



GA Environment

**BASIC ASSESSMENT FOR THE PROPOSED CLOSURE OF THE EMADLANGENI LANDFILL,
EMADLANGENI LOCAL MUNICIPALITY, KWAZULU NATAL PROVINCE**

CLOSURE AND REHABILITATION PLAN

PROJECT REFERENCE NR: DC25/0005/2017

JANUARY 2018

CLOSURE AND REHABILITATION PLAN

for the

**BASIC ASSESSMENT FOR THE PROPOSED CLOSURE OF THE EMADLANGENI LANDFILL,
EMADLANGENI LOCAL MUNICIPALITY, KWAZULU NATAL PROVINCE**

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PROJECT INFORMATION

Title:	Closure and Rehabilitation Plan for the Proposed Decommissioning (Closure) of the Emadlangeni Landfill, Emadlangeni Local Municipality, KwaZulu Natal Province
Competent Authority:	KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs
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Date:	25 January 2018

Document History and Quality Control

Revision	Revision Date	Revision Comments	Originator	Reviewed By
0	13 December 2017	Draft for public review	Nyaladzi Nleya	Nkhensani Khandhela
1	08 January 2018	Draft for public review	Nyaladzi Nleya	Nkhensani Khandhela

SIGNING OF THE ORIGINAL DOCUMENT

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**THE PROPOSED DECOMMISSIONING (CLOSURE) OF THE
EMADLANGENI LANDFILL, EMADLANGENI LOCAL MUNICIPALITY, KWAZULU NATAL PROVINCE**

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LIST OF ABBREVIATIONS

DEA	Department of Environmental Affairs
DWA	Department of Water Affairs and Forestry (now DWS)
DWS	Department of Water and Sanitation
ECA	Environmental Conservation Act (Act 73 of 1989)
EIA	Environmental Impact Assessment
EMPR	Environmental Management Programme Report
G	General Waste
GCB	General Communal Landfill
GSB	General Small Landfill
GMB	General Medium Landfill
GLB	General Large Landfill
H	Hazardous Waste
HDPE	High-Density Polyethylene
H:H	Hazardous Landfill (Hazard Rating 1-4)
H:h	Hazardous Landfill (Hazard Rating 3-4)
IAP's	Interested and Affected Parties
IWMP	Integrated Waste Management Plan

GLOSSARY OF TERMS

This section provides a catalogue of terms and Definitions, which may be used in this report and, or other future waste management plans and documents compiled as part for the decommissioning of the Emadlangeni landfill of other waste management practices within the Emadlangeni Local Municipality. Where more than one definition for a term exists in the literature, additional definitions have been provided for clarity:

Term	Definition	Reference
Audit	A site inspection at which the condition of the site on that day is appraised in terms of a number of predetermined criteria.	DWAF Minimum Requirements for disposal of waste by landfill 2 nd Edition, 1998, Minimum Requirements (1998) hereafter
Buffer Zones	Buffer Zones are separations between the boundaries of registered landfill sites and residential developments. They may vary between 500m and 1000m in width, depending on the classification of the landfill. No residential development may take place within a proclaimed buffer zone. At the discretion of the local authority and the state departments, however, developments such as industrial development may be permitted.	Minimum Requirements (1998)
Cell	This is the basic landfill unit of compacted solid waste which, when completed at the end of each day, is entirely contained by cover material. The sides may be typically formed by 1,5m or 2,0m high soil or rubble berms, or sloped covered waste. Cell width is determined by the manoeuvring requirements of vehicles depositing waste at the working face.	Minimum Requirements (1998)
Co-Disposal	Co-disposal (General and Hazardous waste): The mixing and joint disposal of Hazardous (H) and General (G) waste in the same landfill. The co-disposal of general waste with hazardous waste as a means of facilitating disposal on a hazardous waste landfill is acceptable, whereas the co-disposal of any significant quantity of hazardous waste with general waste on a general waste landfill is unacceptable.	Minimum Requirements (1998)
Co-Disposal	Co-disposal: (Liquid with Dry waste): The mixing of high moisture content or liquid waste with dry waste. This affects the water balance and is an acceptable practice on a hazardous waste landfill site. This is only acceptable on a general waste landfill site when the liquid is not hazardous and the site is equipped with leachate management measures.	Minimum Requirements (1998)
Compliance Monitoring	Monitoring done in compliance with permit conditions	Minimum Requirements (1998)
Cover	The material used to cover waste. Cover material is usually soil, but may comprise builders' rubble, ash or other suitable material. Daily cover is usually 150mm thick, intermediate cover is usually 300mm thick and final cover or capping usually 500mm thick. Final cover may form part of a special capping design and, as is the case with intermediate cover, must be able to support vegetation.	Minimum Requirements (1998)
Cradle-To-Grave	A policy of controlling of Waste from its inception to its ultimate disposal.	DWAF Minimum Requirements for the handling, classification and disposal of

