperative that the following be borne in mind:

- Typical Report Description;
- Document control procedures;
- System for documenting environmental training; and
- Frequency of reports.

Each of these are briefly discussed:

1.12.1 Typical Report Description

A typical report used to indicate the level of environmental compliance on the project must include the following information as a minimum:

- Background Information;
- Terms of Reference;

- Scope of audit and the audit period;
- Objectives of the Environmental Audit;
- Methods Used for Undertaking Compliance Audits;
- Roles and Responsibilities of different parties involved in ensuring the compliance of the EMPr;
- Summary of Main findings;
- Checklist used for checking compliance;
- Photographs of observations of audit; and
- Any other documents deemed important to support the audit findings.

1.12.2 Document control procedures

To ensure the Environmental Auditing Reports are of good quality, these must undergo an internal review prior to submission to relevant parties. An indication of the Document history indicating as a minimum the revision number and date as well as the names and signatures of the compiler, reviewer and approver must be provided.

1.12.3 System for documenting environmental training

The Developer, Project Manager, Contractors and subcontractors must develop a system for documenting environmental monitoring, training and reporting. This system must as a minimum include the following:

- Plans on relevant parties to train and the frequency of training to ensure that all parties; working on the site/providing services are aware of the necessity to adhere to the EMPr;
- An indication of items to be discussed in typical training sessions; and
- Typical documents/material to be used for training and proof of the undertaking of training.

1.12.4 Frequency of reports

The reports compiled to record the findings of the audit must be provided at frequencies and in formats agreed upon between the Environmental Control Office and the Client and/or Project Manager or any other party with whom this is agreed.

1.13 Relevant Legislation

This EMPr has been compiled as per the requirements of Appendix 4 of the NEMA EIA Regulations 2014, as amended and in terms of Section 24N of the National Environmental Management Act (Act No. 107 of 1998).

It is understood that any development during its various phases is a dynamic activity within a dynamic environment. The Developer, Engineer, Contractor and sub-contractors must therefore be aware that certain activities may require further licensing or environmental approval, e.g. a Water Use Licence Application. The Contractor must consult the Engineer's Representative, SHEQ Officer and ECO on a regular basis in this regard. The common list of legislative references contained herein is by no means exhaustive, but is applicable to the general principles of this document.

- National Environmental Management Act, 1998 (Act No. 107 of 1998)

- National Environmental Management Waste Act, 1998 (Act No. 59 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- Environment Conservation Act, 1989 (Act No. 73 of 1989);
- Fencing Act, 1963 (Act No. 31 of 1963)
- National Act on Forests Act, 1998 (Act No. 84 of 1998)
- National Building Regulations and Standards Act, 1977 (Act No. 103 of 1977) (SABS 0400)
- National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- National Road Traffic Act, 1996 (Act No. 93 of 1996)

In addition to the above, the KwaDukuza Local Municipality's by Laws relevant to the development (waste, noise, etc.) must also be adhered to.

1.13.1 General Guidelines

The following measures provide guideline solutions to frequently anticipated issues on most development activities.

- The prevention of any site degradation due to non-compliance, administrative or financial problems, and inactivity during the construction phase, illegal activities, delays caused by archaeological finds etc. are ultimately the responsibility of the applicant / developer as per Section 28 of NEMA, 1998 (as amended) which discusses 'Duty of Care and remediation of environmental change'.
- The study area must be clearly defined and surveyed according to the proposed activities. All workforce members and other construction personnel are not to go beyond the defined footprint.
- The Contractors must adhere to agreed and approved access points.
- Damage to private or public property such as fences, gates and other infrastructure may occur at any time. All damages are to be repaired as soon as practically possible.
- Adjacent landowners and businesses must be informed of the starting date of decommissioning activities, as well as the phases in which the construction shall take place.
- The Contractor must adhere to all conditions of contract including this EMPr.
- Proper planning of the construction activities process must be undertaken to allow for disruptions due to rain and wet conditions.
- All private and public manmade structures near the project site must be protected against damage at all times and any damage must be rectified immediately.
- Proper site management and regular monitoring of site works should take place.
- Proper documentation and record keeping of all complaints and actions taken must be kept at the site office.
- Regular site inspections and good control over the site activities should be undertaken.
- A positive attitude towards Environmental Management by all site personnel must be motivated through regular and effective awareness and training sessions.
- An ESO, on behalf of the Contractor, should be appointed to implement this EMPr. The EO and not the Contractor or his / her ESO is to deal with any landowner related matters.
- Environmental Audits should be carried out during and upon completion of Operation on a bi-weekly basis.

- Social issues in terms of safety for human life, on employees should be encouraged. All construction areas and activities should be cordoned off and no casual access be gained, where deep trenches or open electrical infrastructure are to be exposed.

1.14 Tasks and Responsibilities

In order to ensure the sound development and effective implementation of the EMPr, it is necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the project. The following key roles will need to be provided for during the implementation of the EMPr:

- Authorities;
- Developer/ Proponent;
- Consulting Engineers (CE);
- Engineer's Representative (ER);
- Environmental Officers (EO);
- Environmental Site Officer (ESO);
- Environmental Control Officer (ECO);
- Project Manager (PM);
- Contractors (C); and
- Environmental Assessment Practitioner (EAP).

These roles and line of communication has been incorporated below:

1.14.1 Role players and Responsibility matrix

In order for the EMPr to be successfully implemented, all the role players involved in the project need to co-operate. An example of declaration of understanding between various parties working on site regarding the requirements of the EMPr must be produced (Refer to **Appendix 2**). For this, role players must clearly understand their roles and responsibilities, they must be professional and they must form respectful and transparent relationships, and maintain open lines of communication.

[Construction activities for closure and decommissioning]- Role players or project teams will include the Authorities, Other Authority (OA), Developer / Proponent – (Developer), Consulting Engineers (CE), Engineer's Representative (ER), Environmental Site Officer (ESO), Environmental Control Officer (ECO), Project Manager (PM), Contractors, Environmental Assessment Practitioner (EAP). Furthermore, the surrounding landowners, I&APs and the relevant environmental and project specialists are also important role players.

[Monitoring]), Internal or external Environmental Control Officer (ECO), Developer / Proponent – (Developer

The functions and responsibilities of these role players are outlined in **Table 1.**

Table 1: Functions and Responsibilities of the Project Team

KEY	FUNCTION	RESPONSIBILITY
D	Developer *KwaDukuza Local Municipality*	Proponent is ultimately accountable for ensuring compliance with the EMPr and conditions. The ECO must be contracted by the developer (full time or part time depending on the size of the project) as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of EA, and the EMPr for the project. The developer is further responsible for providing and giving the mandate to enable the ECO to perform their responsibilities. The developer must ensure that the ECO is integrated as part of the project team.
CE	Consulting Engineer *To be appointed*	CE is Contracted by the developer to design and specify the project engineering aspects. Generally, the engineer runs the works contract. The CE may also fulfil the role of PM on the proponent's behalf (see PM). The RE will also be required to be familiar with the EMPr specifications.
PM	Project Manager *To be appointed*	The Project manager has overall responsibility for managing the project, Contractors, and Consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any construction activity in contravention of the EMPr in accordance with an agreed warning procedure.
ER	Engineers Representative	The consulting engineer's representative on site. They have the power / mandate to issue site instructions and in some instances, variation orders to the Contractor, following request by the SHEQ Officer or ECO. The ER oversees site works, liaison with Contractor
ECO	Environmental Control Officer *To be appointed*	An independent appointment by the Developer to objectively monitor the implementation of relevant environmental legislations, conditions of the Environmental Licences/Permits (where applicable), and this EMPr for the project. The ECO must be onsite prior to any site establishment and must endeavour to form an integral part of the project team. The ECO should be proactive and have access to specialist expertise as and when required, these include botanist's ecologists etc. The ECO must conduct audits on compliance to relevant environmental legislation, conditions of the EMPr for the project. The size and sensitivity of the development, based on the EIA (where applicable), will determine the frequency at which the ECO will be required to conduct audits. The ECO must liaise the relevant authorities and the project team. The ECO must communicate and inform the developer and CE of any

KEY	FUNCTION	RESPONSIBILITY
		changes to environmental conditions as required by relevant authoritative bodies. The ECO must ensure that the registration and updating of all relevant EMPr documentation is carried out. The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in construction related methods and practices. The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant Authority as soon as possible. The ECO must convey the contents of this EMPr to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce. The ECO must indicate suggested corrective action measures to eliminate the cause of the non-conformance incidents. In order to keep a record of any impacts, an Environmental Log Sheet (refer to Example in **Appendix 4**) is to be kept on a continual basis.
C	Contractor *To be appointed*	The Principal Contractor is responsible for the implementation and compliance with the requirements of the EMPr and conditions of the EA's (where applicable), contract and relevant environmental legislation. The Contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMPr. One of the Methods of awareness is training. The contractor is required, where specified, to provide Method Statements setting out how the management actions contained in this EMPr will be implemented.
ESO	*Environmental Site Officer*	The ESO is employed by the Contractor as his / her environmental representative to monitor, review and verify compliance with the EMPr, the Waste Management Licence as well as other authorisations. The ESO must ensure that daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area / habitat in which they are working. The EO and not the Contractor or his / her ESO is to deal with any landowner related matters.

