



**DRAFT OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME  
SECTION 24G REPORT IN TERMS OF THE NATIONAL ENVIRONMENTAL  
MANAGEMENT ACT 107 OF 1998, (NEMA)  
FOR THE UNLAWFUL OPERATION OF A WASTE DISPOSAL SITE ON  
PORTION 5 FAROASFOTEIN FARM NO. 372 IQ, WALKERVILLE  
WITHIN THE JURISDICTION OF THE MIDVAAL LOCAL MUNICIPALITY IN  
THE GAUTENG PROVINCE**

**REFERENCE NO: S24G/03/19-20/0465**

**SUBMISSION DATE: 02 JUNE 2020**

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## TERMS AND DEFINITIONS

TERMS	DEFINITIONS
<b>Alien vegetation</b>	all undesirable vegetation, defined as but not limited to, all declared category 1 and category 2 plants in terms of the Conservation of Agricultural Resources Act (43 of 1983) (CARA) amended regulations 15 and 16 as promulgated in March 200.
<b>Builder's rubble</b>	Includes pieces of masonry, bricks, concrete, etc. resulting from construction, repair and demolition operations, without reinforcing steel, uncontaminated with general waste and with a maximum particle size of 300-mm.
<b>Building and Demolition Waste</b>	Building and demolition waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any building structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.
<b>Bulky Waste</b>	Includes items, such as large tree trunks, large concrete blocks, etc., for which the large size precludes or complicates their handling by normal collection, processing or disposal methods.
<b>Cell</b>	A cell which is designed and engineered to contain waste. It is underlain by a liner to prevent the waste or the leachate from the waste coming into contact with the environment.
<b>Clean Garden Waste</b>	Compostable waste derived from garden waste (for instance gardens, parks and similar), which has not been mixed with other waste categories. This may include clippings, pruning and other discarded plant material.
<b>Closure</b>	The act of terminating the operation of a landfill. Closure is preceded by rehabilitation and followed by end-use and post-closure monitoring.
<b>Commercial Waste</b>	Solid waste generated by stores, offices and other activities not involved in manufacturing.
<b>Communication register</b>	A register aimed at tracking all communication activities in the project.
<b>Compaction</b>	The process whereby the volume of waste is reduced, using a purpose-built compactor or other suitable machine.
<b>Compaction Density</b>	The mass of a body of solid waste divided by the volume (after compaction) occupied by that same body of waste.

TERMS	DEFINITIONS
<b>Compaction Ratio</b>	The ratio of the volume of loose waste to the volume of the same waste after placement and compaction.
<b>Construction activity</b>	Any action taken by the Contractor, his subcontractors, suppliers or personnel in undertaking the construction work.
<b>Construction area(s)</b>	All areas used by the Contractor in order to carry out the required construction activities. This includes all offices, accommodation facilities, testing facilities/laboratories, batching areas, storage & stockpiling areas, workshops, spoiling areas, access roads, traffic accommodation (e.g. bypasses), etc.
<b>Contaminated water</b>	Water contaminated by pollutants from on-site or off-site activities; for example, runoff from un-rehabilitated parts of the waste body or runoff from waste management vehicle or plant wash areas. Contaminated water must be treated to ensure water released into the receiving environment meets minimum standards and guidelines. Treated water should be recycled where possible.
<b>Contractor</b>	A person or company to carry out stipulated activities.
<b>Cover Material</b>	Soil or other suitable material like builders' rubble or clinker ash that is used for enclosing a body of compacted waste.
<b>Daily Cell</b>	<p>A body of waste which has been placed between waste berms covered with soil, soil berms or builder's rubble berms compacted and enclosed by cover material.</p> <p>The size being determined by the mass of waste disposed of in a single day, as well as by the number of vehicles delivering waste.</p>
<b>Degradation</b>	The lowering of the quality of the environment through human activities e.g. river degradation, soil degradation, atmospheric degradation.
<b>Development</b>	<p>This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:</p> <ul style="list-style-type: none"> <li>• Construction, alteration, demolition, removal or change in use of a place or a structure at a place;</li> </ul>

TERMS	DEFINITIONS
	<ul style="list-style-type: none"> <li>• Carrying out any works on or over or under a place;</li> <li>• Subdivision or consolidation of land comprising a place, including the structures or airspace of a place;</li> <li>• Constructing or putting up for display signs or boards;</li> <li>• Any change to the natural or existing condition or topography of land; and</li> <li>• Any removal or destruction of trees, or removal of vegetation or topsoil.</li> </ul>
<b>Domestic Waste</b>	Solid waste that originates in a residential environment.
<b>Emergency</b>	An undesired event that results in a probable significant environmental impact and requires the notification of the relevant statutory body such as a local or provincial authority.
<b>Engineer</b>	A suitably qualified duly appointed natural or juristic person or partnership or any other engineer appointed from time to time by the Owner, to act on its behalf with regards to certain aspects of the administration and execution of the work.
<b>Environment</b>	In terms of the National Environmental Management Act (NEMA) (No 107 of 1998), “environment” means the surroundings within which humans exist and that are made up of: (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) of (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
<b>Environmental Assessment Practitioner</b>	Means the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.
<b>Environmental Audit</b>	Systematic, documented, regular and objective evaluation to see how well an organisation or facility is operating in terms of the Environmental Management Programme and is complying with statutory requirements and the organisation’s Environmental Policy.

TERMS	DEFINITIONS
<b>Environmental Authorisation (EA)</b>	The authorisation by a competent environmental authority for commencement of listed activities in terms of the National Environmental Management Act and associated Specific Environmental Management Acts (SEMAs).
<b>Environmental Control Officer (ECO)</b>	An independent person, who is responsible for undertaking site inspections to audit and report on compliance with the environmental specifications contained within the Environmental Management Programme.
<b>Environmental Impact Assessment (EIA)</b>	The process of collecting, organising, analysing, interpreting and communicating information in accordance with the environmental legal requirements set out in GNR. No 982, GNR. 983, GNR. 984 and GNR 985 as published on 14 December 2014, promulgated in terms of Chapter 5 of the National Environmental Management Act, for the purposes of obtaining an Environmental Authorisation in accordance with Chapter 5 of the National Environmental Management Act.
<b>Environmental impact</b>	The change to the environment resulting from an environmental aspect (an activity) on the environment, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.
<b>Environmental Management Programme (EMPr)</b>	A tool used to prescribe management mechanisms / methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits of a development.
<b>Fauna</b>	All species of animals found in a particular region or environment.
<b>Fire hazard</b>	The relative combination of fuel, oxygen and heat that will lead to the start and spread of a potential fire.
<b>Flora</b>	All species of vegetation found in a particular region or environment.
<b>General Waste</b>	General waste means waste that does not pose an immediate hazard or threat to health or to the environment, and includes - <ul style="list-style-type: none"> <li>• domestic waste;</li> <li>• building and demolition waste;</li> <li>• business waste; and</li> </ul>

TERMS	DEFINITIONS
	<ul style="list-style-type: none"> <li>• inert waste</li> </ul>
<b>Groundwater</b>	Subsurface water in the zone in which permeable rocks, and often the overlying soil, are saturated under pressure equal to or greater than atmospheric.
<b>Heritage resource</b>	Any place or object of cultural significance including buildings, structures, landscapes, graves and geological, archaeological and paleontological sites.
<b>Impact</b>	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 and space.
<b>Incident</b>	An undesired event which may result in a significant environmental impact but can be managed through internal response.
<b>Induction training</b>	The training provided to new / existing employees to (re)acquaint them with the company structure, their specific job requirements, practical and/or organisational issues and occupational health, safety and environmental considerations required on the project.
<b>Landfill (n)</b>	The waste body created by landfilling. This may be above or below ground level, or both.
<b>Landfill (v)</b>	To dispose of waste on land, whether by use of waste to fill in excavations or by creation of a landform above grade, where the term “fill” is used in the engineering sense.
<b>Landfill Gas</b>	Typically malodorous gases generated during the decomposition of waste.
<b>Landfill Operation Monitoring</b>	The auditing and assessing of a waste disposal operation to determine whether it conforms to the Landfill design and to the Minimum Requirements.
<b>Landfill Operator</b>	The person, firm or company including the Landfill Operator’s heirs, executors, administrators, trustees, judicial managers or liquidators, as the case may be, responsible for maintenance and operational standards at the landfill. Depending on the circumstances, the Landfill Operator may also be the Landfill Owner.
<b>Landfill Owner</b>	The Landfill Owner will be deemed to be the local municipality.



TERMS	DEFINITIONS
<b>Leachate</b>	An aqueous solution with a high pollution potential, arising when water is permitted to percolate through decomposing waste. It contains final and intermediate products of decomposition, various solutes and waste residues. It may also contain carcinogens and / or pathogens (Sporadic / Significant).
<b>Leachate Management</b>	The collection and drainage of leachate to a point where it can be extracted for treatment. This requires a system of under-drains and liners and, in certain instances, is synonymous with containment.
<b>Mitigate</b>	The implementation of practical measures to reduce adverse impacts, or to enhance beneficial impacts, of an action.
<b>Mitigation measures</b>	Mitigation seeks to find better ways of doing things, by the implementation of practical measures to reduce, limit, and eliminate adverse impacts or enhance project benefits and protect public and individual rights.
<b>Natural vegetation</b>	All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.
<b>Non-compliance</b>	Failure to comply with the requirements of the EMPr.
<b>Non-conformance Report</b>	A report outlining a deviation from process, procedure or compliance specifications.
<b>Pollution</b>	Any change in the environment caused by substances, radioactive or other waves, or noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
<b>Project Manager</b>	The person appointed by the Midvaal Local Municipality from time to time to act in the capacity and notified, by name and in writing by the client to the Contractor, to act as required in the contract.
<b>Recycle</b>	A process where waste is reclaimed for further use, this involves

TERMS	DEFINITIONS
	the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.
<b>Rehabilitation</b>	Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the insurance of a stable land surface. Re-vegetation must aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.
<b>Resource recovery</b>	Recycling of waste or the recovery of energy.
<b>Response Action Plan</b>	A plan intended to counter or minimise the adverse effects of any malfunction of a landfill design element with immediate effect.
<b>Safe Disposal</b>	The process whereby spoilt foodstuff or condemned products may be disposed of on the landfill under supervision of the Environmental Health Officer and/or Landfill Supervisor.
<b>Safety, Health and Environmental Plan</b>	A documented plan which addresses hazards identified and includes safe work procedures to mitigate, reduce or control the hazards identified.
<b>Salvaging</b>	The controlled and/or uncontrolled process of recovering any material, gas, compost, or other matter from the waste for benefit and for personal consumption.
<b>Sanitary Landfilling</b>	A method of disposing of waste on land without causing nuisances or hazards to public health or safety. Sanitary landfilling uses the principles of engineering to confine the waste to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day's operations or at such less frequent intervals as may be acceptable.
<b>Sedges</b>	Grass-like plants growing in wetland/marshy areas or adjacent to water.
<b>Sensitive receptors</b>	Locations or areas that is likely to experience an impact greater than at other locations or areas; for example, schools and

TERMS	DEFINITIONS
	residential areas.
<b>Site Manager</b>	The person, representing the Contractor, responsible for all the Contractor's activities on the site including supervision of the construction staff and activities associated with the construction Phase. The Site Manager will liaise with the Principal Agent in order to ensure that the project is conducted in accordance with the environmental management programme.
<b>Sustainability</b>	Meeting the needs of today without compromising the ability of future generations to meet their own needs.
<b>Topsoil</b>	This is defined as the A horizon of the soil profile. Topsoil is the upper layer of soil from which plants obtain their nutrients for growth. It is often darker in colour, due to the organic (humic) fraction, but regardless of the fertility appearance, structure, agriculture potential, this profile constitutes the topsoil.
<b>Waste</b>	Means any substance, whether or not that substance can be reduced, re-used, recycled and recovered— (a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; (b) which the generator has no further use of for the purposes of production; (c) that must be treated or disposed of; or (d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— (i) a by-product is not considered waste; and (ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.
<b>Waste Body</b>	This refers to the body of waste (and cover) that is contained in the landfill. Because it is subject to decomposition, it has the potential to generate leachate and must therefore be adequately separated from the water regime.
<b>Waste minimisation</b>	A programme that is intended to promote the reduced generation and disposal of waste.
<b>Waste prevention</b>	The prevention and avoidance of the production of waste.

TERMS	DEFINITIONS
<b>Water body</b>	Any open body of water including streams, dams, rivers and lakes.
<b>Weeds and invader plants</b>	Weeds and invader plants are defined as undesirable plant growth that shall include, but not be limited to all declared category 1, 2 and 3 listed invader species as set out in the Conservation of Agricultural Resources Act (No 43 of 1983) regulations. Other vegetation deemed to be invasive should be those plant species that show the potential to occupy in number, any area within the defined construction area.
<b>Working Face</b>	The active part of the landfill; where waste is deposited by incoming vehicles, then spread and compacted on the sloped face of the cell by a compactor. The width of the working face is determined by manoeuvring requirements of the vehicles depositing waste.

**ABBREVIATION**

<b>ABBREVIATION</b>	<b>DEFINITIONS</b>
<b>B<sup>-</sup></b>	Water deficit climate, resulting in only sporadic leachate generation.
<b>B<sup>+</sup></b>	Water surplus climate, resulting in significant leachate generation
<b>C</b>	Communal Landfill
<b>C</b>	Compliance
<b>DEA</b>	Department of Environmental Affairs
<b>DWS</b>	Department of Water & Sanitation
<b>EA</b>	Environmental Authorisation
<b>EAP</b>	Environmental Assessment Practitioner
<b>ECA</b>	Environmental Conservation Act, 1989 (Act 73 of 1989)
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EIAR</b>	Environmental Impact Assessment Regulations
<b>EMPr</b>	Environmental Management Programme
<b>G</b>	General Waste or Landfill for General Waste
<b>IDP</b>	Integrated Development Plan
<b>IEM</b>	Intergrated Environmental Mangement
<b>IPWM</b>	White Paper on Integrated Pollution and Waste Management
<b>IWMPs</b>	Integrated Waste Management Plans
<b>IWMSA</b>	Institute of Waste Management of Southern Africa
<b>KPI</b>	Key Performance Indicator
<b>MRF</b>	Materials Recovery Facility
<b>MSDS</b>	Material Safety Data Sheet
<b>MSW</b>	Municipal Solid Waste
<b>NC</b>	Non-Conformance
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No.107 of 1998)
<b>NEM:WA</b>	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
<b>NWA</b>	National Water Act, 1998 (Act No. 36 of 1998)
<b>NWMS</b>	National Waste Management Strategy
<b>PLM</b>	Polokwane Local Municipality
<b>PPE</b>	Personal Protective Equipmment
<b>WLD</b>	Waste Licensing Directorate
<b>WML</b>	Waste Management Licence

## 1. INTRODUCTION

Lesekha Consulting was appointed by the Midvaal Local Municipality to apply under section 24G for the Waste management licence for the Walkerville landfill site located on Portion 5 Faraosfontein Farm No.372 IQ Walkerville within the Midvaal Local Municipality in the Gauteng Province. Lesekha Consulting was assigned as an independent Environmental Assessment Practitioner (EAP) responsible for facilitating the legally required waste management licence in terms of the National Environmental Management Waste Act (NEM: WA) (Act 59 of 2008). Municipality operates the Walkerville landfill site without a waste management licence. the operation landfill is a listed activity in terms of the National Environmental Management: Waste Act 59 Of 2008.As a result the facility must have a valid waste management license in terms of this Act. In addition, prior to commencing with a listed activity, the municipality was supposed to obtain an environmental authorisation (EA) in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998). Since the municipality has commenced with operations without the necessary licence, it needs to apply for a Section 24G rectifications in terms of NEMA from the Gauteng Department of Agriculture and Rural Development (GDARD). An application was submitted to the Gauteng - Department of Agricultural and Rural Development (GDARD) on the 23<sup>rd</sup> of August 2019. As such the Midvaal local Municipality was required to renew the waste management licence prior to the expiry of the waste management licence that was issued in 2013.

The National Environmental Management Act (No. 107 of 1998) (as amended) (NEMA) provides various measures for the prevention of pollution and ecological degradation, as well as for ecologically sustainable development in order to protect human health and the environment. The relevant application has already been lodged with the Gauteng - Department of Agricultural and Rural Development (GDARD) for authorisation, with the reference number as: **S24G/03/19-20/0465**: As such, Section 24G application was undertaken to obtain a waste management licence for the project.

The Environmental Management Programme (EMPr) for the landfill is designed as an environmental management tool used to prescribe management mechanisms / methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits during the closure process. The plan has been developed to take cognisance of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requirements for bestowing a 'Duty of Care' on those who cause, have caused or may in future cause pollution or degradation of the environment, as per Section 28 (1) of NEMA. Section 28 (1) has been amended to include significant

pollution or degradation that occurred before the commencement of NEMA, that arises or is likely to arise at a different time from the actual activity that caused the contamination or that arises through an act or activity of a person that results in a change to pre-existing contamination.

An EMPr is a stand-alone document that is typically used to guide and regulate environmental performance through all stages of development, including planning, design, construction, operation, closure, rehabilitation and post closure monitoring.

An EMPr describes the measures that need to be taken to ensure the Duty of Care is bestowed upon those who cause, have caused or may in future cause pollution or degradation of the environment, as per Section 28 (1) of NEMA. Section 28 (1) has been amended to include significant pollution or degradation that occurred before the commencement of NEMA, that arises or is likely to arise at a different time from the actual activity that caused the contamination or that arises through an act or activity of a person that results in a change to pre-existing contamination. Non-compliance to Section 28 (Duty of Care) is a criminal offence and may lead to criminal prosecution. An EMPr is used to guide and regulate environmental performance through all stages of development, including planning, design, construction, operation, closure, rehabilitation and post closure monitoring.

The objectives (Chapter 2 of NEMWA) of afore-mentioned outcomes are to protect health, well-being and the environment by implementing the following NEMWA measures:

- Minimising natural resource consumption;
- Minimisation and avoidance of waste generation;
- Reduction, re-use, recovery and recycling of waste;
- Treating and safely disposing of waste;
- Ecological degradation and pollution prevention;
- Securing ecologically sustainable development while promoting justifiable economic and social development;
- Ensuring the promotion of effective waste delivery services;
- To undertake remediation of land where contamination (may) present(s) a significant risk of harm to health or the environment; and,
- To achieve integrated waste management reporting and planning.

Appended to this Operational Environmental Management Programme (EMPr) is an Emergency Response Plan (ERP) as (Appendix A) , Waste Management Plan (WMP), (Appendix B) and Storm water management plan (Appendix C) and the Rehabilitation Plan

as (Appendix D) that must be considered and implemented where applicable during construction and operational phases of the development. These documents must be read in conjunction with this EMPr and the specifications therein be implemented.

## **1.1 PURPOSE OF THE OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)**

The EMPr, which must comply with section 24N of the Act, must include all the information specified in Regulation 33 of the EIA Regulations, 2010. This Environmental Management Programme aims to address the management of the identified activities in the report. Regulation 33 specifies the minimum set of requirements for management, monitoring and reporting of the impacts of the landfill on the environment. In addition, the Applicant must ensure that the contents of this document not only aim to strictly adhere to the conditions of authorisation, but also to manage the environmental impacts that may arise from the construction, operation and rehabilitation of the landfill Site.

The Competent Authority may also require the holder of the Waste Management License to provide environmental audit reports on the impacts of the authorised activity on the environment, at specified times or intervals as requested by the Competent Authority. This means that in order to comply with the Waste Management License the Applicant must make financial provision for environmental monitoring and compliance audits as a key component of the EMPr. The purpose of this document is to outline a programme of action to mitigate and manage the impacts of the facility on the surrounding environment and to ensure that such impacts do not compromise the environment and people working on or around the site. The Other objectives of the EMPr are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels.
- To create management structures that addresses the concerns and complaints of I&APs with regards to the construction that will take place.
- To establish a method of monitoring and auditing environmental management practices during all phases of the construction.
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management.
- Description of detailed actions needed to achieve these objectives, including how they will be achieved, by whom, by when, with what resources, with what monitoring / verification, and to what target or performance level.
- Allocate responsibilities in terms of mitigation, monitoring, reporting and review.



- Ensure compliance with regulatory authority stipulations, which may be local, national and / or international.