Term	Definition	Reference
		hazardous waste disposal of waste (2 nd Edition, 1998)
Development Plan	A plan indicating the phasing of the development of a landfill from the landfill preparation, through the operation (which is usually divided into areal phases), to the final closure, rehabilitation and end-use. The phasing, and hence the Development Plan, forms part of the design.	Minimum Requirements (1998)
Disposal Site	A site used for the accumulation of waste with the purpose of disposing or treatment of such waste;	ECA
Duty of Care	This requires that any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, the person retains responsibility for the waste generated or handled.	Minimum Requirements (1998)
Eco-Toxicity	Eco-toxicity is the potential to harm animals, plants, ecosystems or environmental processes.	Minimum Requirements (1998)
End-Use Plan	The purpose for which the area of the rehabilitated and closed landfill is used. This may be as a park, playing fields, or other suitable land-use.	Minimum Requirements (1998)
Environment	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) and (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 well-being.	National Environmental Management Act, 1998 (Act 107 of 1998), NEMA, 1998 hereafter
Extended Producer Responsibility	Means measures that extend a person's financial or physical responsibility for a product to the post-consumer stage of the product, and includes— (a) waste minimisation programmes; (b) financial arrangements for any fund that has been established to promote the reduction, re-use, recycling and recovery of waste; (c) awareness programmes to inform the public of the impacts of waste emanating from the product on health and the environment; and (d) any other measures to reduce the potential impact of the product on health and the environment.	NEMWA (2008)
Fatal Flaw	A factor or situation which prevents the development of an environmentally acceptable waste disposal facility, except as prohibitive cost.	Minimum Requirements (1998)
General Waste	Waste that does not pose an immediate threat to man or to the environment, i.e. household waste, builder's rubble, garden waste, dry industrial and commercial waste.	White Paper on IP&WM
General Waste	Waste that does not pose an immediate threat to man or the environment, i.e. household waste, builders' rubble, garden waste, and certain dry industrial and commercial waste. It may, however with decomposition, infiltration and percolation, produce leachate with an unacceptable pollution potential.	Minimum Requirements (1998)
General Waste	All urban waste that is produced within the jurisdiction of local authorities. It comprises rubble, garden, domestic, commercial and general industrial waste. It may also contain small quantities of hazardous substances dispersed within it such as batteries, insecticides and week-killers discarded	DWAF Waste Generation Baseline Studies

Term	Definition	Reference
	on domestic and commercial premises. General waste may be disposed of in a permitted landfill and may be equated to what is commonly referred to as domestic, solid waste and municipal waste, i.e. that which is normally managed by a local authority.	
General Waste	Means waste that does not pose an immediate hazard or threat to health or to the environment, and includes— (a) domestic waste; (b) building and demolition waste; (c) business waste; and (d) inert waste.	NEMWA (2008)
General Waste Landfill	A landfill designed to accept only general waste. Depending on the Site Water Balance, it may or may not have a leachate management system.	Minimum Requirements (1998)
Generator	An industry or other party whose activities result in the production of waste. The responsibility for hazardous waste remains from cradle-to-grave with the generator of the waste and the generator is held liable for any damage that the waste may cause to humans or to the environment.	Minimum Requirements (1998)
Guidelines	While not requirements, guidelines are recommended actions, which represent good practice. They are not enforceable, but may form the basis for site specific permit conditions in which case they become mandatory.	Minimum Requirements (1998)
Hazard	a source of or exposure to danger.	NEMA (1998)
Hazardous Waste	Waste that may, by circumstances of use, quantity, concentration or inherent physical, chemical or infectious characteristics, cause ill-health or increase mortality in humans, fauna and flora, or adversely affect the environment when improperly treated, stored, transported or disposed of.	Minimum Requirements (1998)
Hazardous Waste	Waste, other than radioactive waste, which is legally defined as hazardous in the state in which it is generated, transported or disposed of. The definition is based on the chemical reactivity or toxic, explosive, corrosive or other characteristics, which cause, or are likely to cause, danger to health or to the environment, whether alone or when in contact with other waste.	Minimum Requirements (1998)
Hazardous Waste	Waste, including radioactive waste, which is legally defined as “hazardous” in the state in which it is generated. The definition is based on the chemical reactivity or toxic, explosive, corrosive or other characteristics which cause, or are likely to cause, danger to health or to the environment, whether by itself or when in contact with other waste.	White Paper on IP&WM
Hazardous Waste	means any waste that contains organic or inorganic elements of compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.	NEMWA (2008)
Incineration	Incineration is both a form of treatment and a form of disposal. It is simply the controlled combustion of waste materials to a non-combustible residue or ash and exhaust gases, such as carbon dioxide and water.	Minimum Requirements (1998)
Infectious Waste:	Any waste which is generated during the diagnosis, treatment or immunisation of humans or animals; in the research pertaining to this; in the manufacturing or testing of biological agents – including blood, blood products and contaminated blood products, cultures, pathological wastes, sharps, human and animal anatomical wastes and isolation wastes that contain or may contain infectious substances.	Minimum Requirements (1998)
Interested and Affected Parties (IAP's)	Interested and Affected Parties are those people who will be affected in some way by the Waste disposal process. Residents or farmers, a whole residential community, or the public at large may represent them.	Minimum Requirements (1998)
Landfill (V)	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.	Minimum Requirements (1998)