A	*Lead Authority*	The authorities are the relevant environmental department that are responsible for ensuring that the monitoring of this EMPr and other authorisation documentation is carried out; this will be achieved by reviewing audit reports submitted by the ECO and conducting regular site visits should the need for this arise.
OA	*Other Authority / ies*	Other authorities are those that may be involved in the approval process of this EMPr. Their involvement may include reviewing EMPr's to ensure the accuracy of the information relevant to their specific mandate. Other authorities may be involved in the development, review or implementation of this EMPr.
EAP	*Environmental Assessment Practitioner*	The definition of an EAP in section 1 of NEMA is "the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through
EO	*Environmental Officer*	The EO or ESO must ensure daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area / habitat in which they are working. The EO and not the Contractor or his / her ESO is to deal with any landowner related matters.

1.14.2 Environmental Awareness Training

The ECO and the ESO are responsible for ensuring that **all** site employees are given an environmental awareness induction prior to the commencement of site activities. The initial training must be undertaken by the ECO. Environmental awareness mainly aims to:

- Promote general environmental awareness as well as awareness specific to the project;
- Inform personnel about the availability and importance of adherence to the EMPr, Waste Management Licence, Environmental Authorization as well as any other permits or licenses issued for the project;.

The environmental awareness training programme will include:

- Induction of all personnel in a language and method most suitable;
- Signing of an attendance register and declaration of ensuring environmental protection

Topics that must be included in the induction;

- What is the environment and why must it be protected?
- What are the environmental sensitivities of the area in which activities are being undertaken?
- How construction activities can adversely impact of the environment;
- What are the mitigation measures for adverse impacts?

- What is the social responsibility of all site employees during construction?
- How should environmental incidents be recorded?

All new employees must be inducted by the ESO prior to commencing with work on site. Proof of the induction must be kept.

Refresher environmental awareness training must be conducted by the ESO as and when the need arises. An example of this is when there is repeated non-compliances. The ESO must ensure daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area / habitat in which they are working, etc. Awareness posters and pamphlets must be provided to create environmental awareness throughout the site.

1.14.3 Contractor Environmental Method Statements

Method Statements are written submissions to the Engineer by the Contractor, in collaboration with his / her ECO, in response to a request by the EO and or Engineer. The Method Statements set out the plant, materials, labour and method that the Contractor proposes using to carry out an activity, identified by the EO and / or Engineer. The Method Statements contain the appropriate detail such that the EO and Engineer are able to assess whether the Contractor's proposal is in accordance with the requirements of the EMPr. The Contractor must sign each Method Statement along with the EO and Engineer to formalise the approved Method Statement. An example of a template that can be used to record all applicable Method Statements by the Contractor is attached as **Appendix 3.**

All Method Statements, including those which may be required as ad-hoc or emergency construction method statements, must be submitted to the Engineer for approval prior to the commencement of any activity. Any changes to the method of works must be reflected by amendments to the original approved Method Statement. Any changes in this regard must be approved by the EO and Engineer on the understanding that such changes are environmentally acceptable and in line with the requirements of this EMPr.

The following minimum Method Statements for the proposed activities must be compiled and submitted to the EO, ECO and Engineer for approval before construction commences:

- Construction of crew camps and lay-down areas;
- Management of Fire;
- Handling and storage of oils and chemicals;
- Management of accidental spills;
- Management of contaminated materials
- Solid waste management;
- Management and storage of reusable materials;
- Dust Control;
- Stormwater and Sediment Management;
- Groundwater Management;
- Construction of Workshop and vehicle maintenance areas;

- Removal of alien vegetation;
- Storage and Management of Waste;
- Site refuelling of construction vehicles and plant on site.

1.15 Site Documentation

The following is a list of some examples of documentation that should be held on site and made available to the ECO and/or any other relevant parties on request:

- This EMPr;
- Site daily diary / instruction book / incident reports;
- Copies of Environmental Audit Reports;
- A Complaints register;
- Proof of Environmental training undertaken by the Contractor and the ECO;
- Schedules for environmental audits;
- Environmental Auditing Checklists;
- Non-compliance and corrective action reports; and
- Method statements signed by the contractor.

A Method Statement Template is attached in **Appendix 3**.

1.15.1 Pro forma documentation

Prior to the commencement of activities, some key documents that are binding to the EMPr and project contract must be completed. One of these is the 'Declaration of understanding by the Developer/ Engineer/ Contractor' attached as **Appendix 2**.

The signing of this document is crucial as it binds the contractor to the contents of the EMPr

2. ENVIRONMENTAL MANAGEMENT PROGRAMME IMPLEMENTATION

The point of departure for this EMPr is to ensure a pro-active rather than re-active approach to environmental performance by addressing potential problems before they occur. This will limit corrective measures needed during the rehabilitation activities. The purpose of this EMPr is therefore to provide management measures that must be implemented by the Developer, Engineers and Contractors alike to ensure that the potential impacts of the proposed activities and their associated impacts are minimised. It must also be ensured that the EMPr is maintained and upheld as a dynamic document i.e. a living document, in order for the project team to add or improve on issues that might be considered left out or not relevant to the project. The EMPr should be used for all phases of the project.

The tables outlined in this report form the core mitigation measures appropriate to the pre-construction and the monitoring phase. The tables present the objectives to be achieved and the management actions that need to be implemented in order to mitigate the negative impacts and

enhance the benefits of the project. Associated responsibilities, criteria / targets and timeframes are clearly specified.

2.1 Pre-construction phase/ Pre- rehabilitation

The 'pre-construction/ pre-rehabilitation' section of this EMPr, refers to the period of time leading up to and prior to the commencement of the decommissioning activities, and is included to ensure pro-active environmental management measures with the goal of identifying avoidable environmental damage at the onset and sustain optimal environmental performance throughout the construction phase for as part of the decommissioning of the landfill. Most impacts will occur during the rehabilitation activities phase and must be mitigated through the contingency plans identified in the pre-construction phase.

The bulk of environmental impacts will have immediate effect construction phase. If the site is monitored on a continual basis during the undertaking of all activities, it is possible to identify when these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the project team.

2.3 Construction phase as part of the rehabilitation of the landfill

The 'construction' section refers to all construction activities associated with the closure and rehabilitation of the landfill. This construction section is divided into four functional areas, namely: *general planning, materials; facility; and site activities.* Each of these functional areas within the EMPr contains specific mitigation requirements and requested contractor method statements stipulated where required.