## **2. PHASES OF THE PROJECT**

The process which was followed in compiling this Operational EMPr is in compliance with NEMA EIA Regulations 2017, and applies the principles of Integrated Environmental Management (IEM). The purpose of this operational EMPr is to formulate mitigation measures that are made binding on all contractors during the construction phase as well as during the operational phase. The point of departure for this EMPr is to take a pro-active route by addressing potential problems before they occur. This should limit corrective measures needed during the construction and operational phases of the development. Additional mitigation will be included throughout the project's various phases, as required and if necessary. This Operational EMPr deals with the following phases as detailed below:

### **2.1. THE PLANNING PHASE**

This EMPr offers an ideal opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development. While there is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g. this EMPr) during the planning phase, the necessary corrective action can be taken to further limit potential impacts.

### **2.2. THE CONSTRUCTION PHASE**

The bulk of the impacts during this phase will have immediate effects (e.g. loss flora and fauna, noise, dust and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts can then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from Midvaal Local Municipality.

### **2.3. THE OPERATIONAL PHASE**

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

## **2.4. PROJECT DESCRIPTION**

The project involves the licencing of a landfill site to service the Midvaal Local Municipality. The landfill site has an admin office, ablution facilities, weigh bridge and a security office. The site of the Walkerville landfill site is approximately 10 hectares. (is it the footprint or the site) It is proposed that the life span of the landfill site is approximately 2 years. Furthermore, the following formed part of the scope of works for the landfill site:

- Electricity
- Water reticulation
- Access roads
- Bulk water and sewerage supply.
- Perimeter fencing
- Security guard house
- Administration block with ablution facilities, computers,
- Constructions of landfill cells and leachate management
- storm-water drainage management system.

## **2.5 COMPOSITE MAP**



*Figure 1: Locality map*

## 2.6 DETAILS OF A PRACTITIONER

As per the requirements of the NEMA, the details and expertise levels of the persons who prepared the EIA Report are provided below.

<b>DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER(EAP)</b>	
Environmental Consultants	Lesekha Environmental Consulting
Physical Address:	25 Caroline Close Rowland Estate Mafikeng 2745
Environmental Assessment Practitioner:	Lesego Senna
Expertise:	<p>Lesego Senna is a qualified Environmental Practitioner; she managed and coordinated the EIA study of the project in discussion. She holds the Bachelor Degree: in Biological Science majoring in Microbiology and Biochemistry. She also holds an Honours Degree: Environmental Sciences, Majoring in Environmental Impact Assessment and Earth Sciences – North West University (Potchefstroom Campus).</p> <p>Lesego holds a certificate in Environmental Law (NQF level with the following courses: Waste Management, Biodiversity Management, Waste Management, Heritage Assessment, Environmental law &amp; Environmental Impact Assessment obtained from the Centre of Environmental Management at Potchefstroom University). She also holds a certificate in GIS and GPS course (NQF level 5) from the Free State University, with the following Modules: Spatial data Structures; Spatial data symbolization and analysis and interpretation Map design. Lesego is a registered Environmental Scientist registered with the South African Council of Natural Scientific Profession SACNASP (Reg.No.4000165/17). The acquired qualifications and experience demonstrated that we are uniquely qualified to undertake this Environmental Impact Assessment Study.</p>

## **2.7 DETAILS OF THE ENVIRONMENTAL CONTROL OFFICER**

Details of the ECO will be attached in the final EIR.

## **3. DECLARATION OF COMPLIANCE WITH THE EMPR**

The Midvaal Local Municipality shall be held liable and responsible for ensuring compliance with the conditions by any person acting on his/her behalf, including but not limited to, an agent, contractor, subcontractor, employee or person rendering a service to the holder of the authorization. This EMPr is a dynamic document which will be updated as required on a continuous basis to ensure environmental best practices.

## **4. SUMMARY OF IMPACTS ASSOCIATED WITH ACTIVITY**

The focus of the EMPr has been on the potential impacts associated with the construction and operational phases of the project. On-site and off-site impacts can be induced during the construction phase and later during its operation. On-site impacts result from construction activities carried out within the construction site. The possible impact includes the following:

- Removal and/or destruction of natural vegetation.
- Groundwater and surface water impacts pollution
- Fire hazard due to uncontrolled open fires.
- Soil contamination from oil and/or other chemicals from construction vehicles and equipment.
- Loss of fauna surrounding the area.
- Surface Geology disturbance as a result of earthworks and excavation activities.
- Littering of site and surround's due to wind-blown litter.
- Air quality impacts
- Pollution of surface and ground water
- Erosion and sedimentation of the non- perennial stream

## **4.2 PLANNING ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PLANNING PHASE**

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
<b>PLANNING ENVIRONMENTAL MANAGEMENT PROGRAMME</b>			
General compliance reporting	<ul style="list-style-type: none"> <li>- The planning, construction and operation of the landfill must conform to both the applicable permit conditions and the Minimum Requirements associated with the site classification.</li> <li>- It is the duty of the responsible person to ensure that the Minimum Requirements for the operation of the landfill site and the permit conditions are applied to the degree equal with its class to the satisfaction of the Department of Water Affairs and Sanitation and the Department of Environmental Affairs.</li> <li>- There must be sufficient facilities (plant materials) and resources (trained labour force) to ensure that the landfill operation can conform to both the permit conditions and relevant Minimum Requirements. For example, there should be sufficient trained staff to monitor, control and record incoming waste where required.</li> </ul>	Midvaal Local Municipality	Continuous
Appointment and Duties of ECO	<ul style="list-style-type: none"> <li>- Midvaal Local Municipality must appoint an independent Environmental Control Officer (ECO) who must monitor the contractor's compliance with the environmental management plan.</li> <li>- The Midvaal Local Municipality must provide the ECO and contractor with a copy of the EMPr.</li> <li>- The priority of the ECO is to maintain the integrity of the development conditions outlined in the EMPr and must be enforced and adhered to at all time.</li> <li>- The ECO must form part of the project management team and attend all project meetings.</li> </ul>	Midvaal Local Municipality	Once-off
Appointment and Duties of EO	The contractor must appoint an Environmental Officer (EO). This person will be required to monitor the situation with a direct hand on approach, and ensure compliance and co-operation of all personnel. He should be fluent in the languages of the employees.	Midvaal Local Municipality	Once -off
EMPr	This EMPr must be made binding to the main contractor as well as individual contractors and should be included in tender documentation for the construction contract.	Midvaal Local Municipality, contractor & ECO	Continuous
Permits and Permissions	The Client shall ensure that all pertinent permits, certificates and permissions required for the project have been obtained prior to any activities commencing on site and ensure that they are strictly enforced/adhered to. This includes, for example, licence for storage of flammable liquids and hazardous materials (obtained from Midvaal Municipality, if applicable) and other permits and legislative requirements applicable to the project. The Contractor shall maintain a database of all pertinent permits and permissions required for the contract as a whole and for critical activities for the duration of the contract.	Midvaal Local Municipality	Continuous
Method Statement	<ul style="list-style-type: none"> <li>- The Contractor shall submit written Method Statements to the Site Manager for the activities identified by the Site Manager or ECO.</li> </ul>	Site manager, Contractor & ECO, RE	Once Off

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
	<ul style="list-style-type: none"> <li>▪ Activities that will require method statements include:</li> <li>▪ Concrete pre-cast and batching operation</li> <li>▪ Crushing plant operation</li> <li>▪ Storage facilities for any hazardous substances</li> <li>▪ Emergency procedures</li> <li>▪ Site establishment</li> <li>▪ Removal and clearing of vegetation</li> <li>▪ Materials, equipment and staffing requirements (camp establishment)</li> <li>▪ Transporting the materials and/or equipment to, from and within the site.</li> <li>▪ The storage provisions for the materials and/or equipment</li> <li>▪ The construction procedure designed to implement the relevant Environmental Specifications</li> <li>▪ Other information deemed necessary by the RE and/or ECO.</li> <li>▪ Method Statements shall be submitted at least ten working days prior to the commencement of work on an activity to allow the RE (and/or ECO) time to study and approve the method statement.</li> </ul> <ul style="list-style-type: none"> <li>- Under certain circumstances, the RE may require changes to an approved Method Statement. In such cases the changes must be agreed upon in writing between the Contractor and the RE, and appropriate records retained.</li> <li>- Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the EMPr specifications.</li> </ul>		
Existing Services	<ul style="list-style-type: none"> <li>- The Contractor shall ensure that existing services (e.g. roads, pipelines, powerlines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE.</li> <li>- The Contractor shall be responsible for the repair and Infrastructure reinstatement of any existing infrastructure that is damaged or services which are interrupted.</li> <li>- Such repair or reinstatement will be to the Contractor's cost and shall receive top priority over all other activities.</li> <li>- A time limit for the repairs may be stipulated by the Site Manager in consultation with the Contractor</li> </ul>	Contractor, RE	Once-Off
Environmental incidents	The contractor must take corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves	Contractor, site manager	Continuous

## 4.2 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME

<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
<b>SITE CLEARING</b>			
Site clearing must take place in phased manner, as and when required.	Areas which are not to be maintained within two months' time must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained. Spoil that is removed from the site must be removed to an approved spoil (i.e. building rubble, stripped vegetation, etc) site or licensed landfill site. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.	Contractor & ECO	Prior to moving to site
<b>SITE ESTABLISHMENT</b>			
Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site.	All no-go areas, within and outside of the boundary must be indicated and the personnel on site must be made aware of such areas. Appropriate signage must be placed on site for the public to be aware of the construction activities. The site camp must not be located on any inclined slopes. The construction camp must have waste storage areas. Sufficient space to accommodate all other equipment's required or to be used for the construction activities must be available.	Contractor & ECO	Prior to moving to site
<b>CONSTRUCTION TRAFFIC AND ACCESS</b>			
Sound environmental principles must be followed whilst establishing access to the site.	Temporary access roads that might be required must be rehabilitated prior to the contractor leaving the site. Strategic positioning of entry and exit points to ensure as little impact/ effect as possible on the traffic flow. Developing access routes may require vegetation clearing; however, this exercise must be monitored by the Engineer and ECO for the duration of the project. Their permission must therefore be acquired prior to commencing with developing access routes. Access route must be single track and the same access route is to be used by all construction related vehicles. No additional parallel routes or tracks may be created. Agreed turning areas for construction vehicles must be formalised and used by the Contractor. No turning manoeuvres other than at designated places	Contractor & ECO	Prior to moving to site



<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
	must be permitted.		
Road maintenance	The contractor must ensure that access roads are maintained in good condition by attending to potholes, corrugations and storm water damage as soon as these develop. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt.	Contractor, Project Manager	Prior to moving to site
Construction Traffic	<p>Construction routes must be clearly defined. Access of all construction and material delivery vehicles must be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. The construction trucks routes and times of operation must be carefully planned. Wheel washing and damping down of un-surfaced roads must be implemented to reduce dust. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.</p> <ul style="list-style-type: none"> <li>• Servicing must be done off-site.</li> <li>• Oil changes must take place on a concrete platform or on a drip tray.</li> <li>• Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels.</li> <li>• Temporary access roads that might be required must be rehabilitated prior to the contractor leaving the site.</li> <li>• Strategic positioning of entry and exit points to ensure as little impact/ effect as possible on the traffic flow.</li> <li>• The main routes to the site must be clearly signposted.</li> </ul>	Contractor, Project Manager	Prior to commencement of construction works
General	The contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labeled as to their potential hazards according to specifications. All the required safety labeling on the containers and trucks used shall be in place. The contractor shall meet these safety requirements under all circumstances. All equipment transported shall be clearly labeled as to their potential hazards according to specifications. All the required safety labeling on the containers and trucks used shall be marked.	Contractor/ECO	Throughout the project duration
<b>CONSTRUCTION CAMP</b>			
Careful planning of the setting	Choice of site for the contractors' camp requires the ECOs permission and must	Contractor & ECO	Prior to

<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
<p>up of construction Camp to ensure that time and costs associated with environmental management and rehabilitation is reduced.</p>	<p>take into account location of local residents and / or ecologically sensitive areas. A site plan must be submitted to the ECO and project manager for approval. The construction camp may not be situated within the 1:100-year flood line or on slopes greater than 1:3. If the contractor chooses to locate the camp site on private land, he must get prior permission from both the project manager and the landowner. The size of the construction camp must be minimized (especially where natural vegetation or grassland has had to be cleared for its construction). The contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. No development, or activity of any sort associated with camp, is allowed below the 1:100-year flood line of any water system.</p>		<p>commencement of construction works</p>
<p>Storage of materials (including hazardous materials).</p>	<p>Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. Storage areas must be designated, demarcated and fenced. Storage areas must be secure so as to minimize the risk of crime. They must also be safe from access by unauthorised persons. Fire prevention facilities must be present at all storage facilities.</p> <ul style="list-style-type: none"> <li>• Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume, and this must be sited away from drainage lines in a site with the approval of the ECO.</li> <li>• These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.</li> </ul>	<p>Contractor &amp; ECO</p>	<p>Weekly</p>

**4.2. IMPACTS DURING THE CONSTRUCTION PHASE**

POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<ul style="list-style-type: none"> <li>• Clear signage must be placed at all storage areas containing hazardous substances / materials.</li> <li>• Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.</li> <li>• A Waste Disposal Contractor must be employed to remove waste oil. These wastes must only be disposed of at DWS licensed landfill sites designed to handle hazardous wastes. A disposal certificate must be obtained from the Waste Disposal.</li> <li>• The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.</li> <li>• Any spillage, which may occur, shall be investigated and immediate action must be taken. This must also be reported to the ECO and DWS, as well as local authorities if so required.</li> </ul>		
End of construction	<p>Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, re-seeding shall be done. Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, leveled and re-vegetated.</p> <ul style="list-style-type: none"> <li>✓ Only designated areas must be used for storage of construction materials, soil stockpiles, machinery and other equipment. Specific areas must be designated for cement batching plants.</li> </ul> <p>Sufficient drainage for these plants must be in place to ensure that soils do not become contaminated. The construction camp must be kept clear of litter at all times. Spillages within the construction camp need to be cleaned up immediately and disposed of in the hazardous skip bin for correct disposal. No open fires are allowed within the construction camp and no wood from surrounding vegetation may be used to create a fire.</p>	Contractor & ECO	Weekly

**ENVIRONMENTAL EDUCATION AND TRAINING**

<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
Environmental Education must be conducted for Site Staff. These points need to be made clear to staff on site before the project begins.	<p>The ECO is to ensure that all site personnel have a basic level of environmental awareness training. Topics to be covered must include:</p> <ul style="list-style-type: none"> <li>✓ What is meant by “Environment”</li> <li>✓ Why the environment needs to be protected and conserved</li> <li>✓ How construction activities can impact on the environment</li> <li>✓ What can be done to mitigate against such impacts?</li> <li>✓ Awareness of emergency and spills response provisions</li> <li>✓ Social responsibility during construction of the houses e.g. being considerate to local residents</li> </ul> <p>It is the contractor’s responsibility to provide the site foreman with Environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.</p> <ul style="list-style-type: none"> <li>✓ Training must be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary.</li> <li>✓ Use must be made of environmental awareness posters on site.</li> <li>✓ The need for a “clean site” policy also needs to be explained to the workers.</li> <li>✓ Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.</li> </ul>	Contractor &ECO	Weekly
Monitoring of environmental training	<p>The contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules.</p> <ul style="list-style-type: none"> <li>✓ No alcohol / drugs to be present on site.</li> <li>✓ No firearms allowed on site or in vehicles transporting staff to / from site, (unless used by security personnel).</li> <li>✓ Prevent excessive noise.</li> <li>✓ Prevent unsocial behavior.</li> </ul>	Contractor &ECO	Weekly

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<ul style="list-style-type: none"> <li>✓ Bringing pets onto the site is forbidden.</li> <li>✓ No harvesting of firewood from the site or from the areas adjacent to it.</li> <li>✓ Construction staff is to make use of the facilities provided for them, as opposed to ad-hoc alternatives. (e.g.: fires for cooking; the use of surrounding bush as a toilet facility is forbidden).</li> <li>✓ Trespassing on private / commercial / traditional properties adjoining the site is forbidden.</li> <li>✓ Driving under the influence of alcohol is prohibited.</li> <li>✓ Other than pre-approved security staff, no workers shall be permitted to live on site.</li> </ul>		
<b>TOP SOILS</b>			
The stripping of vegetation during preliminary activities on site may increase the risk of soil erosion	The contractor must, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. The full depth of topsoil must be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This must include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. Care must be taken not to mix topsoil and subsoil during stripping. Removed polluted topsoil must be transported to a licensed landfill site.	Contractor & ECO	Weekly
Soil Stripping	No soil stripping must take place on areas within the site that the contractor does not require for construction works or areas of retained vegetation. Subsoil and overburden must, in all construction and lay down areas, be stockpiled separately to be returned for backfilling in the correct soil horizon order. Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes.	Contractor & ECO	Weekly
Stockpiles	Stockpiles must not be situated such that they obstruct natural water pathways and drainage channels. Stockpiles must not exceed 2m in height. If stockpiles are exposed to windy conditions or heavy rain, they must be covered either by vegetation or cloth. Stockpiles may further be protected by the construction of berms or low brick walls around their bases. Stockpiles must be kept clear of	Contractor & ECO	Weekly

<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
	weeds and alien vegetation growth by regular weeding. Where contamination of soil is expected, analysis must be done prior to disposal of excess soil to determine the appropriate disposal route.		
Fuel storage	Topsoil and subsoil to be protected from contamination. Fuel and material storage must be away from stockpiles. Cement, concrete and chemicals must be mixed on an impermeable surface and provisions must be made to contain spillages or overflows into the soil. Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. Contaminated soil must be contained and disposed of offsite at an approved landfill site.	Contractor & ECO	Weekly
Earthworks	Soils compacted during the construction must be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil must be re-spread over landscaped areas. The contractor must be re-vegetated upon completion of construction activities.	Contractor	Weekly
<b>EROSION CONTROL</b>			
The stripping of vegetation during preliminary activities on site may increase the risk of soil erosion.	<p>Wind screening (i.e. erection of barriers, shade nets etc) and storm water control (i.e. gabions, sandbags etc) must be undertaken to prevent soil loss from the site. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. Other erosion control measures that can be implemented are as follow:</p> <ul style="list-style-type: none"> <li>✓ All erosion control mechanisms need to be regularly maintained.</li> <li>✓ Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces.</li> <li>✓ Retention of vegetation where possible to avoid soil erosion</li> <li>✓ Vegetation clearance must be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.</li> <li>✓ Re-vegetation of disturbed surfaces must occur immediately after the construction activities are completed.</li> <li>✓ No impediment to the natural water flow other than approved erosion</li> </ul>	Contractor & ECO	Weekly

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<p>control works is permitted. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.</p> <ul style="list-style-type: none"> <li>✓ where necessary and according to slope and risk in terms bank erosion, disturbed areas of riparian zone must be re-vegetated using either a specified seed mix or appropriate indigenous trees.</li> <li>✓ The use of hay bales packed in rows across diversion and active flow areas during construction must be used to limit sediments input in rivers.</li> </ul>		
GROUNDWATER AND SURFACE WATER POLLUTION			
<p>Water quality is affected by the incorrect handling of substances and Materials.</p> <p>Mismanagement of polluted run-off from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to water quality.</p>	<ul style="list-style-type: none"> <li>• Sanitation Adequate sanitary facilities and ablutions must be provided for construction workers.</li> <li>• The facilities must be regularly serviced and emptied to reduce the risk of surface or groundwater pollution.</li> <li>• No water must be abstracted from any water resource for the purpose of construction activities without a water use license Stockpiling of soil must be done at designated areas as agreed by the contractor and ECO</li> <li>• Soil erosion and loss measures must be implemented.</li> <li>• Construction activities must be limited to the footprint of the development.</li> <li>• Mixing of cement must take place on impervious surfaces.</li> <li>• Regular construction vehicle's checks prior to being used or during their standing period must be done in order to limit or avoid soil contamination.</li> <li>• No servicing of construction vehicles must take place within the site, to avoid soil contamination with hydrocarbons or oils.</li> <li>• Chemical portable toilets provided by contractors must be maintained for the duration of the construction phase.</li> <li>• Water conservation must be promoted by use of water saving technologies.</li> </ul>	Contractor &ECO	Weekly