Term	Definition	Reference
Landfill (N)	The waste body created by land filling. This may be above or below grade, or both.	Minimum Requirements (1998)
Leachate	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.	Minimum Requirements (1998)
Litter	Any object or matter discarded or left behind by the person in whose possession or control it was.	ECA
Medical Waste or Health Care Waste	Wastes emanating primarily from human and veterinary hospitals, clinics and surgeries, also from chemists and Sanitary Services. They may comprise, inter alia, sharps (used hypodermic needles and scalpel blades), malignant tissue, body parts, soiled bandages and liner, and spent or outdated medicines or drugs. They have the ability to affect and infect other living organics, and are considered hazardous.	Minimum Requirements (1998)
Minimum Requirement	A standard by means of which environmentally acceptable waste disposal practices can be distinguished from environmentally unacceptable waste disposal practices.	Minimum Requirements (1998)
Monitoring	The process of checking for changes in status or trends over time. This may be achieved by compiling successive audit or water quality analyses results.	Minimum Requirements (1998)
Operating Plan	A site-specific document which describes the way in which the landfill is operated. The Operating Plan commences at the level and detail of daily cell construction and continues through to the development and excavation sequence, access and drainage within a given phase of the Development Plan.	Minimum Requirements (1998)
Permit	The Permit issued by the Department of Water Affairs, & Forestry for the operation or closure of a landfill, in terms of Regulation 1549, promulgated under the Environment Conservation Act (Act 73 of 1989).	Minimum Requirements (1998)
Pollution	Any change in the environment caused by— (i) substances; (ii) radioactive or other waves; or (iii) 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.	NEMA (1998)
Precautionary Principle	Where a risk is unknown; the assumption of the worst-case situation and making provision for such a situation.	Minimum Requirements (1998)
Recycle	The use, re-use, or reclamation of material so that it re-enters the industrial process rather than becoming a waste.	Minimum Requirements (1998)
Remediation	The rectification of problems, caused by bad practices, through the implementation of remedial measures.	Minimum Requirements (1998)
Responsible Person	The Permit Holder or his legally appointed representative who takes responsibility for ensuring that all or some of the facets of any of the following are properly directed, guided and executed, in a professionally justifiable manner: investigatory work, design, preparation, operation, closure and monitoring.	Minimum Requirements (1998)
Standard	A criteria/measure by which the accuracy or quality of others is judged or a model for imitation, or the degree of excellence required.	Minimum Requirements (1998)
Toxic Waste	A form of hazardous waste that causes death or serious injury, such as burns, respiratory diseases, cancer or genetic mutations.	White Paper on IP&WM