2.3.2 Structure and Contents of Tables

The Tables are arranged as follows:

- **GENERAL PLANNING (A)**
  - A1 RELOCATION OF INFORMAL SETTLEMENT DWELLERS
  - A2 JOB OPPORTUNITIES
  - A3 PROJECT CONTRACT AND PROGRAMME
  - A4 APPOINTMENTS AND DUTIES OF PROJECT TEAM
  - A5 METHOD STATEMENTS
  - A6 SITE DEMARCATION AND DEVELOPMENT
  - A7 EMERGENCIES AND NON-COMPLIANCES
  - A8 PERMITS AND PERMISSIONS
  - A9 EXISTING SERVICES AND INFRASTRUCTURE
  - A10 ENVIRONMENTAL AWARENESS TRAINING

- **MATERIALS (B**)
  - B1 STOCKPILES

- B2 HANDLING OF TOXIC MATERIALS
- B3 STORAGE FACILITIES FOR TOXIC MATERIALS
- B4 USE OF DANGEROUS AND TOXIC MATERIALS

- **FACILITY(C)**
  - C1 CONSTRUCTION SITE
  - C2 EATING AREAS AND SMOKING AREAS FOR CONSTRUCTION WORKERS
  - C3 TOILETS
  - C4 WASTE
  - C5 DUST
  - C6 WORKSHOP EQUIPMENT, MAINTENANCE AND STORAGE
  - C7 NOISE

- **SITE ACTIVITIES (D)**
  - D1 FIRES
  - D2 EROSION AND SEDIMENTATION
  - D3 FAUNA
  - D4 FLORA
  - D5 REMOVAL OF ALIEN INVASIVE SPECIES
  - D6 RIPARIAN AREA
  - D7 HERITAGE RESOURCES
  - D8 NO-GO / SENSITIVE AREAS
  - D9 CRIME, SAFETY AND SECURITY
  - D10 VISUAL IMPACT
  - D11 GROUNDWATER AND STORMWATER
  - D12 SURFACE WATER
  - D13 IMPACTS ON AIR QUALITY
  - D14 IMPACTS ON SOCIO ECONOMICS
  - D15 IMPACTS ON TRAFFIC AND LOCAL ROADS
  - D16 HEALTH AND SAFETY IMPACTS

The tables for the construction activities consists of seven parts which are included as key requirements of EMPr as defined in the NEMA EIA Regulations 2014. These sections are described below as follows:

- **Phase of development –** This section will identify either pre-construction (planning) or actual construction activities during the Operation phase.
- **Impact / issue -** This section will identify the issue being addressed, e.g. Materials, site demarcation, heritage, etc.
- **Mitigation measure -** This column will include all the necessary mitigation measures for each impact / issue'.

- **Management objectives -** This column will indicate what the management objectives to be achieved for each mitigation measure.
- **Measurable targets -** This column will indicate what evidence is to be used as an indication to whether or not the 'Management objectives' have been implemented and hence achieved.
- **Frequency of action -** Provides time guidelines for the 'Responsible party' by which he / she is to action or manage the required mitigation.
- **Responsible party –** Provides the details of the responsible team member which should account on the activities highlighted in column 1 to 4.

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
A1 RELOCATION OF INFORMAL SETTLEMENT DWELLERS i. The KwaDukuza Local Municipality must ensure that the residents of the informal settlement who may need to be relocated and provided with new housing to allow for the construction of the landfill are informed of the planned relocation no later than four months before the commencement of construction activities. Records of all communication must be kept; ii. Alternative housing must be provided for residents who do not qualify for new housing but whose informal dwellings are located within the area planned for the rehabilitation of the landfill as per the engineering designs. These parties must be informed of their relocation at least six months	• To avoid possible community unrest	• Minimal complaints from community members	• Once-off for the relocation plan and ongoing for the job opportunities	• Developer

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
before the commencement of construction iii. Where financially viable, the Municipality must assist residents with the removal of their belongings to the new area/s to which relocation is planned; iv. All adjacent landowners, who will not be offered relocation, must be informed of construction activities at least two months before the commencement of construction activities;				
A2 JOB OPPORTUNITIES i. The appointed Contractor should maximise the use of local labour and local contractors where possible by developing a strategy to involve local labour in the tender and construction processes. ii. Unrealistic job expectations should not be created. A communication strategy should be implemented to	• To alleviate poverty • To provide new skills to labourers • To avoid possible community unrest	•	•	•

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
guard against rumours about employment creation opportunities iii. Training construction workers to respect the property and needs of the affected communities; iv. Ensure that adequate lines of communication are created to deal with any public grievances during the planning and construction phases of the project				
A3 PROJECT CONTRACT AND PROGRAMME i. A copy of this EMPr shall be prepared and kept on site during rehabilitation activities ii. Copies of all project permits must be acquired and kept on site iii. The following documents must be prepared must also be kept on site • Site daily diary / instruction book / incident reports;	• Contingencies for minimising negative impacts anticipated to occur during the closure • Ensure environmental awareness and formalise environmental responsibilities and implementation	• Contract records • Signed declaration of understanding of the contents of the EMPr pro forms by contractor	Once-off	• Developer • Contractor • ECO

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
• Copies of Environmental Audit Reports; • A Complaints register; • Proof of Environmental training undertaken by the Contractor • Proof of Environmental training undertaken by the ECO • Schedules for environmental audits; • Environmental Auditing Checklists; • Non-compliance and corrective action reports compiled by the Contractor; and • Method statements signed by the Contractor. i. The Contractor must compile a Traffic Management Plan indicating the routes that construction vehicles must adhere to, the speed limits of the vehicles as well as the locations for the placement of warning signs. These routes must be communicated to all sub-contractors;				

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY
A4 APPOINTMENTS AND DUTIES OF PROJECT TEAM i. Before construction activities commence, all role players mentioned in 1.14.1 of this EMPr must have a clear indication of their roles in the implementation of this EMPr ii. Subcontractor(s) contracts with the principle contractor must contain a clause to the effect that the disposal of all construction-generated waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMPr.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase	• Contract records • Signed declaration pro forms • Appointment of role-players	Once-off	• Contractor • ECO

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
iii. Transparency of the process and ensuring that the relevant stakeholders are in agreement.				
A5 METHOD STATEMENTS i. As required in 1.14.3, certain method statements must be provided by the contractor. All activities which require method statements may only commence once the method statements have been approved by the engineer and or ECO. ii. Where applicable, the contractor shall provide job-specific training on an ad-hoc basis when workers are engaged in activities which require method statements.	Contingencies for minimising negative impacts anticipated to occur during the construction phase	• Approved method statements and relevant pro forma documents • Regular review of the Method statements in line with current activity Training records	As and when required	• Contractor • ECO

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
A6 SITE DEMARCATION AND DEVELOPMENT i. The surveys for the overall project area and construction footprint as approved by the relevant parties must be completed and clearly demarcated and fenced before the contractors set up their crew camps or begin construction. ii. "No-go" areas must be clearly demarcated (e.g. warning tape) prior to the commencement of construction activities. iii. The site activities and sequencing of the construction activities should be regulated by relevant legislation and best practice	• Contingencies for minimising negative impacts anticipated to occur during the construction phase • Adherence to the EMPr and legislative requirements	• Demarcated areas	As and when required	• Contractor • ECO
A7 EMERGENCIES AND NON-COMPLIANCES i. The Contractor must provide method statements on the protocols to be followed, and contingencies to be put in place for potential incidents	Contingencies for minimising negative impacts anticipated to occur	Method statements	As and when required	• Contractor • ECO

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
A8 PERMITS AND PERMISSIONS i. The Contractor shall ensure that copies of relevant permits, certificates and permissions that must be obtained for the project are kept on site.	Adherence to Permits and permissions	• Compliance with legislation and EMPr requirements	Prior to Construction	• Developer • Contractor
A9 EXISTING SERVICES AND INFRASTRUCTURE i. The Contractor shall ensure that existing services e.g. sewer pipes, manholes, etc are not damaged or disrupted. Prior to construction, the Contactor must obtain drawings indicating required by the contract and with the permission of the service provider. ii. The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted. iii. Such repair or reinstatement will be to the Contractor's	• Avoiding impact on surrounding services such as sewer infrastructure and another underground infrastructure on site • All services identified particularly Eskom must be notified prior to construction • All reusable and/or recyclable materials must be removed prior to the commencement of construction	• Infrastructural impacts • Services impacts • Zero contact with hazardous materials • Zero destruction of reusable and/or recoverable materials	Ongoing	• Contractor • Developer • RE • ESO • ECO

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
cost and shall receive top priority over all other activities. iv. A time limit for the repairs may be stipulated by the RE in consultation with the Contractor. v. Where infrastructure outside the boundaries of the construction is damaged dur to construction activities, e.g. movement of construction vehicles, the owner of the infrastructure must be consulted and arrangements for repairs made by the Contractor				
A10 ENVIRONMENTAL AWARENESS TRAINING The ECO must undertake an initial environmental induction during the site establishment for all Contractors and staff/ labourers on site. Such training shall be repeated by the Contractor and extended in the Toolbox Talks. i. It is the Contractor's responsibility to provide ongoing environmental training to ensure that all labourers have sufficient understanding to pass this	• Raise awareness of importance of Environmental protection	• Environmental Management • Reduce and manage potential Environmental impacts	Daily	• Contractor • ECO • ESO

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY**
information onto the construction staff. Translators are to be used where necessary. ii. Use should be made of environmental awareness posters on site. iii. The need for a "clean site" policy also needs to be explained to the workers. iv. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed. v. The Contractor must ensure that all subcontractors are informed of the importance of the adherence to the EMPr. vi. The Contractor shall ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include; • What is meant by "Environment"?				