**4.2. IMPACTS DURING THE CONSTRUCTION PHASE**

POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
Hazardous materials	<ul style="list-style-type: none"> <li>• Use and or storage of materials, fuels and chemicals which could potentially leak into the ground must be controlled. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential storm water events.</li> <li>• Any hazardous substances must be stored at least 20m away from any of the water bodies on site. The Environmental Control Officer must be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry.</li> <li>• Contaminated wastewater must be managed by the contractor to ensure existing water resources on the site are not contaminated.</li> <li>• All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility.</li> </ul>	Contractor & ECO	Weekly
Public areas	Food preparation areas must be provided at the construction camp with adequate washing facilities and food refuse must be stored in sealed refuse bins which must be removed from site on a regular basis. The contractor must take steps to ensure that littering by construction workers does not occur and persons must be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. No washing or servicing of vehicles on site.	Contractor & ECO	Weekly



<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
Water resources	<p>Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities.</p> <p>Water (or another source approved by the ECO) must instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. The Department of Water and Sanitation and the ECO as well as others. Proper compaction of backfilled material to attain low permeability. Ensure that surface/storm water is diverted away from excavation trenches.</p> <p>Ensure that contaminants are safely stored and away from the construction site. Silt traps must be installed in the stretch of the two rivers downstream of the construction works to trap any silt that is mobilised by the construction activities.</p>	Contractor & ECO	Weekly
<b>STORMWATER</b>			
<p>Construction activities frequently result in diversions of natural water flow resulting in concentration of flow and an increase in the erosive potential of the water. Measures in this section are aimed at reducing the erosive potential of storm</p>	<p>The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. Silt fences must be used to prevent any soil entering the storm water drains. Temporary cut of drains and berms may be required to capture. Storm water and promote infiltration.</p> <p>Promote water saving mind set with construction workers in order to ensure less water wastage. New storm water infrastructure construction must be developed strictly according to specifications from ECO in order to ensure efficiency. There</p>	Contractor/ECO & Project Manager	Weekly

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
water.	must be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed. If a batching plant is necessary, run-off must be managed effectively to avoid contamination of other areas of the site.		
AIR QUALITY DUST AND ODOUR			
Dust control. Main causes of air pollution are dust from vehicle movements and stockpiles, vehicle emissions and fires.	<ul style="list-style-type: none"> <li>• Chemical toilets must be cleaned and serviced weekly depending on usage or as required.</li> <li>• Fires must not be allowed on site to avoid emissions into the surrounding ambient air.</li> <li>• All surfaces that are not paved and generate dust must be sprayed using a water tank continuously, or other environmentally friendly dust suppressing agents can be used to limit the generation of dust.</li> <li>• Vehicular speed to the construction site must be regulated, in order to limit the generation of dust on houses along the access route to site.</li> <li>• Any rubble generated during construction shouldn't be left on site for more than two weeks as it will become susceptible to wind action.</li> <li>• Unnecessary movement of construction vehicle must be avoided.</li> <li>• Vehicles that will be transporting building materials such as sand or rubble need to be covered or wet down to avoid the material being blown by air during windy conditions.</li> <li>• The topsoil removal must be done in a phased manner so that large areas of unconsolidated soils are avoided.</li> <li>• A register must be made available for reporting any excess dust from</li> </ul>	Contractor & ECO	Weekly

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<p>construction activities.</p> <ul style="list-style-type: none"> <li>Any remedial action taken in relation to a complaint must be communicated to the complainant.</li> </ul>		
<b>NOISE</b>			
<p>It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work and increase costs in the form of delays.</p>	<p>The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of residential areas in close proximity to the development.</p> <p>Truck traffic must be routed away from noise sensitive areas, where possible.</p> <ul style="list-style-type: none"> <li>✓ Noise levels must be kept within acceptable limits.</li> <li>✓ Noisy operations must be combined so that they occur where possible at the same time.</li> <li>✓ Blasting operations (if required) are to be strictly controlled with regard to the size of explosive charge in order to minimise noise and air blast, and timings of explosions. The number of blasts per day must be limited, blasting must be undertaken at the same times each day and no blasting must be allowed at night.</li> <li>✓ Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas must not be allowed.</li> <li>✓ With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the contractor and ECO must liaise with local residents on how best to minimise impact, and the local population must be kept informed of the nature and duration of intended activities.</li> <li>✓ As construction workers operate in a very noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993). Where necessary ear protection gear must be worn.</li> <li>✓ Noisy activities to take place during allocated construction hours only as per section 25 of the Noise Control Regulations of the Environment</li> </ul>	<p>Contractor, ECO&amp; Project Manager</p>	<p>Weekly</p>

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<p>Conservation Act, 1989 (Act No. 73 of 1989)</p> <ul style="list-style-type: none"> <li>✓ Noise from labourers must be controlled.</li> <li>✓ Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the contractor may be instructed to remove the offending vehicle or machinery from site?</li> <li>✓ The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the contractor own transport.</li> <li>✓ Signage informing the public of construction activities must be erected on site.</li> </ul>		
<b>VISUAL IMPACT</b>			
	<ul style="list-style-type: none"> <li>• The site must be screened off by use of fence with shade cloth.</li> <li>• The construction sites and camps must be kept neat, clean and organised in order to portray a general tidy appearance.</li> <li>• Rubble and other building litter must be removed off site as soon as possible or placed in a container in order to keep the construction site free from additional unsightly elements;</li> <li>• Dust suppression measures must be implemented; this includes regulating speeds along access routes to site.</li> </ul>	Contractor & ECO	Weekly
<b>FLORA</b>			
Alien plant encroachment is Particularly damaging to natural habitats and is often Associated with disturbance to the soil during construction activities. Care	During the construction phase workers must be limited to areas under construction and access to the undeveloped areas, especially the surrounding open areas must be strictly regulated (“no-go” areas during construction activities. The site must be fenced prior to construction activities and remain fenced off. Collection of firewood and traditional medicinal plants is strictly prohibited. No area must be cleared of trees, bushes and other vegetation for	ECO & Contractor	Weekly

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
Must be taken to conserve existing plant and animal life on and surrounding the site.	<p>the purpose of a camping site.</p> <p>The construction could result in limited opening-up of the vegetal cover during the construction phase. The opening up of existing vegetated areas, thereby creating corridors along which animals can move, may result in increased predation levels on small mammals, reptiles, amphibians, arachnids and scorpions along these corridors.</p> <p>The limitation of the disturbance of vegetation cover as well as rocky outcrops, logs, stumps, termite mounds within sensitive areas will ameliorate this impact.</p> <ul style="list-style-type: none"> <li>✓ Disturbed areas of natural vegetation as well as cut and fills must be rehabilitated immediately to prevent soil erosion.</li> <li>✓ Any post-development re-vegetation or landscaping exercise must use species indigenous to South Africa.</li> <li>✓ The disposal of vegetation on neighbouring properties is prohibited</li> <li>✓ All cleared vegetation must be disposed of at a licensed landfill site. Burning of vegetation is prohibited on site.</li> </ul>		
Rehabilitation	<p>Any post-development re-vegetation or landscaping exercise must use species indigenous to South Africa. Where the removal of alien species may leave spoil exposed, alternative indigenous species must be established before eradication takes place. All damaged areas as a result of construction shall be rehabilitated upon completion of the contract in accordance with ECO satisfaction. Slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced. Extra seed shall be sown on disturbed areas as directed by the ECO. Other methods of rehabilitating disturbed sites may also be used at the discretion of the Project Manager to comply with the conditions of the EMP, e.g. stone pitching, logging, etc. Contour banks shall be spaced according to the slopes. The type of soil shall also be taken into consideration.</p>	Contractor & ECO	Once off

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<p>All-natural areas impacted during construction must be rehabilitated with locally indigenous grasses typical of the representative botanical unit. Fragmentation must be kept to a minimum.</p> <ul style="list-style-type: none"> <li>✓ Rehabilitation must take place as soon as construction is complete to avoid the edge effect, the infiltration of alien species and soil erosion within the servitude.</li> <li>✓ Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for reseeded</li> <li>Demarcation of construction area</li> <li>✓ The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint.</li> <li>✓ Signposts must be erected in areas which are identified by the ECO as being ecologically sensitive and which are adjacent to any construction work to prevent damage by labour and equipment.</li> <li>✓ These areas must be demarcated with branded tape to limit access and indicate to construction staff that these areas are sensitive.</li> <li>✓ Only vegetation within the construction area must be removed.</li> <li>✓ Vegetation removal must be phased in order to reduce impact of construction.</li> <li>✓ The construction site office and lay down areas must be clearly demarcated and no encroachment must occur beyond demarcated areas.</li> <li>✓ Construction areas must be well demarcated.</li> <li>✓ Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora. Sensitive area mitigation measures</li> <li>✓ Intensive environmental compliance monitoring must be conducted during this construction period.</li> </ul>		
<b>FAUNA</b>			
Fauna	- A barrier either preferably concrete or galvanized sheeting that extends as a	ECO	Weekly

<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
	<p>continuous sheet above ground for at least 40cm and below ground for at least 30cm that will physically block animals from accessing the site to be constructed for a distance of 200m on either side of all aquatic and terrestrial underpasses.</p> <ul style="list-style-type: none"> <li>- The contractor must ensure that no faunal species are disturbed, trapped, hunted or killed during the construction phase. Construction activities must be planned carefully so as not to interfere with the calving and lambing season for most animal species.</li> <li>- Care must be taken when removing stumps, logs or rock material. Any scorpions encountered on the site must be left alone and allowed free access away from the activity or safely removed from the area. No scorpions must be intentionally killed.</li> <li>-Snakes must not be harmed or killed and allowed free movement away from the area. Safety precaution measure must be implemented especially during the vegetation clearance phase which could result in encounters with several venomous snake species.</li> <li>- The frequent burning of the vegetation will have a high impact on remaining reptile species. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks. All necessary mitigation measures must be implemented to minimise impacts on the environment.</li> </ul>		
<b>WASTE MANAGEMENT</b>			
Set up of Waste Management Procedures. Construction rubble.	Construction rubble shall be disposed of in pre – agreed, demarcated spoil dumps that have been approved by the relevant Municipality. All building rubble must be removed to a registered landfill site.	Contractor/ECO	Weekly
Litter management	Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. A housekeeping team must be appointed to regularly maintain the litter and rubble situation on the construction site. Waste disposal will need to take place in terms of Section 20(6) of the	Contractor/ECO	Weekly

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<p>Environmental Conservation Act (Act No. 73 of 1989). Subject to the provisions of any other law no person shall discard waste or dispose of it in any other manner, except-</p> <p>(a) at a disposal site for which a permit has been issued in terms of subsection (1); or</p> <p>(b) In a manner or by means of a facility or method and subject to conditions as the Minister may prescribe. In addition, notice must also be taken of the provisions contained in the NEM: Waste Management Act.</p> <p>-If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling.</p> <p>-Littering by the construction workers shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the contractor campsite.</p> <p>-Skip waste containers must be maintained on site. These must be kept covered and arrangements made for them to be collected regularly from the site by the local council.</p> <p>-All waste must be removed from the site and transported to a landfill site as approved by the relevant Municipality. Waybills providing disposal at each site shall be provided to the ECO's inspection.</p>		
Hazardous waste	<p>All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of offsite at a licensed landfill site. Contaminants to be stored safely to avoid spillage Machinery must be properly maintained to keep oil leaks.</p> <p>-Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site.</p> <p>-The ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil</p>	Contractor/ECO	Weekly



**4.2. IMPACTS DURING THE CONSTRUCTION PHASE**

POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	absorbent materials. -If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal.		
Sanitation	The contractor shall install mobile chemical toilets on the site. Staff shall be sensitised to the fact that they must use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. Ablution facilities shall be within 100m from workplaces but not closer than 50m from any natural water bodies or boreholes. There must be enough toilets available to accommodate the workforce. Male and females must be accommodated separately where possible. -Toilets must be no closer than 100m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the ECO. Potable water must be provided for all construction staff.	Contractor	Weekly
<b>HEALTH AND SAFETY</b>			
Workers safety is of outmost importance Implementation of safety measures, work procedures and first aid must be implemented on site.	Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) is required to ensure worker safety. Workers must be thoroughly trained in using potentially dangerous equipment. Must ensure that all equipment is maintained in a safe operating condition. <ul style="list-style-type: none"> <li>✓ A safety officer must be appointed.</li> <li>✓ A record of health and safety incidents must be kept on site.</li> <li>✓ Any health and safety incidents must be reported to the project manager immediately.</li> <li>✓ First aid facilities must be available on site at all times. Workers have the right to refuse work in unsafe conditions.</li> <li>✓ A record shall be kept of drugs administered or precautions taken and</li> </ul>	Contractor, Project Manager, and ECO	Daily

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<p>the time and dates when this was done. This can then be used as evidence in court must any claims be instituted against the contractor.</p> <ul style="list-style-type: none"> <li>✓ The contractor must ensure that all construction workers are well educated about HIV/ AIDS and the risks surrounding this disease.</li> <li>✓ Material stockpiles or stacks, such as, pipes must be stable and well secured to avoid collapse and possible injury to site workers.</li> </ul>		
Worker facilities	Eating areas must be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness Fires are not to be allowed.	Contractor, Project Manager and ECO	Daily
Protective gear	Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn were necessary i.e. dust masks, ear plugs etc. No person is to enter the site without the necessary PPE positions.	Contractor &	Daily
Site safety	<p>The construction camp (if required) must remain fenced for the entire construction period.</p> <ul style="list-style-type: none"> <li>-Potentially hazardous areas such as trenches are to be demarcated and clearly marked.</li> <li>-Adequate warning signs of hazardous working areas.</li> <li>-Uncovered manholes and excavations must be clearly demarcated</li> <li>-Emergency numbers for local police and fire department etc must be placed in a prominent area.</li> <li>-Firefighting equipment must be placed in prominent across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank.</li> <li>-Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site. All speed limits must be adhered to.</li> </ul>	Contractor, Project Manager and ECO	Daily
Procedure in the event of a petrochemical spill	The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, ECO or the contractor. The problem must be assessed and the necessary actions required will be undertaken. The	Contractor &ECO	Daily

<b>4.2. IMPACTS DURING THE CONSTRUCTION PHASE</b>			
<b>POTENTIAL IMPACTS</b>	<b>MITIGATION MEASURE</b>	<b>RESPONSIBILITY/MONITORING OF MITIGATION MEASURE</b>	<b>FREQUENCY</b>
	immediate response must be to contain the spill. The source of the spill must be identified, controlled, treated or removed.		
<b>SECURITY</b>			
Secure the site in order to help reduce the opportunity for criminal activity in the locality of the construction site.	Access to the construction site must be strictly controlled by a security company. 24-hour security on-site. No person shall enter the site unless authorised to do so by the contractor, project manager or ECO. If any fencing interferes with the construction process, such fencing shall be deviated until construction is completed. The deviation of fences shall be negotiated and agreed with the landowner in writing. Trespassing on private / commercial properties adjoining the site is forbidden. Secure the site in order to reduce the opportunity for criminal activity in the locality of the construction site	Contractor	Daily
<b>SOCIO-ECONOMIC</b>			
It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work and increase costs in the form of delays.	All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times. A complaints register must be kept on site. Details of complaints must be incorporated into the audits as part of the monitoring process. This register is to be tabled during monthly site meetings. During the set-up phase of the project, the Contractor needs to make contact with the PSC and the people that are interested or affected by the development (IAPs). The Contractor must appoint a Community Liaison Officer or the ECO is to deal with all social issues. The Contractor must obtain the landowners permission to remove any fence, and infringe on any property. <ul style="list-style-type: none"> <li>✓ No interruptions other than those negotiated shall be allowed to any essential services. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the contractor. A record of all damage and remedial actions shall be kept on site. Influx of Job Seekers.</li> <li>✓ Ensure that employment procedures / policy are communicated to local stakeholders, especially community representative organisations and ward councilors.</li> </ul>	Contractor, Project Manager, and ECO	Weekly

4.2. IMPACTS DURING THE CONSTRUCTION PHASE			
POTENTIAL IMPACTS	MITIGATION MEASURE	RESPONSIBILITY/MONITORING OF MITIGATION MEASURE	FREQUENCY
	<ul style="list-style-type: none"> <li>✓ Construction workers must be clearly identifiable by wearing proper construction uniforms displaying the logo of the construction company. Construction workers could also be issued with identification tags.</li> <li>Outflow of labourers</li> <li>✓ Payment must comply with applicable Labour Law legislation in terms of minimum wages. Direct formal employment opportunities</li> <li>✓ Unskilled job opportunities must be afforded to local residents. Local trade unions could assist with the recruitment process to counteract the potential for social mobilisation.</li> <li>✓ Equal opportunities for employment must be created to ensure that the local female population also has access to these opportunities. Females must be encouraged to apply for positions.</li> </ul>		
CULTURAL AND HERITAGE ARTEFACTS			
Prior to the commencement of construction, the ECO must notify staff what possible archaeological or historical objective of value may look like, and to immediately notify the Engineer / Contractor must such an item be uncovered.	<p>Any findings must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No25 of 1999). Local museums as well as the South African Heritage Resource Agency (SAHRA) must be informed if any artefacts are uncovered in the affected area.</p> <p>The contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken.</p> <p>Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources.</p>	Contractor/ECO	Prior to commence with construction works

### 4.3 OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised, and where possible, avoided. This, in turn, will minimise the risk and reduce the monitoring effort, although the intention here is not to make monitoring redundant. Monitoring and periodic testing of certain critical aspects such as waste management, erosion control, ground and surface water pollution control and cell rehabilitation will still be required. The Midvaal Local Municipality (Applicant), Health and Safety consultant, as well as the Waste Management Control Officer will be instrumental in implementing the EMPr during the operational phase.