Term	Definition	Reference
Transporter	A person, organisation, industry or enterprise engaged in or offering to engage in the transportation of waste.	Minimum Requirements (1998)
Treatment	Treatment is used to remove, separate, concentrate or recover a hazardous or toxic component of a waste or to destroy or, at least, to reduce its toxicity in order to minimise its impact on the environment.	Minimum Requirements (1998)
Waste	Any matter, whether gaseous, liquid or solid or any combination thereof, which is from time to time designated by the Minister by notice in the Gazette as an undesirable or superfluous by-product, emission, residue or remainder of any process or activity (definition of 'waste' substituted by s. 1 (h) of Act 79 of 1992).	ECA
Waste	An undesirable or superfluous by-product, emission, or residue of any process or activity which has been discarded, accumulated or been stored for the purpose of discarding or processing. It may be gaseous, liquid or solid or any combination thereof and may originate from a residential, commercial or industrial area. This definition includes industrial waste water, sewage, radioactive substances, mining, metallurgical and power generation waste.	White Paper on IP&WM
Waste	Any matter, whether gaseous, liquid or solid or any combination thereof, originating from any residential, commercial or industrial area or agricultural area identified by the Minister of Environment Affairs as an undesirable or superfluous by-product, emission, residue or remainder of any process or activity.	DWAF Waste Generation Baseline Studies
Waste	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) where the generator has no further use of for the purposes of production, reprocessing or consumption; (c) that must be treated or disposed of; or (d) that is identified as a waste by the Minister, 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	NEMWA (2008)
Waste Body	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.	Minimum Requirements (1998)
Waste Disposal Facility	Means any site or premise used for the accumulation of Waste with the purpose of disposing of that waste at that site or on that premise.	NEMWA (2008)
Waste Management Activity	Means any activity listed in Schedule 1 or published by notice in the <i>Gazette</i> under section 19 of the NEM Waste Act, and includes— (a) the importation and exportation of waste; (b) the generation of waste, including the undertaking of any activity or process that is likely to result in the generation of waste; (c) the accumulation and storage of waste; (d) the collection and handling of waste; (e) the reduction, re-use, recycling and recovery of waste; (f) the trading in waste; (g) the transportation of waste; (h) the transfer of waste; (i) the treatment of waste; and (j) the disposal of waste.	NEMWA (2008)

Term	Definition	Reference
Waste Management License	Means a licence issued in terms of section 49 of NEMWA (2008) for waste management activities listed under section 19 of the Act.	NEMWA (2008)
Waste Management Facility	All wastes or products stored on a temporary or permanent basis, that could impact on surface or groundwater quality, by leaching into or coming in contact with water, are referred to a "Waste Management Facilities". See also the Waste Management Documents, "Minimum requirements for waste disposal sites" and "Minimum requirements for the handling and disposal of hazardous waste".	Minimum Requirements (1998)
waste management Services	Means waste collection, treatment, recycling and disposal services.	NEMWA (2008)
Waste Minimisation programme	Means a programme that is intended to Promote the reduced generation and disposal of waste.	NEMWA (2008)
Waste Transfer Facility	Means a facility that is used to accumulate and temporarily store waste before it is transported to a recycling, treatment or waste disposal facility.	NEMWA (2008)
Waste Treatment Facility"	Means any site that is used to accumulate waste for the Purpose of storage, recovery, treatment, reprocessing, recycling or sorting of that Waste.	NEMWA (2008)

1 INTRODUCTION

1.1 Background

The Department of Environmental Affairs (DEA) is assisting the Emadlangeni Local Municipality to licence the Emadlangeni landfill for decommissioning (closure). For this reason, a decommissioning licence must be applied for with the KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA). DEA has thus appointed GA Environment (Pty) Ltd as independent Environmental Consultants, to undertake the Basic Assessment (BA) process and the Closure Plan for the Waste Management Licence Process for the Emadlangeni landfill.

The Emadlangeni Local Municipality proposes to close and formally decommission the active Emadlangeni landfill site. As a result of numerous complaints about the state of poorly operated municipal landfills and the associated impacts on the biophysical and social environment, the Department of Environmental Affairs has embarked on an initiative to assist various Municipalities in South Africa with the licensing of the existing illegal waste disposal sites. One of these is the Emadlangeni landfill that will require a Waste Management Licence for decommissioning. The initiative by DEA will assist the Emadlangeni Local Municipality with obtaining a Waste Management Licence which will also serve as a basis to seek funding opportunities and assistance from financial institutions such as DBSA and state departments such Treasury and National Ministries to ensure the closure of the landfill as per the waste legislation.

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

As part of the Basic Assessment Report and Waste Management Licence Application requirements for the closure of the Emadlangeni Landfill Site, a closure plan for the site must be compiled to support the application. *This document thus serves as closure and rehabilitation plan for the Decommissioning of the Emadlangeni landfill site.*

1.2 Site location and Status quo

The eMadlangeni landfill occupies an area of approximately 62 000m² (±6 Ha) and is located on Erf 10000 and Erf 1006 eMadlangeni within the eMadlangeni Local Municipality which falls within the Amajuba District Municipality. The site is within the boundaries of the Utrecht Balele Community Game Park and on the western foothills of the Balele Mountains. The landfill is approximately 4km north of the R34 which provides the main access into the Utrecht CBD. Direct access to the site can be gained from the surfaced President Street leading to Paulpietersburg. The site centre co-ordinates are 27°39'18.65"S; 30° 20' 28.20"E. Refer to Figure 1 for the Locality Map of the site.