Phase of development	PRE-CONSTRUCTION			
Impact / issue	GENERAL PLANNING (A)			
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY
• Why should the environment be protected and conserved? • How can construction activities impact on the environment? • What can be done to mitigate against environmental impacts? • Awareness of emergency and spills response provisions • Social responsibility during construction e.g. being considerate to local residents				

Phase of development	CONSTRUCTION			
Impact / issue	Materials (B)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
B1 STOCKPILES i. Stockpiles of any material only be placed within demarcated areas which will not create nuisances to adjacent residents. The stockpiles must not be located within 100m from the edge of the watercourse or riparian area. ii. Stockpiles must as far as possible be covered to prevent wind and water erosion during seasons when wind or rainfall is prevalent iii. Stormwater runoff from any stockpile sites and other related areas must be directed into the stormwater system with the necessary pollution prevention measures such as silt traps. iv. Stockpiles are to be stabilised if signs of erosion are visible. v. Topsoil and soils to be used as a drainage layer for the capping	• Minimise scaring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint • Containment of invasive plant growth should be encouraged • Minimise contamination of stormwater run-off will be encouraged	• No visible erosion scars once construction is completed	Daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Materials (B)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
of the landfill must be stockpiled separately. vi. Topsoil stockpiles must be clearly demarcated as no-go areas. Although it is noted that there is minimal topsoil on site, this must be conserved for use in the future landscaping of the development. vii. Topsoil stockpiles should not be higher than 2.5 meters to avoid compaction, while the slopes of the stockpiles should not be steeper than 1 vertical to 1.5 meters horizontally. viii. Topsoil stockpiles must be monitored for invasive vegetation growth. Contractors must remediate as and when required in consultation with the ECO. ix. No plant, workforce or any construction related activities may be allowed onto topsoil stockpiles.				
B2 HANDLING OF TOXIC CHEMICALS	• Prevention of pollution of the environment	• No pollution of the environment • No litigation due to transgression of pollution control acts	Daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Materials (B)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
i. The contractor must provide method statements for the "handling & storage of oils and chemicals" and "accidental spills management". ii. These substances must be confined to specific and secured areas within the contractor's construction site, and in a way that does not pose a danger of pollution even during times of high rainfall. These areas must be imperviously bunded with adequate containment (at least 1.5 times the volume of the hazardous material) for potential spills or leaks. iii. Drip trays (minimum of 10 cm deep) must be placed under all vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised to prevent environmental harm. iv. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak	• Minimise chances of transgression of the acts controlling pollution	• Method statements as set out by the contractor adhered to.		• Health and Safety Personnel

Phase of development	CONSTRUCTION			
Impact / issue	Materials (B)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
from the vehicle while standing. v. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle. vi. Spill kits obtained from reputable service providers. vii. All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material).				
B3 STORAGE FACILITIES FOR TOXIC MATERIALS i. The Contractor must designate a specific and secured area for the storage of toxic materials ii. Toxic materials must be sealed and stored in bermed areas or under lock-and-key, as appropriate, in well-ventilated areas.	• Prevention of pollution of soil, surface and groundwater resources	• No visible signs of pollution • No litigation due to transgression of pollution control acts	Monitor daily	• Contractor • ESO • ECO • Health and Safety Personnel

Phase of development	CONSTRUCTION			
Impact / issue	Materials (B)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
iii. Sufficient care must be taken when handling these materials to prevent pollution. Training on the handling of dangerous and toxic materials must be conducted for all staff prior to the commencement of construction. iv. In the case of pollution of any surface water, the Regional Representative of the Department of Water and Sanitation (DWS) must be informed immediately. v. Storage areas must display the required safety signs depicting “no smoking”, no naked flames” and “danger” containers must be clearly marked to indicate contents as well as safety requirements. vi. Material Safety Data Sheets (MSDS) must be prepared for all hazardous substances on site and supplied by the supplier where relevant. MSDSs must be updated as required.				

Phase of development	CONSTRUCTION			
Impact / issue	Materials (B)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
vii. Casual access to the storage facilities should not be encouraged. All dangerous materials and equipment should be safely locked away as to prevent contract workers and employees from using and entering these areas freely.				
B4 USE OF DANGEROUS AND TOXIC MATERIALS i. The contractor must keep the necessary materials and equipment such as spill kits onsite to deal with spills. ii. A record must be kept of all spills and the corrective action taken. iii. Firefighting equipment must be kept on site especially in areas close to the hazardous materials storage area.	• Prevention of pollution of soil, surface and groundwater resources • Minimise chances of transgression of the acts controlling pollution	• No pollution of the environment due to chamical spills • No occurance of uncontrolled fires	As and when required	• Contractor • ESO • ECO • Health and Safety Personnel