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
<b>OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME</b>			
<b>General</b>	<p>A landfill site maintenance plan should be compiled or adopted if Midvaal local municipality has one in place. Records and administration process should be maintained, this must include but not limited to:</p> <ul style="list-style-type: none"> <li>• Emergency preparedness plan, Rehabilitation plan, operational plan,</li> <li>• Records of Environmental awareness trainings should be kept.</li> </ul> <p>The EMPr is a living document that can be amended when a need arises, thus should be reviewed and amended/updated when a need arises.</p> <p>No alien vegetation planting should be allowed on site. Internal and external audits should be performed annually or as and when required by the competent authority. The audit reports should be submitted to the competent authority. The operational plan must be in place and complied with.</p>	Midvaal Local Municipality	Continuous
<b>Loss of Flora</b>	Any landscaping implemented in the development must make use of indigenous vegetation in order to limit or eliminate the introduction of alien and/or invasive species. A leakage detection and collection layer of 150mm compacted clay liner, 150mm bases preparation layer and an in-situ layer must be installed.	Midvaal Local Municipality	Continuous
<b>Loss of Fauna</b>	Change of ecosystem by potential windblown litter. The landfill site must be fenced off windbreakers in the form of trees and/or wall barrier where possible must be considered. Daily compaction and cover of waste must be implemented to reduce wind-blown litter.	Midvaal Local Municipality	Continuous
<b>Geology and Soil</b> Loss of soil and change in the	Storm water management plan must be implemented on site, so as to avoid erosion and sedimentation. The rehabilitation of the active cells must be implemented concurrent with	Midvaal Local Municipality	Continuous

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
geology of the area	operations. Daily compaction and cover of waste must be implemented.		
<b>Visual and aesthetic</b>	<p>The compaction and cover approach should be implemented on a daily basis. Rehabilitation of cells should begin immediately after the cell has been filled. The rehabilitation can occur concurrently with the operation and filling of the cell where applicable</p> <ul style="list-style-type: none"> <li>• The tree around the landfill site act as a barrier, such that the site is not visible from the R82 Road.</li> <li>• Areas should be landscaped using indigenous vegetation.</li> <li>• All litter that gathers around the fence should be regularly cleaned.</li> <li>• Comply with the rehabilitation and stability management plan.</li> <li>• The site must be fenced with walls or palisade to obscure the inside operations and contain any windblown litter.</li> <li>• Operation activities must observe good housekeeping principles and the site must be kept neat at all times.</li> <li>• Daily compaction of waste and cover must be maintained to prevent windblown litter leaving the site.</li> </ul>	Midvaal Local Municipality	Continuous
<b>Environmental awareness</b>	The hunting of fauna within and outside the boundary of the site is prohibited. Environmental awareness and training should be provided to all personnel on site. All fauna on site should be relocated; however, this should be communicated to the competent authority prior. Health awareness programmes should be implemented and held on site.	Midvaal Local Municipality, ECO	Continuous
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• Surface water monitoring shall be performed in all storm water drains on and adjacent to the site</li> <li>• Groundwater monitoring was be conducted to detect any ground water pollution.</li> <li>• Air quality monitoring must be undertaken.</li> <li>• A monitoring Programme must be put in place and eradication programme should be put in place whereby the distribution and abundance of alien and invader fauna are monitored through fixed trapping points.</li> <li>• Conducting internal and external audits.</li> </ul>	Midvaal Local Municipality	Continuous
Waste composition,	All waste coming into the facility should be weighed and classified; in addition, the waste	Midvaal Local	Continuous

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
inventory and inspection	register should be maintained. Details of the waste register should include, but not limited to waste type, date of waste coming in or out (to recycling facilities), details of the collector or producer. Visual inspections should be done frequently at the disposal site to ensure that waste coming into the site is properly disposed off or sorted, at designated areas.	Municipality, site manager	
Management of landfill gas and odours	<p>Emission rates must be reduced by limiting the extent of uncapped areas on non-operational areas of the site.</p> <p>An area or cell should be regularly covered with temporary cover material to reduce gas emissions from the area. The prompt covering of malodorous waste to reduce odour problems is a Minimum Requirement. In extreme cases, odour suppressants such as spray curtains may be required.</p> <p>Where breached in the cover from which significant volumes of landfill gas escape are identified by their odour, a proper investigation is a Minimum requirement. This may be followed by properly engineered passive or active gas venting and flaring to alleviate odour problems. Where a gas management system exists at a site, it must be correctly operated, maintained and monitored to ensure that any landfill gas emanating from the site is properly managed.</p> <p>Special cells must be constructed for the disposal of putrescible general wastes. Such wastes should be deposited and covered immediately with a layer of soil at least 0.5m thick. This will prevent odours and discourage uncontrolled salvage.</p> <p>Accidental fires on landfills where burning is not permitted must be extinguished immediately. Appropriate operational procedures involving the spreading and smothering of burning waste, rather than the application of water, must be implemented.</p>	Midvaal Local Municipality	Continuous
Air Quality: odour from waste body	<p>Compaction and cover approach should be implemented to control odours Where necessary odour suppressants may be utilized to limit the odour coming from the waste body.</p> <p>All exposed areas should be either covered or grassed if it's for long term purposes rehabilitation plan should be implemented in conjunction with the operational phase, thus all landfill slopes need to be grassed.</p>	Landfill operator	Continuous
Vehicle, equipment maintenance and fuelling	Vehicular speed to the site should be regulated, in order to limit the generation of dust onsite. All surfaces that are not paved and generate dust should be sprayed using a water tank continuously, or other dust suppressing agents can be used to limit the generation of	Landfill operator	Continuous

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
	<p>dust. Portable water should not be used for dust suppression, however rain harvested water and recycled water can be utilized.</p> <p>On site, windbreaks can be utilized to limit pollution on surrounding areas of the landfill site. Employ speed control measures on roads to control dust and wearing of roads</p> <p>Unnecessary movement of vehicle must be avoided. Vehicles that will be transporting building materials such as sand or rubble need to be covered or wet down to avoid the material being blown by air during windy conditions.</p> <p>Minor maintenance of equipment and/or vehicles must be restricted to designated areas which are established and managed for maintenance, i.e. workshops. No major maintenance must be carried out on site.</p>		
Health, Safety & security	<p>An emergency plan (including fire management) must be developed and implemented; the relevant authority must approve this plan. Ensure that all fire extinguishers are replaced on or before their expiry dates.</p> <p>Site Safety checks should be carried out in accordance with the pertinent Occupational Health and Safety requirements prior to site closure.</p> <p>Telephone numbers of emergency services shall be posted conspicuously in the office for use in emergency situations.</p> <p>The use of PPE should be enforced on site at all times. Appropriate medical equipment must be placed on onsite and made accessible at all times. The appropriate number of staff members must be adequately trained in first-aid in accordance with the Health and Safety Regulations.</p> <p>24 Hour security must be provided at the landfill site. Suitable barricades must be erected to secure the site and to avoid unrestricted access to the site during construction activities.</p> <ul style="list-style-type: none"> <li>• During operation the area must be fenced off or demarcated, with a security personnel managing the access point(s). Any unauthorised entry of the public to the site must be restricted.</li> <li>• The fence must be inspected and its integrity maintained on daily basis.</li> <li>• The operational plan must be implemented.</li> <li>• Scavenging by unauthorized persons represents a security and health and safety risk and must not be permitted on site.</li> </ul>	Landfill operator	Continuous



IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
	<ul style="list-style-type: none"> <li>Controlled salvaging of waste must be encouraged.</li> </ul>		
Vermin and Disease vectors	<p>Compaction of waste and cover must be maintained. Dust generated from un-surfaced areas must be suppressed by watering. Personnel on site must be provided with Personal Protection Equipment (PPE) for their health and safety.</p>	Landfill operator	Continuous
Fire management	<p>Fires must be made in designated areas only, thus away from any flammable material or an area with a high fire risk.</p> <ul style="list-style-type: none"> <li>Open fires must not be left unattended.</li> <li>Burning of waste on site is prohibited.</li> <li>Compliance reports must be compiled regularly to ensure full compliance with the EMP.</li> <li>The plant must be equipped with firefighting equipment which will include; <ul style="list-style-type: none"> <li>Flame arresters</li> <li>Water sprinklers</li> <li>Gas/ Fire detection equipment</li> <li>Nitrogen and carbon dioxide blanketing equipment</li> <li>Foam spraying.</li> </ul> </li> <li>The fire-fighting equipment should be stored to the satisfactory to the Local Fire Services.</li> <li>Key personnel should be allocated for fire emergencies.</li> <li>All staff should be trained on operation of safety equipment</li> </ul>	Landfill operator	Continuous
Noise management	<p>The service plan for all vehicles and equipment on site should be maintained. All work must be conducted only during regular business hours.</p> <p>When required, the any planned noise disturbances outside of normal working hours. A register for all noise complaints should be kept and corrective actions needs to be applied on issues raised</p>	Landfill operator	Continuous

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
Storm-water Management	<p>Storm water, wherever possible, must be allowed to soak into the land in the area on which the water has been discharged.</p> <p>The storm water system, especially the discharge points, must be inspected and damaged areas must be repaired if required.</p> <p>No waste or refuse must be allowed to access the storm water Infrastructure.</p> <p>Discharge points must be inspected for blockages of any kind; these must be removed timeously to ensure the efficient operation of the storm water management system.</p> <p>Excessive quantities of silt laden runoff water must not be allowed to access the storm water system. In the event that silt runoff occurs off the development site, the cause of this must be investigated and suitable mitigation measures employed. This may include the vegetation of bare areas, installing flow diversion channels in consultation with an engineer, installing velocity reducing structures etc.</p> <p>Where vegetation has been utilised as part of the storm water management system, it is important to ensure that the vegetation is maintained for effective infiltration.</p> <p>Where silt traps have been incorporated as part of the storm water management system these must be maintained as per the engineers requirements, the maintenance crew must be informed as to the correct procedure, in terms of the engineers specifications, how the silt trap is to be maintained. The silt trap must be monitored for efficiency; the management body must consult the engineers should the system not function adequately.</p> <p>Great care should be taken to make sure that the sumps do not overflow, such that they can spill to contaminate the environment.</p>	Landfill operator	Continuous
Waste management	<p>No waste should be dumped indiscriminately on site, other than landfilling at designated areas. Hazardous waste should not be permitted on site. No medical waste is permitted on site.</p> <p>All vehicles transporting waste should be well suited for the transportation of the class and type of waste.</p> <p>Waste disposal should be done in accordance with the NEM:WA standard for Disposal of Waste to Landfill.</p>	Landfill operator	Continuous

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
	The Waste Hierarchy Management Plan should be adhered to. All recyclable material sorted should be taken to a licensed recycler. The green waste should be processed at the designated compost area.		
Waste water management	The stormwater management plan should be adhered to. <ul style="list-style-type: none"> <li>Storm water should be separated from the waste body.</li> <li>All storm water channels should be cleared off litter.</li> <li>Storm water management plan should be implemented.</li> <li>Discharge of pollutants into storm water channels and water courses is prohibited.</li> <li>A leak detection and monitoring system should be installed and implemented</li> </ul>	Landfill operator	Continuous
Employment	Local labour employment should be encouraged, provided that personnel have the appropriate qualifications	Landfill operator	Continuous

#### 4.4 Decommissioning phase

This entails the rehabilitation and closure of the waste disposal site and proposed end-use. During the construction and rehabilitation of the site in preparation for closure a Project Compliance Audit should be undertaken, which should focus on stability issues, erosion, vegetation, water and monitoring. Because this phase will only be undertaken well over 4 years' time, monitoring and audit protocols should be set up then as issues such as change in legislation, waste types, etc. might have changed and could possibly affect how decommissioning is managed. The table below illustrates the monitoring and mitigation measures to be implemented during the various development phases. It should be noted that monitoring should take place on a monthly basis during construction and quarterly during the operational phase. The closure and rehab phase monitoring should be stipulated in the closure plan to be updated closer to the time.

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
<b>DECOMMISSIONING, CLOSURE AND REHABILITATION</b>			
Consultation	The end-use design is to be agreed in consultation with the public and authorities prior to closure, in accordance with applicable regulations. The waste disposal site closure is to be properly planned, with the waste stream diverted elsewhere effectively on closure.	Midvaal Municipality Local	Once off
ECO	ECO to monitor closure plan and rehabilitation process. -Midvaal Local Municipality to ensure planning for future waste disposal towards the end of the present site life. -Independent waste disposal auditor: Audit the waste disposal closure. -ECO to monitor waste disposal condition following closure. -Post closure audits to be undertaken as per the permit requirements -ECO must monitor dust and other nuisance issues from closure and rehabilitation. -ECO must ensure that waste disposal gas is considered prior to closure.	Midvaal Municipality, Auditor Local ECO,	Once off
End Use	Waste disposal site must be properly monitored and maintained to prevent pollution, and to allow the waste disposal to be used for the intended end-use. Waste disposal site rehabilitation is to take place progressively as each phase is completed, so that the waste disposal has minimal visual impact, and as little nuisance as possible is caused by final rehabilitation. -Suitable final landscaping plans in line with the desired end-use must be drawn up and confirmed prior to closure, if required. Indigenous flora specified is to be established as part of waste disposal rehabilitation. -Waste disposal infrastructure that will fall into disuse, such as the office buildings, must be decommissioned. Minimum gradients of 1 in 3 to be achieved by final landform, to ensure efficient drainage following settlement. Drainage systems are to be left in good condition, with all clean runoff draining off site in a controlled manner. -Erosion of final landform to be considered.	Midvaal Municipality, ECO Local	Once -off
Safety and security	-Security must be employed to ensure that unauthorised persons do not enter the site. -Boundary fences to be maintained. If required, unauthorised entry to be prevented. -The single access point to be locked. -No entry signs must be erected.	Midvaal Municipality, ECO Local	Once -off

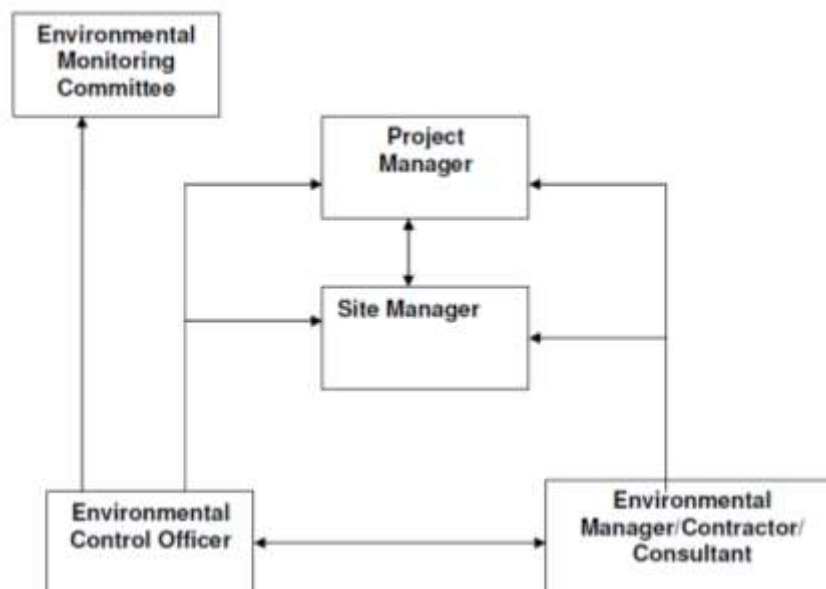
IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
	<p>-Construction team staff must be given safety training, and must be aware of safety reporting structures and procedures.</p> <p>-A risk assessment, detailing closure and rehabilitation activities, methods to be used, associated health and safety risks, and planned mitigation measures, must be drawn up by the construction team and be submitted and approved by the -Midvaal Local Municipality before construction commences.</p> <p>-Health and safety aspects must be regularly checked by the Resident Engineer during construction.</p> <p>-If waste disposal gas does arise in large quantities on the site (which is not expected), such gas must be suitably vented from the waste body through the design and construction of suitable gas vents, and must not be allowed to accumulate to dangerous levels.</p>		
Erosion	<p>Settlement and erosion must be monitored and repaired where required on the final landform, so that the health and safety of those participating in any end-use is not compromised.</p> <p>-If waste disposal gas does arise in large quantities on the site (which is not expected), such gas must be suitably vented from the waste body through suitable gas vents, and must not be allowed to accumulate to dangerous levels.</p>	Midvaal Local Municipality, ECO	Once -off
Capping	<p>Suitable final landscaping plans must be drawn up and confirmed prior to closure, if required. Flora chosen for vegetating final landform must have shallow root system, so that final capping layers are not damaged or penetrated, and must be suitable for the end-use chosen.</p> <p>Indigenous grass to be established as part of waste disposal rehabilitation.</p>	Midvaal Local Municipality, ECO	Once -off

## 5. ROLES AND RESPONSIBILITIES OF THE PROJECT TEAM

### 5.1 IMPLEMENTATION OF EMPr

Several professionals must form part of the project team. The most important from an environmental perspective are the Project Manager, the Environmental Control Officer (ECO), to be appointed. The Project Manager is responsible for the implementation of the EMPr on the site during the Construction phase of the project. The ECO is responsible for monitoring the implementation of the EMPr during the construction phase of the project.

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project manager, Site Manager, Environmental Manager and Environmental Control Officer for the construction phase of this project are as detailed below.



### 5.2 PROJECT MANAGER

The Project Manager is responsible for overall management of project and EMPr implementation. The following tasks will fall within his / her responsibilities:

- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures.
- Monitor site activities on a daily basis for compliance.
- Conduct internal audits of the construction site against the EMPr.
- Confine the construction site to the demarcated area.
- Rectify transgressions through the implementation of corrective action.

- Ensure that Midvaal Local Municipality and the Contractor are aware of all specifications, legal constraints and municipal standards and procedures pertaining to the project specifically with regards to the environment.
- Be fully conversant with the Environmental Impact Assessment for the project, the conditions of the Waste Management Licence, and all relevant environmental legislation

#### **5.4 SITE MANAGER**

- Be fully conversant with the Environmental Impact Assessment.
- Be fully conversant with the conditions of the Waste Management Licence,
- Be fully conversant with all relevant environmental legislation and Midvaal Local Municipality environmental policies and procedures, and ensure compliance with these.
- Have overall responsibility for the implementation of the EMP.
- Ensure that audits are conducted to ensure compliance to the EMP.
- Liaise with the Project Manager or his delegate, the Environmental Control Officer and others on matters concerning the environment.
- Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

#### **5.5 THE ENVIRONMENTAL MANAGER**

- Ensure daily inspections to determine compliance with Waste Management Licence, using checklists.
- Submit monthly audit update report to Midvaal Local Municipality, External Auditor & Project Management, showing progress with closure of findings.
- Facilitate reporting, recording, investigation and follow-up of environmental related incidents as per Risk Management process.
- Facilitate and integrate relevant training programs for personnel covering all activities impacting on the environment.
- Ensure that the environmental commitments in this Environmental Management Programmes and Waste Management Licence, are complied with by the contractor and its sub-contractors.

- Review construction methods, techniques and procedures, identify environmental risk, draw conclusions and recommend possible solutions.
- Develop, implement and manage the necessary construction & operational EMS.
- Proactively interpret and objectively analyse environmental data and initiate programs to mitigate against the environmental and related risks.
- Assume a leading role in performing environmental audits and guiding other staff in the performing of external and internal audits.
- Perform monthly environmental reporting for input into Divisional management information reports.

## **5.6 ENVIRONMENTAL CONTROL OFFICER**

The Environmental Control Officer is responsible to monitor the implementation of the EMPr during the construction phase as well as liaison and with the contractor landowners and authorities. The contract documentation provided to the Contractor includes Employer's Requirements detailing the technical specifications for the operation of the landfill project with which detailed design must comply and this EMPr, with which the Contractor is legally bound to comply.

The Invitation for Bid (IFB) document will typically specify a number of requirements for environmental compliance that the Contractor will be required to implement. This includes the appointment of staff to handle different aspects of environmental and social safeguards such as an Environmental Compliance Officer (ECO). The following tasks will fall within his / her responsibilities:

- Be familiar with the recommendations and mitigation measures of this and to provide input into the EMPr.
- Conduct weekly / monthly audits monitoring of the construction site according to the EMPr.
- Educate the construction team about the management measures of the EMPr.
- Regular liaison with the construction team and the project leader.
- Compile a regular report highlighting any non-compliance issues as well as good compliance with the EMPr.
- The affected parties shall always be kept informed about any changes to the construction programme must they be involved. If the ECO is not on site the contractor must keep the affected parties informed.
- Report non-compliance to the Engineer, as applicable and recommend corrective action.



- Attend site meetings to be able to report on and respond to any environmental issues and be issued copies of minutes of such meetings.
- Take photographs (digital) of the site prior to, during and immediately after construction and rehabilitation as a visual reference.
- Inform the Engineer immediately where clearly defined and agreed “no-go” areas are violated or in danger of being violated,
- Provide input into the Engineer’s environmental compliance documentation and monitor compliance.
- Prior to commencement of work on site, the Contractor shall be briefed by the Engineer and ECO on obligations related to environmental controls and methodologies in terms of the EMPr. The briefing will take the form of an on-site talk and demonstration and any other written or graphic material applicable to the project. The ECO is to be involved in monitoring the following aspects:
  - Impact Avoidance and Minimization Documentation Effectiveness of the storm water management system
  - Erosion, vegetation protection and restoration/rehabilitation
  - Construction staging areas (environmental clearances)
  - Cultural and historical issues and commitments
  - HIV/AIDS education and awareness programme
  - Environmental education and awareness training
  - Other commitments made in the environmental authorisation
  - Specific on-site administration the ECO will be required to do include:
    - Conduct quarterly or six-monthly environmental audits during the construction phase to check adherence to the management provisions of the EMPr.
    - Compile a quarterly or six-monthly environmental audit report based on the findings of the regular audits and submit to Engineer.
  - Monitor the Contractor’s record of environmental incidents (Incident Book) such as spills, impacts, transgressions, including nature and extent of the incident, cause, responsibility, and corrective and preventive actions taken. All incidents must be reported to the Engineer and a summary of recorded incidents must be included in the monthly audit reports.
  - Monitor Contractor’s complaints register in which all social and environmental complaints and any actions taken are recorded.
- The contact numbers of the contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims.

- The Contractor is responsible for the implementation and compliance with recommendations and conditions of the EMPr. Ensure compliance with the EMPr at all times during construction activities. Maintain an environmental register which keeps a record of all incidents which occur on the site during construction of the piggery facilities. These incidents include but not limited to:
  - Public involvement / complaints
  - Health and safety incidents
  - Incidents involving Hazardous materials stored on site
  - Non-compliance incident
  - All incidents are to be reported to the Environmental Liaison Committee (ELC) as per reporting procedure.

### **5.7 THE CONTRACTORS AND SERVICE PROVIDERS:**

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

- Complying with the environmental management specifications where applicable;
- Provide Environmental; Method Statements to the Site Manager with regards to how certain activities on-site will be conducted.
- Adhering to any environmental instructions issued by the Site Manager/Project Manager on the advice of the ECO;
- Submitting a report, in a format and frequency as decided upon by the Project/Site Manager, which will document all incidents that have occurred during the period before the site meeting
- Arrange that all his employees and those of his subcontractors receive training. Training has to be appropriate for the level of the tasks and functions undertaken.
- The Environmental Method Statement referred to above will cover applicable details with regard to:
  - Construction procedures;
  - Materials and equipment to be used;
  - Getting the equipment to and from site;
  - How the equipment/material will be moved while on-site;
  - How and where material will be stored;
  - The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
  - Identified potential impacts of the activity and mitigation measures thereof;

- Compliance/non-compliance with the Environmental Specifications; and Any other information deemed necessary by the Site Manager.