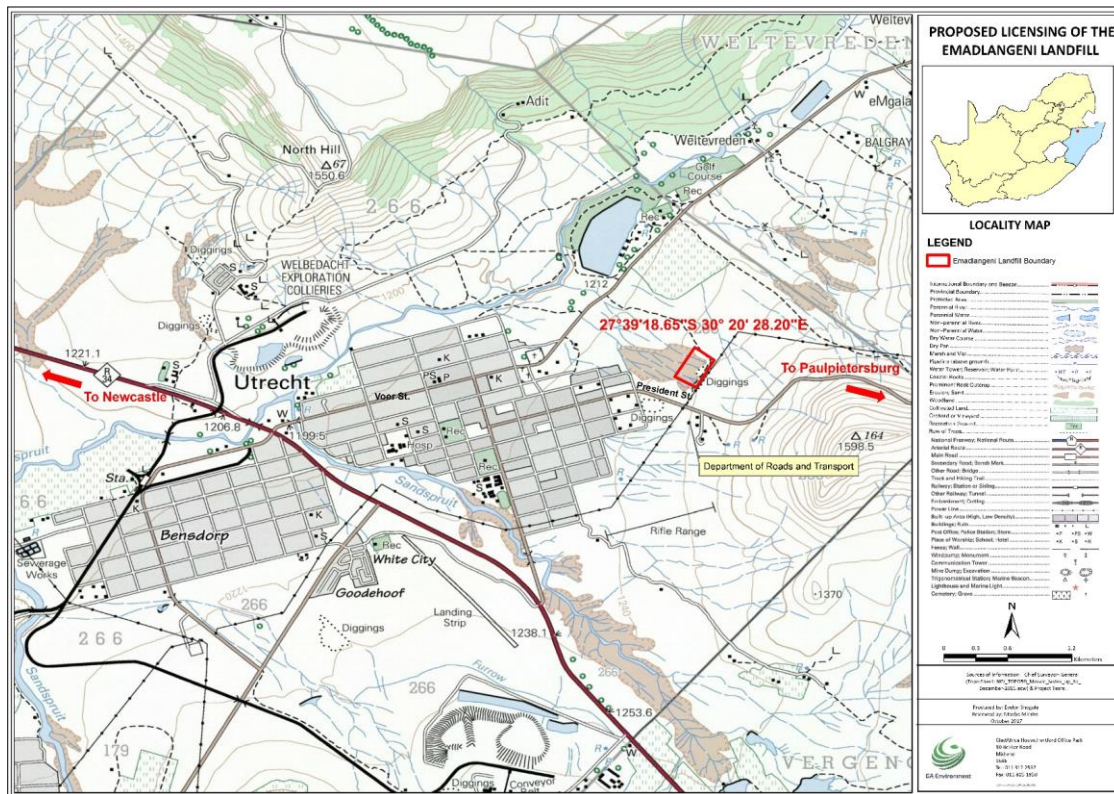


Figure 1: Locality map showing of the Emadlangeni landfill site

According to the Emadlangeni Local Municipality, it remains the function of the Municipality to remove and dispose any household waste or other waste under its jurisdiction. Through the Integrated Waste Management Plan it is the intention of the municipality to dispose of general waste through Buy Back Centres and waste Transfer Centres. The Emadlangeni Municipality seeks to alleviate environmental problems noted on this site include visual nuisances from windblown litter, and air quality problems from the burning of waste, ingress by livestock, etc. Although the site is fenced off and gated, other landfill support infrastructure such as the guardhouse and the toilet is inadequate. Other challenges are with regard to the lack of appropriate equipment required for the compacting of waste on site.

Although the landfill remains poorly operated, one of the key activities noted on site is the reclaiming of recyclable material by locally based reclaimers. This contributes to local revenue generated by members of the community and supports one of the goals of the National Waste Management Strategy which is a legislative requirement of the NEM:WA.

It is assumed that the site has no base liner and that disposed had been placed in non-uniform layers over time with no direct purposeful compaction. By virtue of the topography the north eastern (upper) portion

of the site has some form of stormwater diversion but it does not appear to be purposeful and thus does not provide good stormwater diversion.



Figure 2: Garden waste mixed with general waste

A landfill receiving 8 tons of waste per day would have been classified as a Communal (C) site when using the Minimum Requirements classification system. According to the Engineering Needs Assessment Report it is estimated that the site currently holds approximately 120,000m³ of waste. It is thus possible that the facility is in the order of 30 to 40 years old. The site slopes naturally at about 4.5% from the mountain to the river.