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
C1 CONSTRUCTION SITE i. The contractors must provide and maintain a method statement for "Crew camps and construction lay down areas". ii. Dedicated wash areas must be provided and maintained in good working order. iii. Dedicated areas for the placement of cleared vegetation and other waste that will be removed from the site must be identified iv. The construction site must be monitored for dust fallout and dust suppression applied as required. v. The contractor must provide labourers with plastic bags or other containers to allows for the storage of litter during the clean-up of the construction site on a daily basis. These areas must then be inspected by the contractor or his / her ESO to ensure compliance with this requirement. vi. The contractor is responsible for cleaning the construction site of all structures, equipment, residual litter and building materials at the end of the construction period.	• Minimise unwarranted environmental damage outside the footprint • Maintain a clean and healthy working environment	• No signs of water or soil pollution (surface- and groundwater resources) • No complaints received from the surrounding landowners / I&AP's • No visible signs of litter at the crew camps Method statements adhered to	Monitor daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
C2 EATING AND SMOKING AREAS FOR CONSTRUCTION WORKERS i. The Contractor must, in conjunction with the ECO, designate restricted eating areas for eating during normal working hours. Adequate closed refuse bins must be provided and cleaned on a daily basis. ii. No fires shall to be lit outside of a facility designed to contain fires. The adequacy and positioning of these structures must be determined in consultation with the ECO. iii. The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited. iv. Informal traders must not be allowed to congregate on pavements or outside the construction site. However, at the contractor's discretion, facilities can be made available within the construction site v. The Contractor must provide smoking areas for construction workers. Outdoor ashtrays must be provided by the Contractor. Smoking areas must not be located in close proximity to the Hazardous Material Waste Storage facility.	• Control potential influx of vermin and flies and rats • Neat work place and hygienic environment • Minimise negative social impacts to the employees.	• No visual sign of vermin, flies and rats • No complaints from I&APs and the landowner / client	Once off, monitor daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
C3 TOILETS i. The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet must be provided for no more than 15 workers of the appointed Contractor. ii. The location of all toilets must be approved by the ECO s iii. Sanitary arrangements must be to the satisfaction of the ECO and the OHS official. Toilets must be of the chemical type. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet paper at all toilets at all times. Toilet paper dispensers must be provided in all toilets. iv. Toilets provided by the contractor must be easily accessible to ensure they are utilised. All toilets will be located within the construction site. v. The contractor (who must use reputable toilet-servicing company) must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) must ensure that all	• Ensure proper sanitation is achieved which will encourage the workforce to utilise toilets provided and not the surrounding habitat or the bush • Minimise potential of diseases onsite and influence the health of the employees • Minimise potential to pollute soils, water resources and natural habitats	• Workforce use toilets provided and not the bush • No complaints received from I&APs as well as members of the workforce • No visible or measurable signs pollution of the environment (soils, ground and surface water)	As and when required	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
toilets are cleaned and emptied before the builders' or other public holidays. vi. Toilets out onsite must be secured to the ground and have a sufficient locking mechanism that must be operational at all times.				
C4 WASTE i. The contractors must provide and maintain a method statement for "solid waste management" including the waste that will be removed from site and which includes garden waste ii. Any illegal dumping of waste must not be tolerated as this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on. Waste Manifests (proof of legal dumping of waste) must be kept and produced on request. iii. Bins must be clearly marked for ease of management. iv. All refuse bins must have lids secured so that animals cannot gain access. v. Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's wastes generated on the site.	• Minimise illegal disposal of waste • Minimise litigation and complaints by I&APs • Control potential influx of vermin and flies thereby minimising the potential of diseases and pests onsite and the surrounding environment • Minimise potential to pollute soils, water resources and natural habitats • Adherence to the waste disposal management plan	• Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying onsite • Ensuring the site is neat and tidy • No complaints are received from surrounding residents, businesses and road users • Sufficient containers available onsite for disposal of domestic and construction related impacts • No visible or measurable signs of pollution of the environment (soils, ground and surface water) • Method statement adhered to and waste disposed of in accordance with the waste disposal management plan	Continuous throughout the construction phase of the project	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
vi. A waste disposal management plan for the removal of vegetation must be compiled vii. Chemical containers and packaging brought onto the site must be removed for disposal at a suitable and licenced site.				
C5 DUST i. The contractors must provide and maintain a method statement for "dust control". The method statement must provide information on the proposed source of water to be utilised and the details of the licenses acquired. ii. The construction site must be watered during dry and windy conditions to control dust fallout. iii. Dust production must be controlled by regular watering of roads and works area, should the need arise. iv. Construction vehicles must adhere to low speeds to avoid the generation of dust on the construction site v. In addition to the standard dust suppression measures and where these measures are not sufficient, main access roads and construction site must be	• Reduce dust fall out at construction site • Minimise loss of valuable soil material	• No visible signs of dust around the contractor's camp • No complaints from I&APs • No incidences reported to ECO • No visible evidence of dust contamination on the surrounding environment • Method statements adhered to	Monitor daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
surfaced with a temporary surface such as gravel to assist with dust suppression. vi. All vehicles transporting material that can be blown off (e.g. soil, rubble, etc.) must be covered with a tarpaulin, and adhere to speed limits on public roads vii. Excessive dust conditions must be reported to the ECO.				
C6 WORKSHOP EQUIPMENT, MAINTENANCE AND STORAGE i. The contractors must provide and maintain a method statement for "workshop maintenance" should there be a workshop on site ii. All maintenance and washing of vehicles and equipment must take place in a designated workshop area that is equipped with a bund wall and grease trap oil separator. During servicing of vehicles or equipment, a suitable drip tray must be used to prevent spills onto the soil, especially where emergency repairs are done outside the workshop area. Leaking equipment must be repaired immediately or be removed from site to facilitate repair. iii. Workshop areas must be monitored for oil and fuel spills and such spills must be cleaned and remediated to the	• Prevent pollution of the environment • Minimise chance of transgression of the acts controlling pollution • Disposal of hazardous substances in an appropriate manner	• No pollution of the environment • No litigation due to transgression of pollution control acts • Method statement adhered to	Monitor daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
satisfaction of the ESO or ER. Cleaning and remediation must be done with products that are in line with best environmental practice i.e. SUNSORB iv. A method statement is required from the Contractor, to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage. v. The Contractor must be in possession of an emergency spill kit that is sufficient to construction activities and must be available on site at all times. The Contractor must ensure that senior and other relevant members of the workforce are trained in dealing with spills by using emergency spill kits. vi. The following must be applied • All contaminated material shall be removed and disposed of as hazardous waste at a registered facility. A waste manifest must be produced • All spills of hazardous substances must be reported to the ECO and recorded in the environmental incident log • The contractor must comply with the regulations of the OHS Act.				

Phase of development	CONSTRUCTION			
Impact / issue	Facility (C)			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**FREQUENCY OF ACTION**	**RESPONSIBLE PARTY/ PARTIES**
C7 NOISE i. The working hours stipulated in the Construction permit where applicable must be adhered to. Where this is not applicable, the following working hours must be adhered to: **Monday to Friday** 07:00 – 17:00 for week days. Working hours during weekends must be agreed between the Developer, the Contractor and Community Liaison Officer (CLO) ii. All construction vehicles must be in a good working order to reduce possible noise pollution. iii. Noise reduction is essential and Contractors must endeavour to limit unnecessary noise, especially loud talking, shouting or whistling, radios, sirens or hooters, motor revving, etc. iv. Where necessary, site personnel must be provided with adequate PPE to avoid damage to hearing v. Noisy activities must take place only during working hours. The Contractor must inform all I&APs in writing 24 hours prior to any planned activities that will be unusually noisy or any other activities that could reasonably have an impact on the neighbouring residents.	• Maintain noise levels below "disturbing" as defined in the National Noise Regulations • Minimise the nuisance factor of the development	• No complaints from surrounding landowners or I&AP's	As and when required	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
D1 FIRES i. If fires will be burnt on site, the contractor must provide and maintain a method statement for "fire control", clearly indicating where and for what fires will be utilised plus details on the fuel to be utilised. ii. Fire extinguishers must be placed in close proximity to all designated fire areas. iii. Fires will only be allowed in facilities especially constructed for this purpose within the fenced Contractor's construction site. iv. Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.	• Minimise risk of veld fires and loss of natural habitat • Maintain safety on site and the community in general	• No veld fires started by the contractor's workforce • No claims from landowners for damages due to veld fires • Method statement adhered to	Monitor daily	• ECO • EO • Contractor
D2 EROSION AND SEDIMENTATION i. To reduce the loss of material by erosion, the contractor must ensure that disturbance on site is kept to a minimum. ii. In order to avoid unnecessary clearing/uprooting of plants, all groundcovers that are not trees or shrubs and which are not invasives must be trimmed to a height of at least 10cm and covered with soil to inhibit growth. Invasives must be treated to ensure their eradication if not uprooted. iii. The complete clearing of vegetation must be avoided on all sections of the site. Where vegetation must be completely removed, erosion blankets must be used. iv. The contractor is responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed.	• Minimise erosion occuring on site	• No erosion scars • No loss of topsoil • No interference with the natural flow of water • The footprint has not exceeded the agreed boundaries • All damaged areas successfully rehabilitated by the landscaper	As and when required	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
v. Areas for the catchment of stormwater must be created in various areas of the construction camp. In this areas, silt traps must be installed and maintained to avoid the discharge of heavily silted water into the adjacent watercourse. vi. Stockpiling of erodable materials may not be located within the riparian area. In areas where these stockpiles are kept, these must be protected to prevent erosion. Specific to water erosion, the edges of the stockpiles of erodible materials must be protected by the placement of sandbags, silt fences, bricks. Etc. There must be ongoing monitoring of the erosion protection features. e.g. the silt fence must be cleaned to ensure effectiveness				
D3 FAUNA i. All activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962) [APA]. ii. The extent of the construction site must be demarcated and no vegetation that could be the habitat for faunal species must be removed outside of this zone. iii. All construction workers must be informed that the intentional killing of any animal, including snakes, is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. iv. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake, a specialist must be called in to safely relocate the animal or selected workers must be trained in snake-handling. v. Boards containing information pertaining to Orange / Red / Listed floral species (i.e. identification, conservation status and importance, biology, habitat requirements and management requirements) within	• Minimise disturbance to animals • Minimise interruption of breeding patterns of birds • Minimise destruction of habitat and impacts on the riparian habitat • No casual access of workers and the general community	• No complaints from any I&AP • No litigation concerning applicable animal protection acts	Monitor daily	• Contractor • ECO Faunal Specialist