## **6. MONITORING**

### **6.1 ENVIRONMENTAL MONITORING**

Monitoring efforts would be in vain in the absence of an organized record keeping practice. It is the responsibility of the client management to ensure the development of a database that includes a systematic tabulation of process indicators, performed computations, maintenance schedules and logbook, process control and performance monitoring outcomes. Such a historical database benefits both the plant operator and design engineers. Also, in accordance with the requirements of the regulatory authority, ECO must submit a periodic water quality monitoring programme to DWS. This programme will include:

- Daily monitoring and monthly audits will be conducted by the Environmental Control Officer to ensure compliance to the EMPr conditions, and where necessary make recommendations for corrective action.
- Compilation of an audit report with a rating of compliance with the EMPr. The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage must be directed to the ECO for appraisal. The contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the Landowner or community. All complaints / claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

### **6.2 INSPECTIONS**

During both the construction and the operational phases of the project, regular inspections of the construction site or of the operational facility are to be undertaken, preferably by a third party. The inspection reports are to be kept on file and to be made available to representatives from the DWS and GDRAD or to an External Auditor upon request.

## **7. TRAINING AND CAPACITY BUILDING**

Training is essential for ensuring that the EMPr provisions are implemented efficiently and effectively. Training needs are to be identified based on the available and existing capacity

of site and project personnel (including the Project Proponent, Contractors and Sub-contractors) to undertake the required EMPr management actions and monitoring activities. It is important that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

In addition to training, general environmental awareness is to be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimized and environmental compliance maximized. The onus is on the different parties involved in the various stages of the life-cycle of the project to be environmentally conscious. Contractors are to forward internal environmental awareness and training procedures to the Project Manager and Environmental Control officer for comment prior to the commencement of the project.

## **8. CREATING ENVIRONMENTAL AWARENESS**

### **8.1 ENVIRONMENTAL AWARENESS TRAINING**

#### **8.1.1 OBJECTIVES**

Before starting training or regular work, all employees will be required to attend an induction programme, which shall include site safety procedures (e.g. blasting), emergency procedures, health and safety (e.g. HIV/AIDS), and environmental safeguards. The Contractor must ensure that all people involved in the project (including sub-contractors, casual workers, drivers etc.) are aware of and familiar with the environmental requirements for the project. Environmental Induction must ensure that the workforce:

- Understands the key environmental features of the Site and environs and the kind of activities that impact on them;
- Are thoroughly familiar with the environmental management measures contained in this EMPr and the environmental protection requirements as they apply to construction phase of the piggery project establishment.
- Are trained in the identification of archaeological artefacts and flora and fauna of special interest that may occur on site and the measures that must be applied when they are encountered, and
- Are fully aware of all rules regarding general behaviour on site e.g. littering, noise, toilet behaviour, etc.

### **8.1.2 TOOLBOX TALKS**

Site management will implement a program of toolbox talks for all personnel for the duration of the Project. Toolbox talks will be scheduled on a regular basis, but no less than once per fortnight for each work section or group, will be of adequate duration to cover relevant information and structured to encourage full participation by all personnel. Senior management may also call additional toolbox meetings at any time to discuss or highlight any aspect relating to safety, environment and quality. The Superintendent, Safety Manager and Environmental Manager will be responsible for preparing and conducting toolbox talks which will be focused on issues relating primarily to safety, quality and the environment. Topics to be covered in toolbox talks will be focused on issues relevant to upcoming works, works in or near sensitive receivers or environmentally sensitive areas or incidents that have occurred. Environmental topics will be determined by the EM and Superintendent and will include, but not be limited to:

- Prevention of fire on site.
- Emergence Response plans.
- Pollution
- Noisy works or works outside of normal working hours;
- Water management and water quality controls;
- Environment incidents;
- Changes to previously communicated environmental mitigation measures;
- Environmental procedures; and
- Environment alerts.

Toolbox talk topics, dates delivered and a register of attendees will be recorded and managed in accordance with the processes described in the Safety Plan.

### **8.1.3 MANAGEMENT AND MITIGATION**

It is the Contractor's responsibility to ensure that all people involved with the project receive environmental awareness training before starting work on site. This shall include all new staff recruited during the construction phase. A signed register must be kept of each employee attending the course. Environmental training shall include but not be limited to the following:

- Awareness-raising of how different construction activities can impact on the environment, why it is important to avoid environmental damage and what steps can be taken to mitigate the impacts of construction activities.

- Identification of possible archaeological or historical objects and the requirement to notify the ECO or Engineer if such an object is found, and to be informed of ‘No Go’ areas of cultural heritage.
- General conduct on site such as noise levels (e.g. shouting and hooting), alcohol consumption, drug use, toilet behaviour, littering, no firearms, no pets, no harvesting of firewood / plants, no trespassing or damage to property, no throwing of cigarette butts into the veld etc.
- Responsible handling of chemicals and spills and correct disposal of chemical containers and other waste objects.
- Emergency procedures and incident reporting.
- Location of fire-fighting equipment and its use.
- HIV/AIDS awareness, including use of and access to condoms; and behaviour towards the local community.

The Contractor must maintain a record of all staff that have received Environmental Awareness Training and shall monitor the performance of the construction staff to ensure that the points that were relayed during their induction have been understood and are being followed. If required, a translator may be requested to explain aspects of the environmental requirements or acceptable social behaviour that are unclear. Consideration must be given to the feasibility of introducing fines for workers who transgress the rules e.g. littering, use of the veld as a toilet, damage to property, etc

## **8.2 FINES AND PENALTIES**

- The Site Manager may identify a Contractor that is best implementing the Environmental Specifications and Environmental Method Statements and may make a periodic award to, or acknowledge, that Contractor.
- Spot fines shall be imposed by the Site Manager on the Contractor if the Contractor is found to be infringing on this Specification. The Contractor shall be advised in writing of the nature of the infringement and the amount of the spot fine. The Contractor shall determine how to recover the fine from the relevant person and/or sub-contractor and/or supplier. The Contractor shall also take the necessary step (e.g. training) to prevent a recurrence of the infringement and shall advise the Site Manager accordingly.
- The imposition of spot fines does not replace any legal proceedings the local authorities, environmental authorities and/or members of the public may institute against the Contractor.

- Spot fines, depending on the severity of the infringement. The decision on how much to impose will be made by the Site Manager, and will be final. In addition to the spot fine, the Contractor shall be required to make good any damage caused as a result of the infringement at his own expense.
- A preliminary list of infringements for which spot fines will be imposed is as follows:
  - Moving outside the demarcated site boundaries;
  - Littering of the site and surrounds;
  - Burying waste on site and surrounds;
  - Smoking in the vicinity of fuel storage and filling areas and in any other areas where flammable materials are stored/used;
  - Making fires outside designated areas;
  - Defacement of natural features;
  - Using the veld for ablution purposes;
  - Spillage onto the ground of oil, diesel, etc.
  - Picking/damaging plant material;
  - Damaging/killing wild animals; and
  - Additional fines as determined by the Site Manager and added to this list.

Receipts for fines paid shall be issued, and the appropriate documentation retained, by the Site Manager. Money “raised” through fines may be used to fund environmental/social schemes on-site.

### **8.3 DAILY PRE-START MEETINGS**

The pre-start meeting is a tool for informing the workforce of the day’s activities, safe work practices, environmental protection practices, work area restrictions, activities that may affect the works, coordination issues with other trades, hazards and other information that may be relevant to the day’s work. The Foreman will conduct a daily pre-start meeting with the site workforce before the commencement of work each day (or shift) or where changes occur during a shift.

Daily pre-start meetings are generally succinct in nature and take approximately 10-15 minutes. The environmental component of pre-starts will be determined by relevant foreman and environmental personnel and will include any environmental issues that could potentially be impacted by, or impact on, the day’s activities. All attendees will be required to sign on to the pre-start sheet and acknowledge their understanding of the issues explained. Pre-start

topics, dates delivered and a register of attendees will be recorded and managed in accordance with the processes described in the Safety Plan.

#### **8.4 HEALTH AND SAFETY INDUCTION TRAINING**

No Contractor is to permit an employee or person to enter the site, unless such employee or person has undergone health and safety induction training pertaining to the hazards prevalent on the site and is to be provided with the necessary personal protective equipment (PPE). This safety induction training includes informing all construction workers of the relevant Emergency Procedures. During safety induction, the employees are to be informed about all environmental, health and safety issues.

They are then to be issued with an Induction Certificate that is kept on file. An example of the aspects to be included in such training are listed in the box below.

**Chapter 1:** HSE Policy

**Chapter 2:** Safety (HSE Representative, Duty to inform, PPE, Safety signs, Security, Discipline procedure, Competency/Qualifications, Health and hygiene, Environment, Waste management, etc.)

**Chapter 3:** Operational Safety (Operation of equipment; hand tools; manual lifting of heavy objects; moving equipment; fires; cleanliness; wires, ropes, chains and hoisting plugs)

**Chapter 4:** General Safety (General safety rules; working near electricity lines; travelling on a back of a truck; working on scaffolding; working in trenches or excavations; and using a ladder or climbing the mast)

**Chapter 5:** General Rules on Site (before starting machinery; while on site; emergency procedures; site layout; and medicals).

#### **8.5 HEALTH AND SAFETY PLAN**

The Contractor is to provide and demonstrate suitable and sufficiently documented Health and Safety Plan that shall be applied from the date of commencement of and for the duration of the construction work. The Contractor is to ensure that the construction site / lay down area complies with Occupational Health and Safety (OHS) Regulations during the construction phase. Applicable sections of the regulations are listed in Table 8. (This list is not comprehensive and may be added to).



**Table 3: Occupational Health and Safety Regulations for Construction**  
**Construction OHS Regulations Examples of aspects to Audit**

Chapter 1	HSE Policy
Chapter 2	Safety (HSE Representative, Duty to inform, PPE, Safety signs, Security, Discipline procedure, Competency/Qualifications, Health and hygiene, Environment, Waste management, etc.)
Chapter 3	Operational Safety (Operation of equipment; hand tools; manual lifting of heavy objects; moving equipment; fires; cleanliness; wires, ropes, chains and hoisting plugs)
Chapter 4	General Safety (General safety rules; working near electricity lines; travelling on a back of a truck; working on scaffolding; working in trenches or excavations; and using a ladder or climbing the mast)
Chapter 5	General Rules on Site (before starting machinery; while on site; emergency procedures; site layout; and medicals)

## 9. DOCUMENTATION AND RECORD KEEPING

A document handling system is to be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr. The document handling system is to be devised by the Project Proponent and/or Contractor, and agreed upon by all key parties. Responsibilities must be assigned to relevant personnel for ensuring that the EMPr documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel.

Supplementary EMPr documentation could include:

- EMPr implementation activity specifications (including Method Statements);
- Site instructions;
- Emergency preparedness and response procedures;
- Incident reports;
- Training records;
- Site inspection reports;
- Monitoring reports;
- Auditing reports; and
- Complaints received.

The ECO is typically responsible for ensuring that the registration and updating of all relevant EMPr documentation is carried out. It is usually the responsibility of the Project

Manager to ensure that all personnel are performing according to the requirements of this procedure and to initiate the revision of controlled documents, when required by changes in process, operating procedures, legislation, specifications, audit findings or any other circumstances, by informing the Environmental Control Officer of the changes.

Copies of all EMPr documentation must be kept on site or at the nearest project office. The documents must be kept as hardcopies as well as in electronic format. Documents must be revised as required by changing circumstances. The Contractor is to comply with the actions listed below in terms of incidents, accidents and near misses:

- All accidents, incidents and near misses must be reported by the end of the shift on which the accident, incident and/or near miss occurred.
- The Contractor will take whatever corrective action is necessary to address incidents, accidents and / or near misses. The corrective action is to be discussed the following day during the 'toolbox talk' session together with lessons learnt from the event.
- A comprehensive weekly incident report must be forwarded to the Project Engineer on a weekly basis.

The Contractor is to ensure that the incident report is kept on file and available for review during audits.

## **10. REPORTING PROCEDURES**

Reporting procedures for conveying information from the monitoring activities must be developed for the project in order to ensure that management is able to take rapid corrective action must certain thresholds be exceeded. The EMPr is to contain reporting procedures for dealing with:

- Inspections;
- Accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

These will likely include information on who will be responsible for compiling what reports; who must receive copies; information to be contained in these reports; pro form a or template structure for each report; timing and frequency of response; approvals required, and where copies must be kept. However, reports that are required to ensure adequate record-keeping are specified below.

The issues identified in this EMPr need to be documented in a format that is readily available for review/auditing. The ECO must meet with the Contractor/Engineer on a regular basis, e.g. weekly to discuss the contractors' tasks and review the progress from the past week. The ECO and the Contractor must discuss and agree on the issues in the EMPr and how they must be managed and mitigated as well as agree on the QA/QC targets as specified in the EPP. The agreed upon mitigation measures must be documented and the agreed upon QA/QC targets signed off.

## **10.1 DOCUMENT HANDLING AND RECORD KEEPING**

All meetings and site inspections must be recorded and filed (in hard copy and electronically) for future reference and to provide input into monthly reports. **Minutes of meetings:** Regular meetings must be held between the ECO, CRO, Engineer and Contractor to discuss the schedule of construction activities and requirements for adherence to the EMPr requirements on a weekly basis, at least, or more frequently if required. The minutes of such meetings must be recorded immediately, and shall include the activities to be done, the responsibilities for carrying them out, and deliverable dates. The minutes must be circulated to those concerned and hard and electronic copies filed for safe-keeping. These minutes must provide the basis for follow up at subsequent meetings.

## **10.2 MONTHLY REPORTS**

Monthly review meetings must be held with the Developer, ECO, CRO, and the Contractor to confirm the status of the construction progress and issues associated with implementation of the EMPr. The meetings must aim to collate the inputs for preparation of a monthly report. The monthly report must synthesize all information on work progress, scheduling changes, recorded incidents and complaints, monitoring results, site problems and risks/hazards, areas of compliance and non-compliance with the EMPr targets, and measures take or required to rectify problems.

Monthly reports must be circulated by email and in hard-copy to all on-site managers (ECO, Engineer, CRO and contractor supervisor) as well as Developer and the QAO. The targets and reports relating to the EMPr that DEA has approved in the environmental authorisation must be documented in the form of minutes with agreed upon targets, outputs, QA/QC and deliverable dates. The documents/minutes must be signed off by the ECO and the Contractor once a week to indicate progress and confirmation with prescribed QA/QC with regards to the EMPr.

### **10.3 INCIDENTS AND ACCIDENTS REGISTER**

The ECO must compile and keep an Incidents and Accidents Register on site in which all incidents and accidents are recorded, e.g. chemical spills, fires, accidents involving workers and vehicles, etc. The following information must be recorded in the Incidents Register:

- the name and contact details of the persons involved
- the person recording the incident
- the date and time of incident
- the nature, extent and cause of the accident
- the name and contact details of any persons notified of the incident
- the actions taken to deal with the incident and whether the accident has been sufficiently dealt with
- additional steps required to prevent recurrence of the incident

## **11. STAKEHOLDER ENGAGEMENTS**

### **11.1 COMMUNITY RELATIONS OFFICER**

The Contractor shall appoint a suitably qualified and experienced community relations officer (CRO) acceptable to the Engineer with all necessary support staff and facilities. The CRO shall be responsible for liaising and co-operating with community leaders and organisations for the purpose of:

- Giving advance notification to the local community when particular operations will commence and finish, particularly those which might inconvenience the inhabitants of the area or against which they must take safety precautions.
- Receiving and replying to complaints from the general public about all matters related to the Works.
- Ensuring that remedial and corrective action is taken wherever necessary in response to complaints from the public.
- Supporting community awareness programmes and local development programmes.
- Publicising training and job opportunities.

Such measures are to be undertaken with a view to inculcating in the inhabitants of the areas an acceptance that, despite any temporary or permanent inconvenience that may be caused to them, they will reap direct short and long term benefits from the construction and subsequent operation and maintenance of the landfill, in addition to the indirect benefits to be derived from the increased national wealth resulting there from.

## **11.2 STAKEHOLDER ENGAGEMENT**

The main benefit of involving stakeholders in the EMPr is to include local knowledge, e.g. in the design of monitoring activities, and to ensure that the EMPr addresses aspects of the project that could be a source of social risk. Stakeholders need to understand that their safety, health and environment are not being compromised. They must be kept informed so that no uncertainty exists in this regard.

## **11.3 GRIEVANCE PROCEDURES**

A formal grievance procedure must be developed by the Contractor. The Contractor is to notify IAPs where a complaints register is kept and how they can bring any grievances or issues of concerns to the Contractor's attention. The Contractor is to develop a procedure to address complaints. The protocol is to include the following aspects:

- Name and Contact details of Complainant and date of complaint
- Nature of Complaints, i.e. health related, environment related, safety related or community related.
- Details of complaint, i.e. exact location of incident, severity (emergency situation or not) associated impact, stakeholders involved, frequency of incident, etc.
- Manner in which complaint has been resolved.

## **12. AUDITING**

Typically, an audit analyses the results obtained from monitoring assesses whether objectives and targets have been met and whether there are variances from the stipulated EMPr and legal requirements. In addition, the audit assesses whether EMPr implementation has been undertaken according to planned arrangements and that the EMPr itself is being appropriately updated. The audit must confirm that identified corrective actions have been undertaken and then assess the effectiveness of such actions. The timing of audits must be included in the implementation schedule in the EMPr. The key steps in a successful audit are:

- Establish audit procedures.
- Determine the frequency of audits.
- Ensure that the auditors are competent, in that they must be able to undertake the audit objectively and competently. Audits may be undertaken by internal or external parties, although certain I&AP requirements may define a need for external auditors.
- Maintain records of audits. A procedure is to be developed by the project management team for conducting EMPr audits, and must incorporate processes for scheduling and reporting, as well as the timing and frequency of the audits. This

procedure must also address responsibilities and required resources. The ECO is usually responsible for the maintenance of the environmental audit information that is required prior, during and after an audit.

### **13. SAFETY AND SECURITY**

Safety is provided to community from the site

- The PM is responsible for the safety of all staff, visitors and bystanders on the construction site through all the phases of the project where he emails the project manager.
- The contractor to ensure the safety of persons on site, at the site camp after working hours, on weekend's and public holidays.
- Any crimes to be reported to the Police (SAPS). These incidents must be reported by the PM through the knowledge of the project manager.
- All employees must be clearly identifiable
- Proper supervision of the employees at all the times.
- Construction activities must remain within the construction footprint.
- No unauthorised people must be allowed in the site.

### **14. CHECKLIST FOR MINIMUM ENVIRONMENTAL PROVISION**

The checklist is aimed at a high-level guideline for the budget provision to be able to implement the EMP. It must be read in conjunction with the other documents and does not exempt any other clause that has been stipulated for compliance with the EMP document. In the event of apparent contradictions within the EMP document, will apply the check list. The contractor will not be reimbursed for the items on the list if they are to form part of budgeting for environmental compliance.

**The following items are to be available on the construction site, for immediate implementation.**

#### **General Signage**

1. No go areas
2. A sign at the entrance of the operation site offices indicating the following information
  - a) The contractor's contact numbers.
  - b) Other relevant emergency numbers.

## **Pollution Prevention**

1. Fire protection equipment
2. Waste bins and receptacles that comply with the waste clauses of the EMP.
3. Adequate serviced ablution services
4. designated eating and smoking areas
5. Water carts to adequately water the site minimum of twice a day
6. Spillage kits for all construction vehicles and be easily available on site
7. Screening of unsightly works
8. Drip trays for all vehicles parked overnight
9. Barricading the demarcation of the edge of the working area
10. Hard impervious surfaces for the storage for storage of chemicals.
11. bunding facility for hazardous products.
12. labeled containers for decanting of liquids.

## 15. CONCLUSION

The activities set out in this operational EMPr will effectively mitigate the impacts related to the operation of the Walkerville Landfill. The following mitigation measures must be strictly adhered to minimise negative impacts of the landfill on the environment:

- On-going management on site must be maintained and proper waste classification must be done at the site gate;
- Continuous training of site staff must be done to ensure that they are conversant with the provisions contained within this EMPr; and
- On-site monitoring must continuously be done so that the Municipality become aware of any pollution impacts early on.