1.3 Landfilling Method at the Emadlangeni Landfill

It assumed based onsite observations that the 'end tipping' landfilling method which involves the pushing of waste over the edge of a slope was used on site. This method assists in extending the site laterally. The end tipping method was evident from the site observations as shown in **Figure 4**.



Figure 3: Historical 'end-tipping' method of landfilling noted on eastern active section of the landfill

1.4 Scope and Objectives of the Report

This report is intended to serve the following purposes:

- Serve a guide for the formal closure and rehabilitation planning for the Emadlangeni Landfill Site.
- Used as a framework document, which shall guide the development of more detailed specifications for the implementation of engineering scope of works for the closure and rehabilitation of the Emadlangeni Landfill Site.
- Form part of the Environmental Management Programme for the Closure of the Emadlangeni Landfill site.
- Guide the Emadlangeni Local Municipality to make Financial Provisions for the closure and rehabilitation for the sites.

This report has been prepared in line with the guidance documents on best practice for Closure of Waste Management Facilities, some of which can be found in the Department of Water Affairs and Forestry (DWAF) Minimum Requirements for Waste Disposal by landfill (2nd Editions, (1998), and is intended to ensure compliance with legal and other requirements within the context of Environmental Management Systems and Planning. Appendix 5 of the National Environmental Management Act (NEMA) 1998 (Act No. 107 of 1998), Environmental Impact Assessment (EIA) Regulations regarding the (*Content of the Closure Plan*) has also been considered during the compilation of this document.

The aim of the Closure Plan is to steer the use of the site during its lifetime toward a desirable end use state that minimizes environmental risk, social risk, and financial or economic risk. The closure plan takes all closure requirements into account. The landfill closure plan aims to specify the implementation of requirements for closure of the landfill and would typically include details of rehabilitation measures. The

closure report also seeks to specify details of management, inspection, monitoring and maintenance of the site after it is closed.

1.5 Details of Environmental Assessment Practitioner

This Closure plan was compiled by:

This Environmental Management Program was compiled by:

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Mr Nyaladzi Nleya is an Environmental Scientist and holds B.Sc. (Applied Environmental Sciences). He is an Environmental Scientist with 8 years of experience. Nyaladzi specialises in Environmental Impact Assessments (EIAs), Waste license Applications and has been a project scientist for various EIA's in Northern Cape, North West, Mpumalanga and Gauteng provinces of South Africa. Nyaladzi is currently a Project Manager and Environmental Scientist at GA Environment (Pty) Ltd.

The 'Engineering Assessment and Designs Report' as well as the 'Geotechnical and Geohydrological Report' compiled for the Decommissioning of the Emadlangeni landfill were consulted in the compilation of the Closure Plan and are attached to the Basic Assessment Report.

1.6 Public Participation Processes undertaken to date

According to Appendix 5 of the National Environmental Management Act (NEMA), 1998 Environmental Impact Assessment (EIA) Regulations, details of the public participation process undertaken as part of a project that involves closure must be indicated in the Closure report.

The project was subjected to a Public Participation Process (PPP) as defined in the NEMA EIA Regulations (2014), as amended. Notification letters, site notices and advertisements were issued out to invite registrations and comments from potential Interested and Affected parties (I&APs). I&APs that responded and submitted comments were registered in the project database and their comments captured in the Comments and Response Report. This Closure Plan forms part of the Draft Basic Assessment report that has been issued for public review. Comments received during this period will be captured and included in the Final Basic Assessment Report that will be sent to the Authorities for review and consideration. The summary of the PPP that commenced in October 2017 is summarised as follows:

- An advertisement inviting any potential I&APs to register on the project was placed in section 4 of *the Newcastle Advertiser* Newspaper published on Friday 20th October 2017;
- On-site notices advertising the Waste Management Licence Process were erected on site and at visible and accessible locations close to the site on Monday 18th October 2017; and
- Notification Letters were distributed in the Emadlangeni Area on Wednesday 16th October 2017.

Copies of these Public participation documents, advertisements, site notices, notification letters, proof of communication with I&APs, Project Database, and Comment and response report are attached as Appendices to the draft Basic Assessment report.

It must be noted that meetings were also held with key stakeholders from the Competent Authorities, local and district municipalities and other Interested and Affected parties as per **Appendix 5** of the NEMA EIA Regulations, refer to **Appendix A** of this closure Plan for the Minutes of the Meeting that was held between GA Environment, officials from the Emadlangeni Local Municipality, the KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs and the Department of Water and Sanitation on the 20th September 2017.