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
the area should be erected within the construction and development zone and should be clearly visible to any construction personnel / visitors / residents. vi. Intentional killing of faunal species should be avoided by means of awareness programmes presented to the labour force. The labour force should be made aware of the conservation issues pertaining to the species occurring on the study site. vii. All construction activities must be limited to daylight hours.				
D4 FLORA i. Clearing of vegetation should only be limited to large trees and shrubs as well as all invasive plant species within the area planned for rehabilitation. The clearing of invasive must also include a buffer area of 10m outside the landfill area. In the buffer area, any trees or shrubs must only be removed if they will interfere with construction activities; ii. Clearing of vegetation should be minimal within and outside the landfill boundaries. iii. In order to avoid unnecessary clearing/uprooting of plants, all plants that are not trees or shrubs must be trimmed to a height of at least 10cm and covered with soil to inhibit growth iv. Construction workers may not remove flora or collect seed from any plants outside the areas on which vegetation clearing has been planned. v. Only Indigenous plants must be used in the landscaping of the site. vi. Open fires on site must only be permitted in demarcated areas within the site camp. A fire extinguisher should be available in close proximity to any areas demarcated for open fires vii. All construction vehicles and equipment as well as construction material should be free of plant material.	• Minimal disturbance to vegetation where such vegetation does not interfere with construction • Prevent litigation concerning removal of vegetation • Minimise scarring of the soil surface and land features • Minimise disturbance and loss of topsoil • Minimise risk of veld fires • Removal of alien plant species to encourage indigenous plant growth • Remove only vegetation where essential for construction and do not allow any disturbance to adjoining natural cover.	• No litigation due to removal of vegetation without necessary permission • No visible erosion scars once construction is completed • The footprint has not exceeded the agreed boundaries • All damaged areas and banks successfully rehabilitated • No veld fires started by contractor's workforce • No claims from landowners for damages due to veld fires	As and when required	• Contractor • ECO • Ecological Specialist (where applicable)

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
viii. Rehabilitation / restoration of remaining indigenous vegetative cover and grassland during and after rehabilitation. ix. Management of point discharges during construction activities to avoid unnecessary soil erosion. x. Provision of adequate sanitation facilities located outside of the wetland/riparian area or its associated buffer zone during construction activities. xi. Prevention of erosion, and where necessary rehabilitation of eroded areas. xii. Rehabilitation of disturbed vegetation as soon as undertaken as soon as construction has ended in the area that has been disturbed	•	• Plants that are found during clearing should be planted into landscaped gardens.		
D5 REMOVAL OF ALIEN INVASIVE SPECIES • The removal of the alien vegetation must be undertaken according to the Alien Eradication Plan in Appendix 1 of this EMPr. • The removal of alien invasive vegetation must be undertaken in the dry winter months so that the bare patches of ground form which the aliens have been removed will not be easily eroded by water. • Alien invasive species that were identified within the study site should be removed prior to construction-related soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation. • The rehabilitation plan must be implemented to ensure that any vegetation harmed is replaced. The bare patches of ground must vegetated with indigenous species as soon as possible after their removal. Where this will not possible for a period of 30 days after removal of the vegetation the bare patches must be covered by mulch or similar material	• To ensure that the removal of the alien invasive species do not create cumulative impacts • To avoid the spread of alien invasives	• No regrowth of alien invasive species	Monitor on a weekly basis for the first month of construction. Thereafter, monitor once over a three year period.	• Contractor • ECO • Ecological Specialist (where applicable

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
• All alien seedlings and saplings must be removed as they become evident for the duration of construction and the monitoring phase				
D6 RIPARIAN AREA i. The construction site, offices, ablution facilities and storage facilities must be located within the site boundaries and not within the 1:100 flood line or within 100m from the edge of any watercourses or the riparian habitat, whichever is the greatest. ii. No fires should be allowed within the riparian area of the watercourse. iii. The ECO must ensure ongoing monitoring of any construction activities along the riparian area iv. Sensitive areas, e.g riparian area that falls outside the planned construction areas, should be fenced off prior to construction as "No Go" zones and all construction related impacts / activities should be prohibited within these zones.	• To ensure the protection of the riparian area in areas outside the proposed construction site	• Limited or no damage to riparan	Daily	• Contractor • ECO
D7 HERITAGE RESOURCES i. Should any historically significant finds (e.g. artefacts, human remains or sites of cultural or archaeological importance) be located, work must cease and the Provincial Heritage Resources Authority, Amafa aKwaZulu-Natali (033 394 6543) must be must be contacted immediately through the ECO. Work in the area can only be resumed once the site has been completely investigated and the Amafa aKwazulu Natal has given permission to the developer to resume any activities.	• Avoid damage to heritage resources. • Report all finds of human artefacts to police • Include section on possible heritage finds in induction prior to construction activities take place • Implement chance find procedures in case where possible heritage finds area made	• Limited or no damage to heritage resources	Monthly	• Contractor • ECO • Heritage Specialist

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
D8 NO-GO / SENSITIVE AREAS i. All construction activities must be retained within the boundaries of the development area, as demarcated at the start of construction. ii. The Contractor must communicate the importance of specific working methods in sensitive areas close to the site, e.g. the Netcare Ferncrest Hospital iii. Demarcate all sensitive sites e.g. stockpiles that will be reused during the undertaking of activities iv. Toolbox talks can be used to discuss the location of sensitive areas. Emphasis must be placed on the protection of no-go areas, e.g. the adjacent tributary of the Mbozamo River.	• Reduce possibilities of complains from adjacent sensitive adjacent land owners/ users	• Containment of footprint • Zero complaints from sensitive adjacent land owners/ users	Monitor Daily	• Contractor • ESO • ECO
D9 CRIME, SAFETY AND SECURITY i. The site and crew are to be managed in strict accordance with the OHS Act and the National Building Regulations ii. The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees and limiting casual access to the construction site for workers, use of hazardous substances and materials, etc. iii. The Contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site. iv. The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations around the construction site.	• Reduce the risk of potential incidences • Minimise the potential for impacts associated with loss of human lives and risk of injuries • Reduce the likelihood of the occurence of traffic accidents as result of the presence of construction vehicles	• No incidents reported by any I&AP	Monitor daily	• Contractor • ESO • ECO • Health and Safety Personnel

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
v. A Health and Safety Officer as well as an independent firm must be appointed to audit the site's compliance with the OHS Act during construction. vi. The Contractor must compile a Traffic Management Plan to outline the measures according to which traffic impacted by site activities will be controlled through measures such as the placement of Warning and advisory signage				
D10 VISUAL IMPACTS i. Shade cloth must be utilised to conceal and minimise the visual impact of the construction site. ii. Keep dust levels down by regularly wetting dirt roads and exposed soil areas inside the site. iii. Clearly demarcate the construction site to limit the area of disturbance. iv. Remove all waste, including cleared vegetation from site as soon as possible unless the material will be reused on site. A dedicated area for the placement of waste that will either be removed or reused must be identified. v. Domestic waste generated from the site camp must be kept in bins with lids and removed every week or more often as the need arises and be disposed of at a registered landfill (if there is no space available). vi. Keep the construction site neat and tidy at all times. Remove any waste from the site or contain it in an enclosed area out of the sight from sensitive viewpoints.	• Minimise visual impact. • To achieve the goal of reducing the visual intrusion of the proposed development and to assist in blending the proposed development into the surrounding character, the enviro-architectural design guidelines will inform the key aspects of architectural form, materials and finishes for the proposed development. It should be noted that no precise formula or model exists to ensure innovative design and blending with the visual character of the area. • Reduce and limit dust clouds. • Limit area of disturbance.	• No complaints regarding the visual aspect of the project from I&AP's and local residents. • No evidence of windblown litter	Monitor daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
	• Limit the duration of exposed soil surfaces. • Locate construction site and stockpiles in the least visible area. • Provide additional screening to increase the visual absorption capacity of the site.			
D11 GROUNDWATER AND STORMWATER MANAGEMENT i. Should groundwater be encountered during the undertaking of activities, the Contractor must ensure that this is adequately managed and protected ii. The Contractor must provide method statements for the management of stormwater iii. The Contractor must provide method statements for the management of groundwater, including methods for dewatering and storage of the groundwater subsequent to dewatering. Any contaminated water must be treated or disposed of at a registered facility iv. Groundwater must be analysed every 6 months for macro; trace an biochemical substances and if leaching occurs every month as set out in the government Notice No. 36784; 23 August 2013; National Environmental Management: Waste Act 2008 (Act No. 59 of 2008); Waste Classification and Management Regulations. v. A monitoring program for groundwater must be established.	• To ensure the potection of groundwater during construction activites • To reduce the potential of erosion on • To reduce the likelihood of the bockage of stormwater infastructure into whch stormwater from the site will discharge	• Uncontaminated groundwater • No blockage of stormwater infastructure into whch stormwater from the site will discharge	As and when groundwater is encountered	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
vi. Monitoring boreholes upstream and downstream from the landfill site must be established and monitored vii. Ensure effective stormwater management principles to reduce the loss soils and discharge of contaminated water from the construction site into the groundwater and well as surface water viii. The use of Sustainable Drainage Systems (SUDs) to manage stormwater is considered critical in order to prevent significant impacts on the hydrological functioning and water quality of the freshwater resources associated with the boundaries of the Shakaville landfill site. In this regard, it is highly recommended that a suitably qualified engineer be consulted with regards to the use of SUDs. Examples of these, which may be applicable to this development, include rainwater harvesting, soakaways, and bio-retention facilities or attenuation ponds.				
D12 SURFACE WATER i.e WATERCOURSES i. Construction within the site must take place under the supervision of a Professional Civil Engineer; ii. Sporadic leachate resulting from the site must be directed to a control point, through suitably lined drains or collection pipes. Collected leachate must be treated to quality standard that complies with relevant legislation before being released into the system. iii. The site conditions must be investigated before construction including water quality, surface water, groundwater. Groundwater monitoring system must be installed as well as a water quality monitoring program established. iv. Increased run-off during construction must be managed using suitable structures as required to ensure flow velocities are reduced; this must be done in consultation with the Resident engineer as well as the ECO. Stormwater, wherever possible, should be allowed to soak into the land in the area on which the water fell e.g. retention ponds	• Minimise pollution of soil, surface and groundwater resources in the immediate and surrounding environments • Minimise impeding the natural flow of water • Minimise the impact on natural water flow dynamics • Minimise scarring of the soil surface and land features • Minimise damage to river and stream embankments (where applicable)	• No visible signs of pollution • No signs of siltation of the stream south-east of the site. • No visible erosion scaring once construction is completed • Minimum loss of topsoil • No access roads through river and stream banks • No visible erosion scars on embankments once construction is completed	As and when required, monitor daily	• Applicant • ECO •