It is the applicant's responsibility to ensure that this EMPr is made binding on the contractor by including the EMPr in the contract documentation. The contractor should thoroughly familiarise himself with the requirements of the EMPr and appoint an environmental Control officer (ECO) to oversee the implementation of the EMP on a day-to-day basis.

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



## **APPENDIX A: EMERGENCY RESPONSE PLAN (ERP)**

### **1. Introduction**

The aim of the Emergency Response Plan is to set forth an organizational and procedural framework designed to utilize resources and personnel in the most efficient way possible to limit the loss of life and property in emergency situations. This plan creates procedures and locates resources which may be used to mitigate the impact of an emergency event, provide a more effective response during an emergency, and help to return the landfill to its normal operations.

### **2. Environmental Emergency Response**

The Landfill Site environmental emergency procedures must ensure that there is an appropriate response to unexpected or accidental actions or incidents that could cause environmental impacts. Such incidents may include:

- Accidental discharges to water (i.e. into a water resource) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, and diesel);
- Accidental toxic emissions into the air; and,
- Specific environmental and ecosystem effects from accidental releases or incident
- Accidental Fires
- Proliferation of rodents
- Air quality impacts due to odors.

### **3. The purpose of the Emergency Response Plan is:**

- To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable prompt and effective response to possible events.
- To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas.
- To facilitate emergency response and to provide such assistance on the site as is appropriate to the occasion.
- To ensure communication of all vital information as soon as possible.
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed.

- To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to personnel, public, and environment during the project. Everyone on site expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of construction detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation.

#### **4. Emergency Response Plan**

There are three levels of emergency as follows:

- Local Emergency: An alert confined to a specific locality.
- Site Emergency: An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
- Evacuation: An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation.

Every effort must be made to control, reduce or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur; for a gas fire it is usually appropriate to isolate the fuel and let it burn itself out but keep everything around the fire cold.

#### **4.1 Emergency Scenario Contingency Planning**

##### **4.1.1 Scenario**

Spill which would result in the contamination of land, surface or groundwater;

#### 4.1.1.1 Spill Prevention Measures

Preventing spills must be the top priority at all operations which have the potential of endangering the environment. The responsibility to effectively prevent and mitigate any scenario lies with the landfill manager and the ECO. In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

- All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed designated areas.
- All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
- No refuelling, storage, servicing, or maintenance of equipment should take place within 50m of drainage lines or sensitive environmental resources in order to reduce the risk of contamination by spills.
- No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.
- Any fluids drained from the machinery during servicing should be collected in leakproof containers and taken to an appropriate disposal or recycling facility.
- If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a licensed hazardous waste disposal facility.
- Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
- Contact details of emergency services and Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.
- SABS approved Spill kits must be made available onsite for the clean-up of spills and leaks of contaminants. The relevant construction crew members must be trained in their use.
- Routine servicing and maintenance of vehicles must not take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.

- Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.
- Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.
- Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.
- An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.
- Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.

#### **4.1.1.2 Procedures**

The following action plan is proposed in the event of a spill:

- Spill or release identified.
- Assess person safety, safety of others and environment.
- Stop the spill if safely possible.
- Contain spill to limit entering water bodies and surrounding areas.
- Identify substance spilled.
- Contaminated soil to be collected, stored and disposed to disposal site. □  
Quantify spill (under or over guideline/threshold levels).
- Notify Site Manager and emergency response crew and authorities (in event of major spill).
- Spill clean-up kit.
- Record of spill incident on company database.

#### **4.1.1.3. Procedures for containing and controlling the spill (i.e. on land or in water)**

Measures can be taken to prepare for quick and effective containment of any potential spills. Each contractor must keep sufficient supplies of spill containment equipment at the construction sites, at all times during and after the construction phase. These should include specialised spill kits or spill containment equipment

Other spill containment measures include using drip pans underneath vehicles and equipment every time refueling, servicing, or maintenance activities are undertaken. Specific spill containment methods for land and water contamination are outlined below.

#### **4.1.2. Containment of Spills on Land**

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, and therefore spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies. The following methods could be used:

- **Dykes**

These can be created using soil surrounding a spill on land. Dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

- **Trenches**

Trenches can be dug out to contain spills. Spades, pick axes or a front-end loader can be used depending on the size of trench required. Spilled substances can then be recovered using a pump or sorbent materials.

#### **4.1.3. Containment of Spills on Water**

Spills in water can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water. The following methods could be used:

##### **Weirs**

Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. However, only effective for spilled substances which float on the water surface.

##### **Barriers**

In some situations, barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled substance. Sorbents

will need to be replaced as soon as they are saturated. Water will be allowed to flow through.

#### **4.1.4. Procedures for transferring, storing, and managing spill related wastes**

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible. Spilled substances and materials used for containment must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

#### **4.1.5. Procedures for restoring affected areas**

Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation. Once a spill of reportable size has been contained, the Environmental Control Officer and the relevant authority must be consulted to confirm that the appropriate clean up levels are met.

### **4.2. Scenario: Fire (and fire water handling)**

#### **4.2.1 Action Plan**

The following action plan is proposed in the event of a fire:

- Quantify risk.
- Assess person safety, safety of others and environment.
- If safe – attempt to extinguish fire using appropriate equipment.
- If not safe to extinguish, contain fire.
- Notify Site Manager and emergency response crew and authorities.
- Inform users (and downstream users) of potential risk of fire.
- Record of incident on company database.
- Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.
- Informal vending stations should not be allowed on or near the construction site.
- Fire-fighting equipment and training must be provided before the construction phase commences.

## **4.2.2 Procedures**

Large scale fires may spread very fast in the environment it, hence it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire. Portable firefighting equipment must be provided in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguisher, hose reels, hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and National standards.

Current evacuation signs on site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

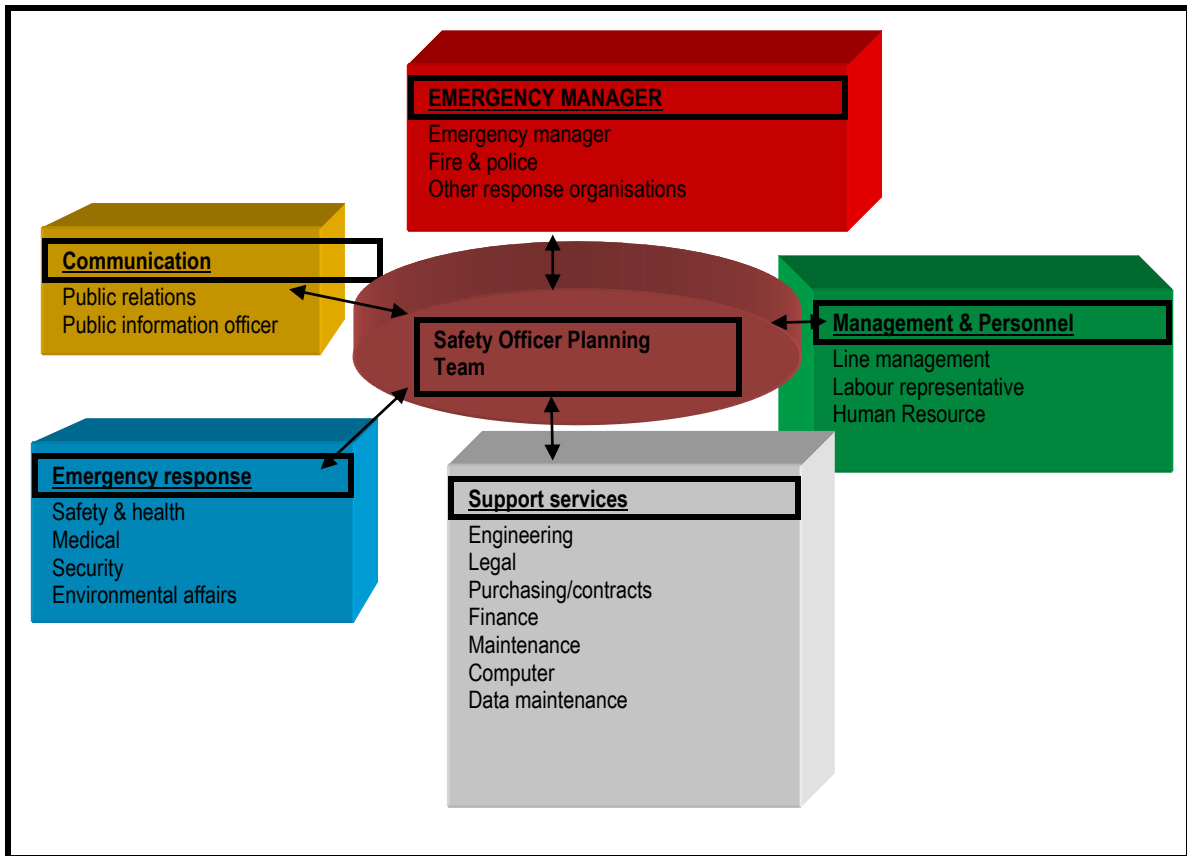
### **4.2.2.1. Procedures for initial actions**

Persons should not engage in trying to stop the fire if any of the following conditions exist:

- No training or instructed in the use of a fire extinguisher.
- Do not know the cause of the fire or what is burning.
- The fire is spreading rapidly.
- No proper equipment to stop the fire.
- No means of escape available.
- Possibility of inhaling toxic smoke.
- No safety clothing available e.g. flame-resistant clothing

### **4.2.2.2. Reporting procedures**

- Report fire immediately to the Site Manager who will determine if it is to be reported to the relevant emergency services and authorities.
- The Site Manager must have copies of the Report form to be completed.



*Figure 1: Typical team for development and Maintenance of Emergency Preparedness Plan*

The client must have a dedicated person, e.g. Emergency Officer to prepare the response of the organization for an emergency situation and to oversee the technical aspects of the response, as well as interfacing with the community, the media, outside response organizations and regulatory agencies, as required. The Emergency Officer must be an employee and a member of management with the authority to make decisions.



## APPENDIX B: WASTE MANAGEMENT PLAN

### 1. BACKGROUND

South Africa's commitment to sustainable development is aimed at balancing the broader economic and social challenges of a developing and unequal society while protecting environmental resources. For the waste sector in South Africa this means care must be given to raw material use, product design, resource efficiency, waste prevention, and minimization where avoidance is impossible. However, economic development, a growing population and increasing rates of urbanization in South Africa have resulted in increased waste generation which requires establishing and implementing effective waste management policies and programmes.

A number of issues continue to be challenges for effective waste management. These include ineffective data collection systems and lack of compliance and enforcement capacity, lack of education and awareness amongst stakeholders within the waste sector, operational costs for management of waste, support for waste reduction at local government level, availability of suitable land for waste disposal, lack of structured incentives for reduction, and recycling and/or reuse of waste (DEA 2009a). The official country problem statement according to the National Waste Management Strategy (NWMS) (DEA 2012a) lists the following as the major challenges faced by South Africa in the waste management arena:

- A growing population and economy, which means increased volumes of waste generated. This puts pressure on waste management facilities which are already in short supply;
- Increased complexity of the waste stream due to urbanization and industrialization. The complexity of the waste stream directly affects the complexity of its management, which is compounded when hazardous waste mixes with general waste;
- A historical backlog of waste services for urban informal areas, tribal areas and rural formal areas. Although 61 per cent of all South African households had access to kerbside domestic waste collection services in 2007, this access remains highly skewed in favour of more affluent and urban communities. Inadequate waste services lead to unpleasant living conditions and a polluted, unhealthy environment;
- Limited understanding of the main waste flows and national waste balance because the submission of waste data is not obligatory, and where data is available, it is often unreliable and contradictory;

- A policy and regulatory environment that does not actively promote the waste management hierarchy. This has limited the economic potential of the waste management sector, which has an estimated turnover of approximately R10 billion per annum. Both waste collection and the recycling industry make meaningful contributions to job creation and GDP, and they can expand further;
- Absence of a recycling infrastructure which will enable separation of waste at source and diversion of waste streams to material recovery and buy-back facilities;
- Growing pressure on outdated waste management infrastructure, with declining levels of capital investment and maintenance;
- Waste management suffers from a pervasive under-pricing, which means that the costs of waste management are not fully appreciated by consumers and industry, and waste disposal is preferred over other options;
- Few waste treatment options are available to manage waste and so they are more expensive than landfill costs; and,
- Too few adequate, compliant landfills and hazardous waste management facilities, which hinders the safe disposal of all waste streams. Although estimates put the number of waste handling facilities at more than 2000, significant numbers of these are unpermitted.

South African waste legislation is influenced and informed by the key elements of the waste hierarchy, which dictates the overall strategic approach for waste management. The waste hierarchy is also clearly visible in the NWMS for South Africa (DEA 2012a). Details on the quantities of waste generated will be attached in the Final EIR.



*Figure 1: Waste management hierarchy as per the National Waste Management Strategy*

*Source: DEA (2012a)*

This approach towards waste management emphasizes the following key elements (DEA 2012a):

- **Avoidance and Reduction:** Products and materials must be designed in a manner that minimizes their waste components or in a manner that reduces the natural material quantities used and potential toxicity of waste generated during the production, and after use;
- **Re-use:** Materials can be used for similar or different purposes without changing form or properties. This approach seeks to re-use a product when it reaches the end of its life span. In this way, it becomes input for new products and materials;
- **Recycle:** This involves separating materials from the waste stream and processing them as products or raw materials. The first elements of the waste management hierarchy are the foundation of the cradle-to-cradle waste management approach;
- **Recovery:** Reclaiming particular components or materials or using the waste as a fuel;
- **Treatment and disposal:** This is a 'last resort' within the waste hierarchy. Treatment refers to any process that is designed to minimize the environmental impact of waste by changing the physical properties of waste or separating out and destroying toxic components of waste. Disposal refers specifically to the depositing or burial of waste onto, or into land; and;
- **Legal:** Processing, treatment, and disposal of waste must take place in accordance with the principles of environmental justice and equitable access to environmental services as articulated in the NEMA.

## 2. PURPOSE OF THE WASTE MANAGEMENT PLAN

The purpose of the Waste Management Plan is to describe the principles, procedures and management of the waste generated by the Walkerville Landfill site has developed this Plan to ensure wastes are reduced, reused and recycled wherever possible. The Waste Management Plan outlines measures to manage and mitigate waste generation and resource consumption during the operation of the landfill. The Plan includes details on the following:

- The types and quantities of waste generated during operation;
- Procedures to collect and dispose of waste;
- Measures that will be implemented to minimise waste generation associated with the development; and
- A program for monitoring the effectiveness of these measures.

The Waste Management Plan is designed to support an ecological based management approach underpinned by adaptive management principles. Waste materials arise from either the materials disposed of onsite and those generated on the site. Disposed waste materials are those which are brought for their final disposal, some waste disposed of can be recycled, such as plastics cans and bricks. Generated materials are those that occur during the daily operations of the site i.e. office waste which are minimal.

Plan also considers other aspects to waste management such as waste reduction, segregation of waste, disposal of waste, financial impacts of waste disposal and recording, monitoring, education and reviewing. This Plan outlines the waste management procedures that have been put in place and demonstrate the benefits to the environment, how we can measure the effects and how these procedures and practices are sustainable.

### **Waste Types**

The operation of the Walkerville Landfill site receives general waste (e.g. plastic, containers and bags household waste), obsolete/worn infrastructure (e.g. ropes and nets).

### **2.1 Waste Categories**

Sources of non-hazardous solid waste accepted at Walkerville Landfill site are:

- Construction waste consisting of formwork and debris;
- Packaging for material and supplies received at the site during both construction and operation;
- Containers (glass, metal, plastic);
- Metals scraps;
- Used equipment and machinery;
- Clean wood and stumps;
- Lumber used for construction;
- Household waste (organic waste, kitchen waste)
- Office waste

Waste materials fall into three categories for management, which include:

- Re use;
- Recycle;
- Landfill.

#### **2.1.1 Re-use**

If waste materials can be used in future operations they are classified as materials which can be re-used, i.e. construction rubble that can be used as cover material. Waste that can be reused in future are stockpiled and reused.

### **2.1.2 Recycling**

If waste is received on site the recyclers are allowed to collect all the recyclable materials. Recyclable waste consists mostly of metal containers, glass products, scrap metal, used equipment and machinery. Quantities of waste collected for recycling is recorded.



### **2.1.3 Landfill**

If the above options cannot be satisfied then the only alternative left is to landfill the waste. The burning of municipal waste at a landfilling site is prohibited except for the controlled.

## **3 WASTE MINIMISATION**

Wastes from the Walkerville Landfill site operation have the potential to impact on the environment. The Waste Management Plan has been developed to manage the risk associated with the potential impacts including minimising waste generation.

Walkerville Landfill site will implement all possible waste minimisation procedures and therefore reduce the amount of waste disposed onsite. Management, staff, design teams, contractors and suppliers will all be encouraged to look at ways to minimise the amount of waste generated at the landfill site.

### **3.1 Industry Best Practice**

Walkerville Landfill site will follow industry best practice guidelines such as:

- Waste materials is recycled where possible;
- Waste is disposed of efficiently

The Walkerville Landfill site Operations Manager or appointed delegate will be responsible for ensuring the instruction of workers and operators' implementation and overseeing of the Waste Management Plan during induction processes. The onsite induction relating to waste management will include advice on appropriate separation, handling, recycling, methods to be used by all parties conducting operations onsite were applicable. Regular toolbox meetings will include discussion of waste management issues and updates on how to minimise wastes. The monitoring of wastes generated will provide an opportunity to review the wastes being generated and ways in which they can be reduced.

#### **4. IMPACTS AND MITIGATION**

The Waste Management Plan is applicable during the Construction and Operational phases of the landfill and will be for use by the Contractors and the sub-contractors that will be involved in the project.

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
<b>WASTE MANAGEMENT PLAN</b>			
Site establishment	<ul style="list-style-type: none"> <li>The Midvaal Local Municipality should provide dustbins to be used during site preparation and surveying.</li> <li>Prior to construction commencing, adequate waste bins should be provided in order to prevent littering on site</li> <li>The Contractor must ensure that provision is made for the separation of waste into categories for easy recycling and disposal purposes.</li> <li>The Contractor must liaise with the Local Authority or the responsible company for the collection of domestic waste on a weekly basis, depending on the volumes and quantities generated thereof.</li> <li>The Contractor must ensure that there is an area that has been clearly demarcated as a temporal storage for recyclable wastes.</li> <li>The Contractor will also be required to make necessary arrangement for the storage and collection of recyclable waste that is generated on site.</li> </ul>	Midvaal Local Municipality	Continuous
Site control, Demarcation, Security, Access Control in Waste Storage areas	<ul style="list-style-type: none"> <li>Waste storage areas shall be provided with signs and display boards which inform everyone entering the site of the demarcated waste storage areas.</li> <li>All Waste Storage areas shall be adequately fenced in and secured to prevent any access of public members and unauthorised people.</li> <li>Areas, Containers and Skips identified for the storage of general, recyclables wastes shall be clearly marked to indicate the intended purposes i.e., glass only.</li> </ul>	Midvaal Local Municipality, contractor, ECO	Continuous
Waste composition, inventory and inspection	Landfill operator must ensure that a register is kept throughout the life of the facility of the quantities and characteristics of the waste deposited.	Midvaal Local Municipality, contractor, ECO	Continuous
	Information on waste register must include the origin of waste, type of waste, date of delivery, identify of the producer or collector, regular visual inspection of the waste at the point of deposit should be undertaken to ensure that waste is properly sorted at receipt.	Midvaal Local Municipality, contractor, ECO	Continuous
<b>Requirements for Waste Management and Collection Contractors</b>	<ul style="list-style-type: none"> <li>General waste shall be collected by a recognised service provider and be disposed off in registered waste site.</li> <li>Recyclable waste shall be collected by a recognised recycling service provider for appropriate recycling purposes.</li> <li>Scrap metals, steel, and glass must be collected in separate waste skips and each container intended for identified recyclable waste must be clearly marked, i.e. scrap metals only</li> </ul>	Midvaal Local Municipality, contractor, ECO	Continuous
General waste	<ul style="list-style-type: none"> <li>Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites.</li> </ul>	Midvaal Local Municipality, contractor, ECO	Continuous

IMPACT	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY
	<ul style="list-style-type: none"> <li>All building rubble, solid and liquid waste etc must be disposed of as necessary at an appropriately licensed refuse facility.</li> <li>The Contractor must ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site.</li> <li>The construction site must be kept in a clean and orderly state at all times. Wet waste should by no means escape from the waste truck whilst in transit. The Contractor must ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises be placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project are disposed of at dumping site as approved by the Council.</li> <li>Wet waste must be contained in such a fashion that whilst in transit, no liquid escapes from the load area.</li> </ul>		
Health risks	The Contractor shall keep records for the regular collection of all waste types and disposal thereto, details of waste company responsible for waste collection.	Midvaal Local Municipality, contractor, ECO	Continuous
Record keeping	Waste storage areas must have adequate provision in place to prevent fires.	Midvaal Local Municipality, contractor, ECO	Continuous



## 5. MONITORING

Walkerville Landfill site is committed to minimising the risks associated with the operation of Walkerville Landfill site. The monitoring of the quantity and types of wastes being generated by the Walkerville Landfill site operations will be recorded in the wastes log book and kept on site at all times so that regular reviews can be undertaken.