1.7 Context and objective of the Closure

The main objective of the current Waste Management Licencing Process is to ensure that the Emadlangeni landfill is legally decommissioned. It is envisaged that subsequent to the licencing of the Emadlangeni landfill, the Emadlangeni Local Municipality will source funds for the construction activities associated with the closure of the landfill and to also ensure ongoing monitoring of the rehabilitated areas and investigate options for appropriate end use.

1.8 Content of a closure and rehabilitation plan for a landfill site

Before any closure plan can be developed, a site assessment/investigation is conducted to assess the existing conditions of the site. The site investigation process is a necessary step in the development of a better and more comprehensive closure and post-closure plan as knowledge of the actual conditions at the site, the operational procedures practiced during its operation, and other issues related to the site, is important. Site investigation may also help in identifying the extent of potential contamination and the likely pathways of contaminants. Site investigation includes the following activities which are to:

- Review pertinent data such as the geology of the site, depth of groundwater, volume and types of wastes disposed, reports, studies, historical records concerning the dumpsite (operations, unusual events such as fires, dumping of hazardous wastes, etc.);
- Review available maps (surroundings, topographical, geological, hydrogeological, etc.);
- Interview those directly involved with the landfill e.g. Municipal Officials, adjacent residents, etc.
- Inventory of existing settlements, structures, surface water bodies, water wells, etc.;
- Determine points of leachate seepage and ponding within and beyond the disposal facility;
- Identify existing land uses around the area;
- Conduct topographic survey of the dumpsite, extending some distance from its boundaries;
- Conduct geotechnical investigation to determine stability of slopes;
- Identify sources of soil or other cover material for the site;
- Determine, if practical, the depths of the dumped wastes;
- Determine gas leakage within and on the areas surrounding the dumpsite;
- Conduct leachate and gas sampling (if practical); and
- Conduct water quality sampling of surface waters, water wells, groundwater (if practical).

Based on the above Investigations, the Closure and Rehabilitation Plan must then:

- Specify the final site topographic plan.
- Include a site drainage plan.
- Provide appropriate cross-sections of the closed site.
- Specify source of cover material,

- Provide geotechnical and geochemical properties of appropriate cover material and determine the soil's permeability of the capping layer.
- Specify procedures for compaction testing of the "barrier layer" during its installation.
- Specify measures to minimize soil erosion and of the materials.
- Identify the vegetative cover and
- Provide landscaping plan for the final capped cells.

It must be highlighted that the information is presented in the Engineering Needs Assessment which must be read in conjunction with the '*Geotechnical and Geohydrological Report*' attached as **Appendix F2** and **Appendix F3** of the Basic Assessment Report respectively.

1.9 Completeness of data for this Closure plan

The completeness of the information indicated in this Closure Plan is shown in **Table 1**.

Table 1: Information Completeness

Required information	Status		Comment
	Yes	No	
Review of pertinent data such as the geology of the site, depth of the ground water, volume, and types of wastes disposed, reports, studies, historical records concerning the dumpsite (operations, unusual events such as fires, dumping of hazardous wastes	√		
Review of pertinent available maps, map of the dumpsite and its surroundings, topographical, geological, hydrogeological etc.	√		
Interview with those directly involved with the operation of the dumpsite, waste pickers, and residents near site	√		
Inventory of existing settlements, structures, surface water bodies, water wells, etc.		√	
Determine points of leachate seepage and ponding within and beyond the disposal facility		√	To be undertake by appointed Engineers
Identify existing land used around the area	√		
Conduct topographical survey of the dumpsite, extending some distance from its boundaries	√		
Conduct geotechnical investigation to determine stability of the site	√		
Identify sources of soil or other cover material for the site		√	Task to be undertaken by Municipality
Determine if practical, the depth of the dumped sites	√		Task was partially undertaken as test pits were only dug to a depth of no more than 2m. Some waste was encountered at a distance of 2m from the surface
Determine gas leakage within and on the areas surrounding the dumpsite		√	
Conduct leachate and gas sampling (if practical); and		√	Leachate sampling required
Conduct water quality sampling of surface water, water wells, groundwater (if practical)		√	

1.10 Approach to and use of this closure and rehabilitation plan

This closure and rehabilitation plan recognizes the fact that the Emadlangeni landfill site faces a number of critical issues, which are not mutually exclusive and requires an integrated holistic engineered solution to address the current problems facing the site.

2 CLOSURE AND SITE REHABILITATION REQUIREMENTS

2.1 Specifications for landfill closure and Rehabilitation

Table 2 below summarises the specifications for closure, which are applicable to the site, and has been developed in line with Minimum Requirements for Waste Disposal by Landfill (2nd Edition, 1998).