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
v. In the event of pollution caused as a result of construction activities, the contractor, according to section 20 of NWA is be responsible for all costs incurred by organisations called to assist in pollution control and / or to clean up polluted areas. vi. The contractor must ensure that excessive quantities of sand, silt and silt-laden water do not enter the watercourse. Design of the stormwater drainage system must ensure that the local and surrounding natural systems are not negatively impacted. Appropriate measures, e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage or watercourses must be taken. These measures must be reviewed and audited by the ECO. vii. No wastewater may run freely into any of the surrounding streets or naturally vegetated areas. Runoff containing high sediment loads must not be released into natural or municipal drainage systems or nearby watercourses. viii. Approval must be obtained from DWA for any activities that require authorisation in terms of Section 39 of NWA ix. Engage with the Department of Water and Sanitation with regard the applicable water use requirements for the landfill; x. As far as possible, avoid any activities within the riparian area or 100m from the edge of the watercourse xi. Implement best management practise for earthwork activities; xii. Ensure that adequate sanitation facilities are provided and located outside the watercourse and the within the riparian area or 100m from the edge of the watercourse xiii. Carrying out routine vehicle maintenance and washing at a maintenance workshops instead of at the construction site; xiv. Utilisation of drip trays to prevent oil or fuel spills in case of on-site emergency maintenance; xv. Minimisation of quantities of fuel, and other hazardous material kept at the construction site;	• Minimise erosion of embankments and subsequent siltation of rivers and streams • Minimise damage to riverine habitats and the wetland (where applicable)	• No erosion or siltation downstream and wetland • No deviation from baseline data during regular sampling		

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
xvi. Ensure effective stormwater management principles to reduce the loss soils and discharge of contaminated water from the construction site into the groundwater and well as surface water xvii. The use of Sustainable Drainage Systems (SUDs) to manage stormwater is considered critical in order to prevent significant impacts on the hydrological functioning and water quality of the freshwater resources associated with the boundaries of the Shakaville landfill site. In this regard, it is highly recommended that a suitably qualified engineer be consulted with regards to the use of SUDs. Examples of these, which may be applicable to this development, include rainwater harvesting, soakaways, and bio-retention facilities or attenuation ponds. xviii. Maintenance of the following infrastructure: *catchwater banks at the top edge of the landfill to prevent erosion and control the runoff down the side slopes *Downchutes to direct the runoff down the side slopes *A drainage bench midway down the side slope to reduce the flow velocity and further prevent erosion *Reno mattresses at all discharge points to prevent scour				
D13 IMPACT ON AIR QUALITY i. Implement dust suppression measures (wetting or application of soil binding compound) in all areas that will be affected by construction activities and where dust will be generated. Dust suppression must also be undertaken during windy and dry weather conditions. ii. A continuous dust monitoring process needs to be undertaken during construction. iii. Speed restriction of no more than 10km/h must be implemented for all construction vehicles within the construction site. iv. All vehicles transporting friable materials such a sand, rubble etc. must be covered by a tarpaulin or wetted down should the need arise	• To ensure that air quality is not affected	• No signs of dust on site	Daily	• Contractor • ESO • ECO

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
D14 IMPACT ON SOCIO ECONOMICS i. All adjacent residents must be must be informed of the commencement of construction activities. at least 30 days prior to their commencement. Proof of their notification must be kept ii. Adjacent land owners must be informed timeously, at least 7 days of any planned service stoppages in their areas. iii. Notification must include possible timeframes for stoppages and consequences of such stoppages must be clearly indicated to all surrounding/affected land owners. iv. A certain percentage of skilled or unskilled labour must be employed on the construction site v. A Community Liaison Officer (CLO) Must be appointed on the projects vi. No vendors should have permitted to operate within the boundaries of the Construction Site	• To ensure that communities in the vicinity of the facility are involved in the project and are able to improve their economic conditions through the acquisition of employment	• Locals' knowledge about the employment opportunities for community members on the project	Ongoing	• Developer • Contractor • ECO
ii. D15 IMPACT ON TRAFFIC AND LOCAL ROADS iii. The Contractor must where necessary update the Traffic Management Plan complied in the Planning Stage of the project. The Plan must indicate the routes that construction vehicles must adhere to, the speed limits of the vehicles as well as the locations for the placement of warning signs. These routes must be communicated to all sub-contractors; iv. There must be an erection of signage warning motorists and pedestrians about the presence of construction vehicles as well and the need to reduce speeds; v. Contractor must communicate road safety to community members through the Community Liaison Officer (CLO);	• To ensure that locals are not negatively affected by the presence of construction vehicles through events such as car accidents.	• Locals' knowledge about the presence of construction vehicles on site	Ongoing	• Contractor and Sub Contractors • ECO

Phase of development	CONSTRUCTION
Impact / issue	Construction Phase Activities (D)

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	RESPONSIBLE PARTY/ PARTIES
vi. Construction activities must be limited to daytime hours. Where this must extend to any time after dark, the Contactor must ensure that community members that are most likely to be affected are informed of this and roof of their consultation kept; vii. Construction vehicles must not exceed speeds of 10km/h within the construction site viii. Construction vehicles travelling on public roads must adhere to speed limits; ix. Construction vehicles must not dispose of soil of other material on roads. Where this occurs, the material must immediately be removed before the end of the working day.				
D16 HEALTH AND SAFETY IMPACTS i. Ensure that adjacent residents are informed of the proposed construction activities. Contractor must communicate road safety to community members through the Community Liaison Officer (CLO) ii. Signs in appropriate local languages must be erected on site to warn people of the potential risks of entering the site iii. The site and any excavations within it must be fenced off as safety mechanisms iv. Personal Protective Equipment (PPE) must be worn at all times by all employees undertaking work that requires them to do so v. All visitors to the site must report to the site office and wear PPE where required vi. Detailed Health and Safety issues will be addressed in reports compiled by the most relevant parties	• To ensure safety of employees, site visitors as well as surrounding land users	• Community knowledge about the importance of safety on the site	Ongoing	• Contractor • Health and Safety personnel

3. MONITORING/ POST CONSTRUCTION PHASE EMPR

3.1 Preamble

The following tables form the core mitigation measures appropriate to the monitoring phase of the project subsequent to the completion of the construction phase. The tables present the objectives to be achieved and the management actions that need to be implemented in order to mitigate the negative impacts and enhance the benefits of the project. Associated responsibilities, criteria / targets and timeframes are specified.