- All products that are considered to be of a concern in relation to the waste being generated will be replaced where possible for products that are less wasteful and/or considered to be environmentally friendly.
- All waste storage containers will be inspected weekly to ensure that they are maintained in a condition appropriate for their use and containment of the specific waste. Skips and/or bins will need to be monitored regularly to ensure that cross contamination doesn't occur.
- All waste removed from site including products for reuse will also be monitored to ensure no cross contamination.
- The Waste Management Plan and its importance will be communicated to the whole team regularly. Business wide updates including improved recycling amounts will be communicated and discussed at management and toolbox meetings.
- The Waste Management Plan will be analysed to produce key performance indicators and it will be the individual site manager's responsibility to develop best practice solutions throughout the Walkerville Landfill site operations and monitor them. Results will be recorded in the quarterly site audit.
- A Water Quality and Environment Monitoring Program will be implemented to monitor potential impacts of Walkerville Landfill site operations assist with the development of environmentally sustainable practices.

## **6. CONCLUSION**

It is mandatory that Walkerville Landfill site Municipality (applicant) to appoints a Waste Management Control Officer (WMCO) to oversee all the environmental aspects relating to the development. The WMCO must be suitably qualified personnel with experience in managing environmental impacts associated with establishment and operational phases of disposal facilities. The WMCO must be appointed during the planning phase and must form part of the project management team. She/he must attend monthly project meetings, compile periodic Environmental Compliance Reports (ECRs) to evaluate compliance with the EMPr and be responsible for providing feedback on potential environmental, health and safety problems associated with the facility. The ECR must contain information on the implementation and compliance of the EMPr, compliance with the conditions of Environmental Authorisation and compliance with any the directives of the Competent Authority.

## **APPENDIX C: STORM WATER MANAGEMENT PLAN**

### **1. INTRODUCTION**

Storm water management and drainage planning are critical components on waste management sites during operations and after closure of the site. Therefore, the storm water management infrastructure should be designed to comply with Government Notice 704 of the National Water Act of 1998.

The Storm water Management Plan (SMP) offers mitigatory measures for the all development phases in order to minimise environmental impacts at the operation of Walkerville Landfill site. The plan overlaps with the Erosion Management and Alien Invasive Management Plan, but for successful rehabilitation, it is imperative that this plan is at all times used in conjunction with the other plans and the approved EMPr.

### **2. OBJECTIVES OF STORM WATER MANAGEMENT PLAN**

This Stormwater Management Plan acts as a guideline to be applied by all landfill operators appointed by the Midvaal Local Municipality (operators) on the Walkerville Landfill site. This storm water management plan is an evolving guideline that needs to be updated or adapted as progress is made with the revegetation and rehabilitation of the project area, and successes and failures of procedures are identified. The design focuses on mitigating potential adverse effects of inadequate storm water management at the site. The objectives of a Storm Water Management Plan (SWMP) can be summarised as:

- To ensure that dirty (contaminated effluent) and clean water are separated.
- to protect water resources from pollution by separating and collecting all storm water that has a poor quality into dirty water 'storage' facilities for treatment before discharging into the environment or reuse within the site operations where applicable.
- to ensure that all storm water management infrastructure is designed to handle a 1 in 50-year storm event and is not adversely affected by a 1 in 100-year storm event.
- to maintain downstream water quantity and quality requirements by ensuring that the maximum volume of clean water runoff is diverted directly to the natural watercourses and the minimum amount of clean storm water is contaminated and thus enhancing the overall catchment yield. All the storm water that falls on part of the landfill cell which is not operational (and probably capped) will not be allowed to get mixed with the dirty water and will be diverted to natural water courses around the site.

- Preserve as best possible the natural habitats on site and to minimise erosion.
- Preserve or recreate the structural integrity of natural plant communities.
- Allow for natural surface and sub-surface flows so as not to impede the movement of water along drainage lines.
- Include measures to promote the dissipation of storm water run-off.

In addition to meeting the fore mentioned objectives, the storm water management system will ensure that:-

- contaminated areas will be minimized and remain isolated from clean areas.
- clean storm water may be reused in the site operations.
- seepage losses from waste management facilities are minimized and overflows are prevented.

Good storm water management is based on separating clean and dirty water and therefore incorporates the fundamental principle of pollution prevention. The site should be divided into dirty and clean areas. The storm water that fall on these areas shall be classified as dirty storm water and clean storm water respectively.

The storm water flowing towards the site will be collected away from the waste cell in drains or will be diverted by berms to the downstream side of the facilities. After capping of the landfill all the water falling on top of the landfill is considered clean therefore it can be released directly to the water courses downstream of the landfill.

### **3. SITE DESCRIPTION**

#### **3.1 Rainfall**

The study area of the landfill project climate is typical Highveld climate. Walkerville and surrounding areas receive weather statistics from near weather station called Sonlandpark. During summer season in Meryeton normally receives about 544mm of rainfall per annual. It receives lowest rainfall (0mm) in June and highest (106mm) in January. During summer month's temperature can generally be described as warm with an average maximum of 30°C-35°C midday for the month of January in Meryeton. The minimum night temperatures for January are 10°C. During winters season maximum temperature drops from warm to cool 18°C midday and minimum night temperature of 5°C.

### **3.2 Erosion**

The clay loam soil and other alluvial sands found in the area vary from cohesive to non-cohesive. By large this type of soil is highly erodible and poses a constant and significant threat to the stability of the natural landforms. On the steeper slopes, erosion can take place extremely quickly once initiated, resulting in dongas and undermining structures. The damage to the watercourse will seriously impact not only on the site of the erosion but could damage non perennial river located in the downstream where the eroded sediment will be deposited. The cost of correcting the damages will be substantially more than the precautions required avoiding the damages.

### **3.3 Flooding**

The landfill tends to increase the natural rainfall infiltration and reduce storm runoff in areas cultivated. However, flood risks associated with water collected from the surface of the landfill site will therefore increase flood runoff. However, the latter will be attenuated by diverting the water through the use of storm water drains into the near-by vegetation. The design of the major stormwater system must address this issue as far as possible, but it is important to note that each individual development and its associated infrastructure must be designed such that the downstream post-development flood risks are no greater than the pre-development flood risks.

### **3.4 Pollution**

The activity will tend to be a pollution threat if oil, diesel and other hazardous chemicals used during construction are not used with caution and clean ups are not done to the spillages. During the operational phase pollution is likely to occur as a result of leachate and polluted runoff. This will pose a risk to downstream users of water when they are washed away by water during periods of heavy rains if the above two risks are not managed well.

### **3.5 Storm water Management Philosophy**

The major stormwater system consists of all-natural water ways, including springs, streams, rivers, wetlands and dams. It includes detention and retention dams and other devices constructed to control stormwater. Roadways and their associated drainage structures are part of the major stormwater system if they result in a significant deflection of stormwater from its natural overland flow path.

The minor stormwater system consists of any measures provided to accommodate stormwater runoff within sites and road reserves and convey the runoff to the major

stormwater system. These measures include gutters, conduits, berms, channels, road verges, and infiltration constructions.

Stormwater runoff should not be concentrated to an extent that would result in any damage to the environment during storms with a probability frequency more than 1 in 10 years and would result in only minor, repairable damage in storms with a probability frequency more than 1 in 50 years. All elements of the built and natural environment must be able to withstand a 1 in 100-year storm event without significant consequential loss and risk to property and life.

Note that a “storm frequency” equates to a “probability of occurrence” of a storm event that should be used to assess the annual budget or insurance provision for remedial works, should the event occur. In all catchments, the water courses and built stormwater infrastructure must be maintained in a clean state, free of any rubbish, debris and matter likely to pose any pollution threat to the lower reaches of the water courses.

The Stormwater Management Philosophy for Landfill sites encourages developers, their professional teams, contractors and property owners to do the following:

- Maintain adequate ground cover at all places and at all times to negate the erosive forces of wind, water and all forms of traffic.
- Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- Reduce stormwater flows as much as possible by the effective use of attenuating devices.
- Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development theme for the area.
- Prevent pollution of water ways and water features by suspended solids and dissolved solids in stormwater discharges.
- Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies during both construction and operation.
- Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.

### **3.1. Stormwater Management Policy**

The following rules are to be observed by all developers,—municipality their professional teams, contractors and sub-contractors:

1. Designs for the buildings and site development in general must avoid concentration of stormwater runoff both spatially and in time and may be required to provide for on-site attenuation of stormwater runoff to limit peak flows to pre-development levels.
2. Detailed plans to control and prevent erosion by water must be agreed with prior to the commencement of any works, including site clearance, on any portion of the site.
3. Removal of vegetation cover must be carried out with care and attention to the effect, whether temporary or long term, that this removal will have on erosion potential.
4. Precautions shall be taken at all times on building sites to contain soil erosion and prevent any eroded material from being removed from the site.
5. Landscaping and re-vegetation of areas not occupied by buildings or paving shall be programmed to proceed immediately building works have been completed, or have reached a stage where newly established ground cover is not at risk from the construction works.
6. On-site stormwater control systems, such as swales, berms, soil fences and detention ponds are to be constructed before any construction commences on the site. As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
7. Earthworks on sites are to be kept to a minimum. Where embankments have to be formed, stabilisation and erosion control measures shall be implemented immediately.
8. Stormwater must not be allowed to pond in close proximity to waste.
9. Prior to any physical work proceeding on any site, stormwater control plans (SCPs) detailing the proposed stormwater control measures are to be submitted to the Design Review Committee of Midvaal local municipality, or their appointed representative. No work is to be undertaken without an approved SCP.
10. Stormwater Control Plans must describe what control measures are to be implemented before and during the construction period, as well as the final stormwater control measures required for the site on completion of site development. Plans must indicate who is responsible for the design of the control measures and who is, or will be, designated as the responsible person on site during each stage of the implementation of the control measures.

11. Stormwater Control Plans must show that all the provisions, regulations and guidelines contained in this document have been taken into account.
12. In the event of a failure to adequately implement the approved stormwater control plan, the owner/developer shall be responsible for making good all consequential environmental damage at his own cost. Owner/developers are therefore advised to ensure that all members of their professional teams and their contractors are competent to undertake the development work and are adequately insured.

### **3.2. Major Stormwater Systems**

In due course, the stormwater systems in each drainage basin will need to be identified and analysed to determine the requirements for new stormwater infrastructure to meet the objectives of this stormwater management plan. The results should be documented in a Stormwater Systems Report that advises designers on the hydraulic capacities of the major system and provides parameters for further detailed design at specific locations within the overall development. The parameters should include:

- Allowable ranges for the percentage impervious for commercial and residential areas site.
- Average depression storage values for pervious and impervious areas.
- Initial and final infiltration rates and the appropriate Horton's decay constant.
- Equivalent Rational Method coefficients and unit area runoffs for developments on the small sites

It is important that all landfill site designs provide for maximum on-site stormwater attenuation and that the developers instruct their professional teams accordingly. It is important that level and near-level areas, such as building culverts and drains, are used to best advantage to attenuate storm runoff.

## **4. CRITICAL ASPECTS**

1. Stormwater drainage is a crucial aspect in the development and operation of the landfill site and will require careful planning, designing and managing.
2. The stormwater detention ponds should be designed for the 100-year storm event and should be located at appropriately selected sites in the primary watercourses. Site selection must take account of the necessary geotechnical, environmental and topographical conditions.



3. In addition to macro stormwater measures, micro-stormwater measures should be implemented on individual sites. The form of this attenuation will be dependent on a number of factors such as topography (natural and artificial slopes), the zoning of the site and soil conditions present. It is envisaged that in the steeper regions on-site attenuation tanks will be the most suitable form of attenuation with outlets to the municipal pipe network, where provided, or appropriate flow spreaders.
4. In the less steep areas where soil conditions are favourable, infiltration measures will be the preferred form of on-site stormwater control and disposal. In certain instances infiltration devices may need to be supplemented with attenuation tanks with outlets to the municipal pipe network.
5. A limited stormwater pipe network should be provided for stormwater reticulation to safely convey minor stormwater runoff from properties and roads to and between the attenuation facilities. Hydraulic analysis is required to determine where existing elements of the major stormwater system are inadequate and how the problems can best be addressed.
6. To ensure that water quality is not compromised, silt and trash traps will need to be provided within the system. Where conditions permit, open ditches, drains and channels should be used instead of pipes. Attention must be given to the erodibility of channels where flow velocities are high and appropriate lining provided. Forms of lining will vary from natural vegetation to stone pitching and reinforced concrete linings.
7. While the stormwater management objective of the development should be to minimise the concentration of stormwater and attenuate flows as much as possible, roads and driveways cut into steeper slopes will cause storm runoff to be channelled and focused. Exit points should be located over flat ground, where sheet flow can be re-established or into culverts that convey the flow to a water body, or an energy-dissipating device.
8. In preparing the sub-catchment boundaries, account has been taken of the natural watersheds and the impact on the flow of stormwater runoff. Certain sub-catchment boundaries will be defined landfill design that are likely to concentrate stormwater runoff in a formalised system. Within the development area, stormwater servitudes of adequate width will be required over properties straddling a natural watercourse, or where runoff is diverted for a specific reason.
9. Open channels or pipes, with outfall energy dissipaters must be provided wherever there is an assessed risk of erosion on slopes steeper than 2%.
10. The landfill should not adversely impact on the environments of the development node and surrounding areas in terms of erosion and sediment deposition, but the frequency of flooding and the total runoff volume will increase unless adequate provision can be made

to maintain the current natural rate of stormwater retention and infiltration in the sub-catchments.

11. An overall stormwater systems model should be developed to determine peak flood flow rates and flood levels for the main watercourses and assess the collective impacts of developments on runoff patterns. The outputs from the modelling will provide the input data required for the design of culverts, channels and other stormwater infrastructure associated with the proposed developments.
12. Detailed hydraulic analysis will be required during the design stage to assess storm runoff and flood levels at specific locations, such as landfill area road culverts and where properties are affected by the 100-year flood. It is important to note that although a structure may be designed for a return period less than 1 in 100 years, the design analysis must still assess the consequences resulting from a 100-year storm event.
13. For sub-catchments flowing into the development area, potential future development in these sub-catchments should be considered and any requirements for stormwater detention should be identified. Similarly, for sub-catchments flowing out of the development area the impact on the downstream watercourse must be considered and measures taken to ensure any upstream development does not result in an increased flood damage risk downstream.
14. Sites within the landfill that bound on stormwater detention areas, near road crossings, watercourse confluences and water features could be subject to flooding. In these situations, no development should take place below the outfall levels of water detention areas, plus an appropriate freeboard allowance.
15. The development layouts will impact on storm runoff to varying degrees. Adequate provision will have to be made for the management and disposal of stormwater runoff from the various developments as they are planned and this must be done in an integrated and coordinated process to avoid stormwater damage in the future.
16. Overland flow may be encouraged where possible, but should be avoided in the specific areas identified. Plans must take into account probable impact of flow from these points of concentration on the downstream environment.
17. Steep watercourses will require protection from erosion through the use of appropriate channel lining, detention dams, or controlled drops to dissipate flow energy.
18. All natural and unlined channels should be inspected for adequate binding of soil by sustainable ground cover. Stone pitching should be used to reinforce channel inverters on steep slopes. Existing wetlands and stormwater detention areas should be protected from encroachment by the development.

## **5. GUIDELINES FOR OWNERS/CLIENT AND DEVELOPERS**

All developments within the landfill site area will be required to control stormwater runoff in accordance with the stormwater management philosophy and policies of water affairs guideline and the Midvaal Local Municipality.

The following guidelines are intended to assist developers, owners and their professional teams with the planning of site layouts, the design of the major and minor stormwater systems infrastructure and to ensure that the objectives of this Stormwater Management Plan are met during the planning, design, construction and operational phases of the landfill site. Where prescriptive wording is adopted, the guideline shall be accepted and implemented as a rule.

### **6.1. Stormwater Runoff Control**

Formal surface and underground stormwater systems are provided in the overall development for the acceptance of stormwater drainage around the landfill site but it is important that the peak runoff rate do not exceed the hydraulic capacities of the elements in the major stormwater system. The following are general guidelines for stormwater control from properties around the site.

### **6.2. Buildings**

Any building will inevitably result in some degree of flow concentration, or deflection of flow around the landfill site. The developer/owner shall ensure that the flow path of the stormwater on this site is adequately protected against erosion and is sufficiently roughened to retard stormwater flow to the same degree, or more, as that found in the natural predevelopment state of the site.

Where the construction of the landfill causes a change in the natural flora of the site that might result in soil erosion, the risk of soil erosion by stormwater must be eliminated by the provision of approved artificial soil stabilisation devices, or alternative flora suited to the changed conditions on the site.

Where a piped stormwater system exists, an on-site stormwater drainage system should be connected to this external system. Any inlet to a piped system shall be fitted with a screen, or grating to prevent debris and refuse from entering the stormwater system. This must be done immediately on installation of the piped system.

No road works, earthworks, walls or fences may obstruct or encroach on a watercourse inside or outside the site without approved plans that do not compromise the objectives of the Stormwater Management Plan.

### **6.3. Road Drainage**

Road designs must adopt the One-Planet-Living-10 principles and rainfall runoff from roofing and other areas, not subjected to excessive pollution, must be efficiently captured for re-use where possible for on-site dust management.

Where ground conditions permit, rainwater runoff that is not stored and utilised on site must be connected to infiltration galleries or trenches designed to maximise groundwater recharge. Infiltration facilities must be large enough to contain at least the first hour of a minor storm's runoff without overflowing.

Infiltration trenches must be aligned along the contour on the downstream side of the landfill site such that any spillage during major storms results in sheet overland flow. Where a piped stormwater system has been provided, surplus runoff should be connected to this system. Garden and other debris must be trapped on screens or gratings before entering the municipal or local development's stormwater system.

### **6.4. Parking Areas and Yards**

Any external parking area, yard or other paved area must be designed to attenuate stormwater runoff from a major storm to an acceptable degree. Any area in the landfill must discharge rainwater flowing over, or falling onto its surface, in a controlled manner either overland as sheet flow, or into a detention facility, or infiltration gallery suitably sized to accommodate minor storm runoff.

### **6.5. Driveways**

Driveways shall not be constructed to deflect or channel runoff onto a roadway, or to concentrate runoff along a particular path that is not a natural water course, without prior consent. Driveways and paths should be designed and constructed such that the rate of flow of stormwater across and along the driveway or path is not increased when compared with the pre-development state. Where the driveway joins the road, the driveway must not obstruct the flow in any open channel, whether line or unlined, found along the road verge.

## **6.6. Roads**

The principle of overland flow should apply to roadways where possible and roads should be designed and graded to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the major stormwater system should be taken, with the provision of detention storage facilities at suitable points. Inlet structures at culverts must be designed to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point and detention storage should be provided on the road and/or upstream of the stormwater culvert.

Outlet structures at a road culvert or a natural watercourse must be designed to dissipate flow energy and any unlined downstream channel must be adequately protected against soil erosion.

## **6.8. Stormwater Storage Facilities**

- The sufficiency and effectiveness of on-site detention and retention storage to meet stormwater attenuation requirements within the minor and major stormwater systems is the responsibility of the landfill operator.
- Retention ponds shall be maintained in good condition and shall not be permitted to become a health hazard or nuisance.
- Midvaal Local Municipality, shall have the right to inspect any stormwater drainage control facility at any time and issue instructions for repair and maintenance works deemed to be necessary, which instructions must be carried out within the prescribed time period.