3.2 Structure and contents of tables

The table consists of four parts as follows:

Environmental Consideration / Impact / issue - This row will identify the issue being addressed, e.g. Materials, site demarcation, heritage, etc.

Mitigation Measure - This column will include all the necessary mitigation measures for each impact / issue'.

Frequency of action - Provides time guidelines for the 'Responsible party' by which he / she is to action or manage the required mitigation

Responsible Party – Provides the details of the responsible team member which should account on the activities highlighted in column 1 to 4.

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Where applicable, the mitigation measures for the construction phase will be carried forward to other phases. In addition, the following specific measures will also apply:

Table 2: Core mitigation measures appropriate to the monitoring phase of the EMPr subsequent to construction

ENVIRONMENTAL IMPACTS	MITIGATION MEASURES	FREQUENCY OF ACTION	OBJECTIVES	RESPONSIBLE PARTY/PARTIES
1. Proliferation of exotic vegetation and weeds in disturbed areas.	• All exotic flora and weeds to be eradicated in an environmentally friendly manner	• Monthly for the first year after rehabilitation.	To ensure that indigenous plants are well established	Developer
2. Damage to plants established as part of rehabilitation	• All areas under rehabilitation must be cordoned off as no-go areas If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • The survival rate of plant species established as part of rehabilitation must be monitored and replanted where necessary	• Weekly for the first two months after establishment and after that, monthly for the first year after rehabilitation.	To ensure that indigenous plants are well established	Developer
3. Damage to landfill capping	• Repair damages as soon as they become apparent	• Weekly for the first two months after establishment and after that, monthly for the first year after rehabilitation.	To ensure that the capping for the landfill fulfills its purpose of maximizing run off and minimising ingress of water into the waste body.	Developer
4. Damage to Stormwater, leachate and gas monitoring systems	• Ensure that all systems are repaired no later than 3 weeks after damage	• Monthly for the first year after rehabilitation. Frequency must be increased	To ensure that stormwater and groundwater do not adversely impact	Developer

ENVIRONMENTAL IMPACTS	MITIGATION MEASURES	FREQUENCY OF ACTION	OBJECTIVES	RESPONSIBLE PARTY/PARTIES
5. Soil erosion	• Maximum slope angle of 1v:3h implemented across the landfill. • Complete vegetative covering of waste bodies (ideally indigenous flora). • Selection of non-erodible and non-dispersive topsoil to avoid erosion. • Creation of sufficient horizontal channels along outer slopes of waste bodies to decrease flow rate of surface runoff and minimise erosion. • Concrete drainage channels surrounding cells to be maintained to avoid clogging and possible overflowing of storm water and leachate resulting in continued erosion along base of waste bodies.	• Monthly for the first year after rehabilitation. Frequency must be increased during the rainy season		

APPENDIX 1. ERADICATION OF ALIEN VEGETATION

1. Background

Section 13 of the National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004): Alien and Invasive Species Regulations: Alien and Invasive Species Regulations state that the following restricted activities should not be undertaking in dealing with alien invasive species

(a) Spreading or allowing the spread of any specimen of a listed invasive species;
(b) releasing any specimen of a listed invasive species;
(c) the interbasin transfer of specimens of alien and listed invasive species;
(d) discharging of or disposing into any waterway or the ocean water from an aquarium, tank or other receptacle that has been used to keep a prohibited alien species or a listed invasive species; and
(e) importing into the Republic, including introduction from the sea, any peat or peat products.

As these restricted activities will not be undertaken, there will be no need for an application of a permit as discussed in Sections 87- 93 of the National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004).

2. Timing of the removal of alien invasive species

The removal of alien invasive vegetation must be undertaken in the dry winter months so that the bare patches of ground will not be easily eroded by stormwater associated with the summer months. As dust will most likely be generated during the removal, the area to be cleared must be sprayed prior to conducting the removal.

3. Methods of eradicating the alien invasive vegetation on site

The removal of invasive vegetation can be through mechanical and chemical means (Department of Water and Sanitation, Undated; Invasive Species South Africa, Undated).

2.5.3.1. The general removal methods for removal of alien vegetation.

The removal of alien vegetation can be **mechanical** or **chemical** and must be suitable to the specific type of alien vegetation (Department of Environmental Affairs. Undated; Department of Water Affairs, Undated).

Mechanical (physical) methods of removing invasive alien vegetation

These include:

- Hand pulling of small plants and seedlings and their roots
- Cutting plant to a level closest to the ground and then completely removing the roots of the plant

Chemical Methods of removing invasive alien vegetation

These include

- The use the use of herbicides - expert advice on the most appropriate method must be acquired and must be applied (by spraying or painting) on plants that are less than 2m in height, either naturally or after cutting. In addition to this, the herbicide can be injected into the plant (Department of Water and Sanitation, Undated).

Although these two methods are generally used in the eradication of alien species, *only the mechanical methods* must be used for in the proposed Stone River's Arch as these cause less environmental harm than chemical methods.

4. Phases in the control of alien vegetation

This must be undertaken with the use of a long-term plan of three phases. These are:

- Undertake Initial Control - high level of the reduction of existing populations of alien species;
- Follow up control - control of seedlings, root sucker and coppice growth; and
- Maintenance control - sustain low alien plant numbers with annual control.

5. Maintenance control of eradicated alien invasive vegetation

All plants that have been eradicated/treated must constantly be checked and there must be repetition of the method initially used for eradication.

6. Disposal of alien invasive vegetation

The disposal method of the plant species will depend on factors such as species, quantity and growth stage. The alien invasive plant species removed as part of the rehabilitation plan must be handled in a manner that will not create additional problems in the environment. The first method of preference is the reuse of the material on other parts of the proposed development where it can be chipped and used for mulch (Conservation at Work, undated). Plant species such as trees may be cut into large pieces and used whole or in landscaping.

However, care must be taken to ensure that seeds do not spread during the removal. Where the seeds are collected, they must be placed in sealed plastic bags and allowed to dry on site as high temperatures will destroy most seeds (Dahlquist et al, 2007; McSorley and Gill, 2010).

If material cannot be reused, it must be disposed of at a registered landfill after being dried on site.

7. The revegetation of bare ground after the removal of alien invasive species

Vegetation is useful in rehabilitation as it binds and stabilises soil and slows the velocity of stormwater water. This reduces soil erosion and in turn prevents the deposition of sediment in the nearby watercourse. Despite this however, measures such as Erosion Control Blankets must be used to provide immediate protection to soil after the soil has been left bare. The Erosion Control Blankets are useful for slopes in sensitive areas close to watercourses (Thabakholo Environmental Solutions, Undated).

8. Principles to be ensure successful rehabilitation with the use of vegetation

In order to ensure successful rehabilitation by vegetation, the following must be adhered to:

- Alien species may not be used for re-vegetation;
- Only indigenous plants must be used;
- There must be a diversity of species as this will ensure greater chances of survival;

APPENDIX 2: EXAMPLE OF DECLARATION OF UNDERSTANDING BY THE DEVELOPER/ENGINEER/CONTRACTOR

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme (EMPr) for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

APPENDIX 3: EXAMPLE OF METHOD STATEMENT: HAZARDOUS MATERIALS MANAGEMENT

METHOD STATEMENT: Hazardous Materials Management

PROJECT:……..
CONTRACTOR:……..
DATE:……..
WHAT WORK IS TO BE UNDERTAKEN? [Provide a brief description of the works to be undertaken on site that will require the management of hazardous materials* Note: please attach extra pages if more space is required.

*Insert additional pages as required

WHERE ARE THE WORKS TO BE UNDERTAKEN? (Where possible, provide an annotated plan and a full description of the extent of the works): * Note: please attach extra pages if more space is required.

*Insert additional pages as required

APPENDIX 4: EXAMPLE OF INCIDENT AND ENVIRONMENTAL LOG

INCIDENT AND ENVIRONMENTAL LOG

ENVIRONMENTAL INCIDENT LOG				
Date	**Environmental Incident**	**Comments** *(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)*	**Corrective Action Taken** (*Give details and attach documentation as far as possible)*	**Name & Signature of party confirming the undertaking of corrective actions**

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