## **6.9. Subsurface Disposal of Stormwater**

- Any construction providing for the subsurface disposal of stormwater should be designed to ensure that such disposal does not cause slope instability, or areas of concentrated saturation or inundation.
- Infiltration structures should be integrated into the terrain so as to be unobtrusive and in keeping with the natural surroundings.

## **6.10. Channels**

- Lined and unlined channels may be constructed to convey stormwater to a natural watercourse where deemed necessary and unavoidable.

- Channels must be constructed with rough artificial surfaces, or lined with suitable, hardy vegetation, to be non-erodible and to provide maximum possible energy dissipation to the flow.

### **6.11. Energy Dissipators**

Measures should be taken to dissipate flow energy wherever concentrated stormwater flow is discharged down an embankment or erodible slope and the resulting supercritical flow poses a significant risk to the stability of the waterway. Attenuation dams should be provided at the head of the energy dissipating structure if possible. A means of dissipating energy must be provided at the outfall of any drop structure to ensure stormwater flow is returned to a safe sub-critical state, or to disperse the flow.

### **6.12 .Flow Retarders**

- Stormwater flow should be retarded wherever possible through the use of surface roughening or other flow restricting devices, provided these are designed and built to avoid blockages that could result in environmental and structural damage.
- All such constructions must be regularly maintained by the owner and may be inspected at any time by Midvaal Local Municipality, or their appointed representatives.

## **6. Stormwater Pollution Control**

- The Landfill operator must ensure that no materials, fluids or substances are allowed to enter the stormwater system that could have a detrimental effect on the flora, fauna and aquatic life in the water courses, wetlands and dams.
- Regular monitoring of sites within the catchments should be the Midvaal Local Municipality, or their appointed representatives.
- The owner of any site that is required to store any substances that could be regarded as hazardous in terms of water pollution, shall notify the Midvaal Local Municipality and shall take measures to ensure spillages of the substance(s) can be adequately contained to prevent contamination of the water resources within and around the development area.
- No stormwater, wash water, or waste water may be directed towards any permanent water body or wetland without the installation of a suitable filtration System to prevent pollution, including silt, from entering such water body.

## **7.2. Stormwater Erosion Control**

Midvaal local Municipality may, at its discretion, inspect the individual properties within in the Farm area on a regular basis to:

- determine the effectiveness of the stormwater management policies and amend policy as and when necessary to meet the objectives of the Stormwater Management Plan.
- advise contractor of any repair, maintenance and improvement works required on the stormwater system control elements within their jurisdiction.

## **7.3. Safety**

### **7.3.1. Inundation of Property and Buildings**

- No new buildings are to be constructed below the 1:100 year flood line.
- The 1:100 year flood line may not be altered by the development of the site, land forming or other means, without the approval of the engineer or the Midvaal Local Municipality, in case this interferes with the performance of existing stormwater management facilities.
- All risk of inundation by flood water is carried by the Midvaal local Municipality.
- No flood water may be diverted or concentrated such that a risk of flooding or inundation of any property or building is created.

### **7.3.2. Structural Damage**

The diversion or concentration of stormwater, whether on the surface or underground, must not increase the risk of structural damage to any development within landfill area. The above includes the undermining of structures due to erosion of soil by stormwater.

## **8. Stormwater Plan Implementation Procedures**

The following procedures are to be followed by Midvaal Local Municipality appointed agents, professional teams and contractors:

### **8.1. Application for Permission to Build**

- A copy of the Stormwater Management Plan shall be obtained from the client.

### **8.2. Site Survey and Investigations**

- Anyone involved in site survey and investigation work shall be familiar with the contents of the Stormwater Management Plan.

### **8.3. Design Stage**

- The professional team shall take into account the stormwater management requirements contained in this document and shall clearly indicate on all plans and in any contract document where and how measures have been provided in the design to ensure the stormwater management requirements are implemented. Approval from the Midvaal local Municipality must be obtained before commencing construction.

### **8.4. Construction**

Contractor shall prepare a Stormwater Control Plan to ensure that all construction methods adopted on site and within the landfill area do not cause, or precipitate, soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction.

The designated responsible person on site, as indicated in the stormwater control plan (usually the contractor) shall ensure that no construction work takes place before the stormwater control measures are in place.

### **8.5. Certificate of Occupation**

On completion of the works, the Midvaal local Municipality, or their appointed professional person will inspect the site for compliance with the stormwater management requirements, prior to the issuing of a certificate of occupation by the Midvaal Local Municipality.

### **8.6. Occupation Period**

During occupation of any property, Midvaal Local Municipality may undertake periodic inspections, to ensure the stormwater management policy is being correctly implemented, and may serve notice on occupants to undertake remedial work, which is deemed necessary in the opinion of Midvaal Local Municipality.

### **8.7. Compliance with Stormwater Management Policy**

Within the jurisdiction of a site specifically and the proposed landfill area by large, the owner and his professional team, including the contractor, shall be responsible for ensuring that the requirements of this Stormwater Management Plan are met. The owner and his professional team shall be responsible for the performance of all stormwater control measures



implemented on a site under their jurisdiction and the impact such works may have on downstream property within the landfill area.

Approval of any plan or document, whether verbally or in writing, by the Midvaal Local Municipality shall not be construed as absolving the owner or the professional team of this responsibility.

## **APPENDIX :D REHABILITATION PLAN**

### **1. INTRODUCTION**

Site Closure will proceed when the site is no longer deemed to be serviceable. This phase outlines as far as possible, measures to rehabilitate the environment affected by the landfill. The aim is to landscape all the open areas, thus indigenous vegetation must be used for the landscaping. The areas to be landscaped must be incorporated in the designs of the landfill. The other rehabilitation that must happen should be done concurrent to operational phase, i.e. as the active cell is closed, it must immediately be rehabilitated with grassing where possible.

The steps associated with the closure/rehabilitation plan are set out in the Department of Environmental Affairs' Waste Management Series – Minimum Requirements for Waste Disposal by Landfill. The closure plan is developed to provide specifications for the closure of the site. The Rehabilitation Plan for the closure of the landfill site is designed as an environmental management tool used to prescribe management mechanisms/methods for the prevention of undue or reasonably avoidable adverse environmental impacts and for the enhancement of the positive environmental benefits during the rehabilitation process.

#### **1.1. OBJECTIVES OF REHABILITATION PLAN**

The objective of the rehabilitation plan is to meet the aims stipulated above by accomplishing the following site-specific objectives:

- Establish nature and extent of soil pollution, if any, through the commissioning of a soil pollution assessment.
- Implement measures to restrict current and future illegal dumping occurring on the site.
- Ensure closure application complies with NEM: WA regulatory requirements.
- Ensure relevant waste regulations are complied with.
- Develop programmes for the effective removal of waste and remediation of the site.
- Rectify / Remediate pollution, if any.
- Implement measures to reduce, monitor and manage waste generation, whilst maximising recycling efficiency during decommissioning and rehabilitation.
- Reinstate to functional land use.

- Develop, communicate and implement a public awareness programme to raise public awareness.
- Institute measures to ensure that the public and private sectors understand and co-operate in working towards ensuring the closure and prevention of illegal dumping does not negatively affect rehabilitation measures implemented.
- Establish a clean bill of health for future sale of land.
- Ensure public acceptance of End-use Plan.
- Rehabilitate the waste disposal site to ensure it is socially and environmentally acceptable and suited to the proposed end use.
- Provision of alternative transfer stations/landfill sites.
- Serve as a mechanism to manage and monitor decommissioning and rehabilitation to ensure public health and environmental protection.

## **2. REGULATORY REQUIREMENTS FOR CLOSURE**

The rehabilitation plan aims to ensure compliance to the legislative requirements applicable to the closure of waste management facilities. Compliance thereof shall result in effective waste management with subsequent prevention of pollution and environmental degradation during and after site closure. A closure application must be submitted to the Gauteng - Department of Agricultural and Rural Development (GDRAD) in accordance to the regulatory requirements for site closure for permitted sites.

## **3. REQUIREMENTS FOR CLOSURE OF THE LANDFILL**

The landfill rehabilitation or closure process should start by identifying the potential hazards that the landfill poses to the environment. Once this screening has been carried out, an appropriate risk assessment should be completed to allow identification of the mitigation measures (essential and technical precautions) that need to be adopted to ensure satisfactory environmental protection. The following steps and measures need to be implemented in terms of the Closure/rehabilitation of the landfill site:

### **3.1. Site Access**

It is recommended that the site be fenced off and isolated and that no further development or dumping of additional waste of any kind be carried out. Signage in at least 3 applicable languages in the region, must be placed at the fences and entrance of the site indicating that

the site is out of bounds for public, closed and that no disposal or dumping is allowed on this site. The following measures must be taken to prevent access to the site:

- **Prevention of further illegal dumping**

All existing fencing shall be repaired and maintained to prevent access for illegal dumping.

- **Awareness**

The local community shall be informed of the site closure and made aware of further alternatives through public meetings, the placement of notices in local newspapers and other advertisements.

- **Signage**

The MLM shall ensure placement of signage close to the road informing the public of site closure and providing details on alternative transfer sites.

- **Security**

Maintain security at the site for a short period after closure to prevent potential illegal dumping and / or vandalism.

- **Vermin Control**

- Ensure adequate vermin control to prevent migration of vermin into residential areas after removal of suitable habitat and food source.

### **3.2. SURVEYING/RE-CONTOURING**

Once site surveys diagrams, cross-sections and layouts have been generated and other site risk assessment have been completed, the design engineer shall develop a final closure design which must be submitted to the department. The profile, soil condition and landform of the Midvaal Landfill site must be restored to a similar state to the surrounding landscape to provide for homogenous representivity. Areas requiring re-contouring shall be stripped of the top 150 mm of topsoil and this shall be stockpiled separately from other soil stockpiles. All areas where re-contouring interventions are required shall be cross-ripped before topsoil placement. Topsoil shall be uniformly scarified to allow for vegetation growth. Ripping depths shall be determined by the depths identified for the soil profiles during the pre-construction survey

### **3.3. DESIGN**

The final closure design shall be primary informed by the risk assessment process of the landfill site must:

- Ensure that the identified pollution Risk is mitigated and managed. Pollution control is the primary function of the closure design.
- Reduce the infiltration of precipitation into the landfill to control leachate generation.
- Minimise fugitive emissions of landfill gas through the surface of the cap.
- Separate the waste in the landfill from its surrounding environment.

The capping design must be designed by and signed off by a Professional Engineer

### **3.4. SLOPE AND GRADING**

Construct a storm water diversion berm upstream of the capped cell (north, east and west) to divert any stormwater from the waste mass and the following:

- Provide boreholes for groundwater quality monitoring.
- Control the encroaching soil erosion.

The plateau of the site must be graded to 2 - 3% slope and the sides to a minimum of 3:1 slope; however, the final shape must be approved by the regulating authority.

### **3.5. Leachate Management**

Due to the location of the site and the nature of waste that was deposited into the site it is not anticipated that the site will generate significant amounts of leachate post closure. If the landfill site can be shaped and capped in such a way as to prevent any pooling or damming of storm water over the landfill, it will not be necessary to construct a lined pond for collection of the run-off or leachate. If properly constructed the shaping and capping of the landfill should prevent water from coming into contact with the waste. Should there be leachate onsite cut-off trench must be installed downstream of the capped areas in order to intercept the leachate coming from the unlined capped cells.

### **3.6. Final Cover and Capping**

The final covering and capping of the site must be undertaken based on recommendations from the risk assessment and design. Before final capping, the waste must be compacted and shaped in such a way as to promote run-off and to prevent any ponding of water on the landfill site.

- Filling and landscaping may be necessary to achieve this. This is very important in order to prevent any pooled water from seeping through the capping layer and in to waste below.

- The final shaping of the landfill should comprise a gentle slope and must incorporate the existing berm. The final sloping of the landfill should not exceed 1 in 2.5. This does not include the outside slope of the existing berm, or any part of the inside slope that remains vegetated. Care must be taken not to disturb the vegetation on the berm so that erosion is minimized.
- The berm should not be continuous around landfill such that damming of water can occur. Storm water should be allowed to drain away from the landfill, without coming into contact with the waste.
- The capping needs to be impervious to water in order to keep the waste in the landfill as dry as possible and to prevent any further contamination leaching into the ground water. It should also be continuous with the existing berm.

### **3.7. Final Elevation**

The final elevation of the site shall be determined following the survey, but it must not exceed the background topographical features.

### **3.8. Vegetation cover**

Once the final layer of top soil has been placed on the cap, the site must be seeded with a mixture of indigenous grasses, and allowed to propagate to form a health grass community on the site. The grassing and vegetation must commence immediately after final capping in order to prevent soil erosion.

## **4. SOIL REMEDIATION**

### **4.1. Mulch**

Herbaceous garden waste shall be chipped and rotavated into the top 100mm of topsoil at a rate of 4 tons per hectare. No material bearing fruit or seed and/or capable of vegetative reproduction shall be chipped and used as mulch.

### **4.2 Composting**

Organic garden waste shall be composted. The ploughed area should be ameliorated with relatively coarse but properly composted organic material (typically mushroom compost) at a rate of approximately 5 tons (moist – not wet) per hectare (or 6 - 8 m<sup>3</sup> per hectare). The exact quantity is not critical but it is important to increase the soil's organic matter content

with material that can still undergo 14 further microbial decomposition. The compost should be incorporated into the soil through ploughing

### **4.3 Fertilising**

Soil analysis tests on the top 75 mm of prepared surface shall be performed prior to revegetation/seeding to determine the required fertiliser levels for vegetative cover. These levels should be in line with the following used for dry land production of pasture grasses: Nitrogen at 70kg/ha-1, Potassium at 40kg/ha-1 and Phosphorus at 20kg/ha-1. The fertiliser application rate will be dependent on the fertiliser mix and application rates as identified during soil analysis. These requirements will be determined from findings following tests done on adjacent lands or prior to decommissioning and rehabilitation activities commencing. The nutrient levels of the soil, after fertiliser application within the site, shall be similar to nutrient levels in adjacent lands. Fertilisers shall contain both macro and micro elements. All soil analyses tests must be done by an accredited laboratory.

### **4.4 HYDRO SEEDING**

#### **4.4.1 Seed acquisition**

Seed shall be purchased from a South African National Seed Organization (SANSOR) accredited dealer. Seed used for rehabilitation shall not be older than one season. Purchased seed must be of the correct species and of known origin, dried and packed, conforming to all legal requirements for seed. Proof of compliance must be provided to the Midvaal Local Municipality prior to commencement of works.

#### **4.4.2 Hydro seeding/Conventional Seeding**

The Midvaal Local Municipality shall appoint a reputable hydro seeding/conventional seeding company to undertake the hydro seeding/conventional seeding. The appointed Contractor shall ensure that an approved hydro seeding machine is used capable of dispensing a uniform solution of seed, anti-erosion compound, fertiliser and water. The seed mix required for revegetation will be dispensed at a rate of not less than 20 kilolitres of water per hectare. This mixture will comprise a selection of species that are indigenous and locally occurring, and capable of growing under natural conditions.

The hydro seeding machine shall be thoroughly cleaned after each application and before a different seed mix is introduced into it. This is to prevent contamination of the specific seed mix with alien seed stock that could potentially become invasive. Hydro seeding/conventional seeding shall only be carried out after the first good rains (minimum of 5 mm) have fallen during the summer rainfall period. All hydro seeding/conventional seeding

activities shall be completed one month before the end of the growing season. The mixture of species, appropriate for the Soweto Highveld, is recommended below.

*Table 1: recommended species for rehabilitation*

Recommended Rehabilitation	Species for	Common name	Rate kg/ ha
	<i>Cenchrus ciliaris</i>	Foxtail buffalo grass	6
	<i>Digitaria eriantha</i>	Common finger grass	4
	<i>Panicum maximum</i>	Guinea grass	4
	<i>Antheophora pubescens</i>	Wool grass	5
	<i>Eragrostis curvula</i>	Weeping love grass	8
	<i>Chloris gayana</i>	Rhodes grass	6
	<i>Eragrostis tef</i>	Teff	2

The grass cover requirements at the end of the growing seasons following the rehabilitation work and hydro seeding are: 60% cover of the approved seed mix species diversity after the first growing season. 80% cover of the approved seed mix species diversity after the second growing season. The appointed Contractor shall be held liable during the Defects Notification Period applicable to rehabilitation will commence when the 60% grass cover is achieved and end when 80% grass cover is achieved.

## 5. ALIEN VEGETATION CONTROL

The rehabilitated areas shall be maintained weed and invader plant free. An active programme must be implemented to ensure no further spread of these plants in adjacent areas occurs. Control of weeds and invader plants must be done in accordance with accepted control measures implementable for each species. The Midvaal Local Municipality shall identify and manage invasive and other noxious plants as per the requirements of the Conservation of Agricultural Resources Act's (Act 43 of 1983) Regulations (Notice No. R. 1048 of 25 May 1984, as amended by Government Notice No. R. 2687 of 6 December 1985) pertaining to weeds and invader plants control. As such, the following measures shall apply:

- Category 1 weeds and invader plants: the Midvaal Local Municipality shall actively remove all growth forms of Category 1 weeds from all works areas, at all times; and
- Category 2 and 3 weeds and invader plants: the Midvaal Local Municipality shall actively remove all Category 2 and 3 plants prior to flowering.



All weeds and invader plants shall be controlled before the setting of seeds. All such material must be removed to a registered landfill site. The transportation of such material must not result in the spread of weeds and invader plant species along public or private roads.

## **6.TIMEFRAMES FOR REHABILITATION**

Rehabilitation works shall proceed after the first good rains (minimum of 5 mm) have fallen during the summer rainfall period. All hydro seeding/conventional seeding activities shall be completed one month before the end of the growing season.

### **6.1 MONITORING AND REPORTING**

The Contractor will be responsible for environmental control on site during rehabilitation and the maintenance period. During rehabilitation, activities will be monitored and recorded by an independent ECO and audited against the EMPr. Photographic records of the site will support the visual assessment. Monitoring and incident information will be communicated to the Project Manager. Any complaints will be recorded and investigated. After rehabilitation, the site needs to be inspected and monitored to ensure that the rehabilitation activities have been successful and maintained. The monitoring actions are:

- Inspection of all erosion and sediment control devices on a regular basis, particularly after heavy rains.
- Inspection of the site to check for soil compaction and contamination.
- Water control bunds, drains, ponds and channels will be checked regularly and after each heavy rainfall to ensure they are functioning correctly.
- General housekeeping will be examined regularly to ensure stormwater runoff does not contain refuse or contaminants.
- Noise generated on site will be subjectively assessed during site inspections.
- An audit (summer) of rehabilitated areas will be undertaken to record species composition and cover.
- Ongoing assessment of unsuccessful rehabilitated areas and erosion, stability and drainage re-establishment.
- Regular visual assessment of all storage containers and areas for capacity, potential for recycling and evidence of spillage, among other criteria.
- Adequacy of bunding will be assessed.
- Records of spills will be examined in the environmental incident register.
- Continuous monitoring of the site shall be required to determine the maintenance requirements and would typically including drainage systems. Drainage systems shall

be reviewed to determine functional integrity. All drainage channels shall be inspected for erosion which shall be backfilled and compacted whilst silt and vegetation shall be removed.

- The vegetation cover shall be monitored to determine whether the purposes of aesthetic improvement, erosion control, rehabilitation, and end-use have been achieved.

Incident reports will be checked to ensure that appropriate follow-up actions were taken. The MLM shall appoint an independent ECO to monitor and report for the duration of the works on the decommissioning and rehabilitation phases. The ECO shall be suitably qualified and have relevant experience in auditing decommissioning and rehabilitation projects. The ECO reports to the MLM.

## **6.2 END-USE APPROVAL**

The public are to be afforded the opportunity to contribute in a public participation process to provide input on the approved end-use. During this process, interested and affected parties (I&AP's) across the public / private spectrum are engaged and the outcomes of which inform the feasibility studies.

## **6.3.APPLICATION FOR SITE CLOSURE CERTIFICATE**

The closure of the Midvaal landsite shall require the submission of an application for closure to the the Gauteng - Department of Agricultural and Rural Development (GDRAD) to ensure compliance with the NEM:WA.

The inclusion of a rehabilitation plan shall provide the MLM with a management tool for use during the decommissioning and rehabilitation phase of landfill lifecycle, thereby ensuring the implementation of sound environmental management principles during the closure of the site.