Table 2: Specifications for closure

SPECIFICATION	DESCRIPTION
Landfill Class	The Minimum requirements set out specific requirements for the design of closure for different classes of landfill sites.
End Use Plan	The closure design must take into account the planned end use of the landfill. There are many different options and alternatives for end use of landfills including agricultural use, ecological uses, recreational and amenity uses etc., and the choice of the desired end use is typically influenced by a number of factors including: <ul style="list-style-type: none"> • Type of waste and associated operational constraints; • Size, location and access; • The development plan or framework; • The aspirations of local residents, interest groups, etc.; • Scheme economics • Long-term management requirements
Identification of Impacts of Closure	The final closure design is primarily informed by the risk assessment process of the dumpsite, and should: <ul style="list-style-type: none"> • 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.
Public Participation on End-Use Plan	It is required that the public and stakeholders are consulted during the process of closure and determining the final end use of the site.
Design and landscaping	<ul style="list-style-type: none"> • The site must be surveyed by a professional land surveyor. • Once site survey 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 final elevation of the site shall be determined following the survey, but it must not exceed the background topographical features. • The plateau of the site must be graded to 2 - 3% slope and the sides to a minimum of 3:1 slopes; and the final shape of the site must be approved by the regulating authorities.
Final Cover and Capping	<ul style="list-style-type: none"> • 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 any existing berms. The final sloping of the landfill should not exceed 1 in 2.5.
Vegetation Cover	<ul style="list-style-type: none"> • Once the final layer of topsoil has been placed, 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.
Storm-water Diversion	<ul style="list-style-type: none"> • 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. • Permanent Storm water diversions must be designed around the site.
Anti-erosion measures	<ul style="list-style-type: none"> • Measures to control soil erosion especially erosion of the slopes must be developed.

SPECIFICATION	DESCRIPTION
Monitoring	<ul style="list-style-type: none"> • Water quality monitoring • Gas monitoring • Fire monitoring • Vegetation monitoring • Security and access control monitoring

2.2 Lateral Landfill Gas Migration management

It is proposed in the preliminary engineering design that a landfill gas management system will be constructed prior to closure. The details of required operation, maintenance and monitoring of this system is to be include in the detail design phase and carried through tot eh closure plan. After closure, a remote monitoring system could be utilized and maintenance staff will be contacted for emergencies. A quarterly inspection and monitoring program will likely have to be established to evaluate landfill gas generation for a minimum of 25 years.

2.3 Shaping and sloping of the site

The final shaping and capping of the landfill as described, is aimed at preventing stormwater from coming into contact with the waste and any contamination. Any stormwater on the rehabilitated site could thus be considered clean and runoff from the rehabilitated site will be discharged into the existing natural watercourse.

The proposed eMadlangeni stormwater management system shall at least include:

- Catchwater banks at least 500mm high constructed of compacted in situ material at the top edge of the landfill to prevent erosion and control the runoff down the side slopes
- Downchutes to direct the runoff down the side slopes in a controlled manner. The downchutes are to be constructed of flexible material that would allow for moderate plant growth and possible future landfill deformation. The downchutes can be lined by GCL/GM to ensure permeability protection in the event of large deformations;
- A drainage bench to be constructed midway down the side slope, as per the drawings, to reduce the flow velocity and also assist in the prevention of erosion.

Refer to the Engineering Assessment and Designs Report in **Appendix F3** of the Basic Assessment Report for drawings indicating the shaping and sloping of the waste body.

2.4 End Use Planning

An end-use plan shall guide what would be the most suitable land use for the area. The choice of type of end use is dependent on the urban or rural spatial planning of the area in which the landfill is situated. The type of end-use can also related to the potential vulnerability, expressed in the average number of hours per day that people are spending at the location. The longer the time that humans spend at or near the site, the higher the chance on potential exposure to any residual effects of the landfill site and the higher the potential vulnerability.

The Emadlangeni Municipality in consultation with the Engineer appointed for detailed designs will determine the suitable end use for the landfill site.

2.5 General Rehabilitation recommendations for the site

For the capping design of this landfill it is proposed to use a restricted moisture cap without a HDPE barrier layer in order to minimize the ingress of rain water and isolate the waste body from the atmospheric environment. The materials used in the design shall aim to reduce the percolation through the cap to less than 15 litres per hectare per day. The design will aim to restore the site to the natural condition it was in prior to the start of waste disposal in 2001. This design principle is seen to have the least effect on the natural environment and will revert the area to its natural state as far as possible.

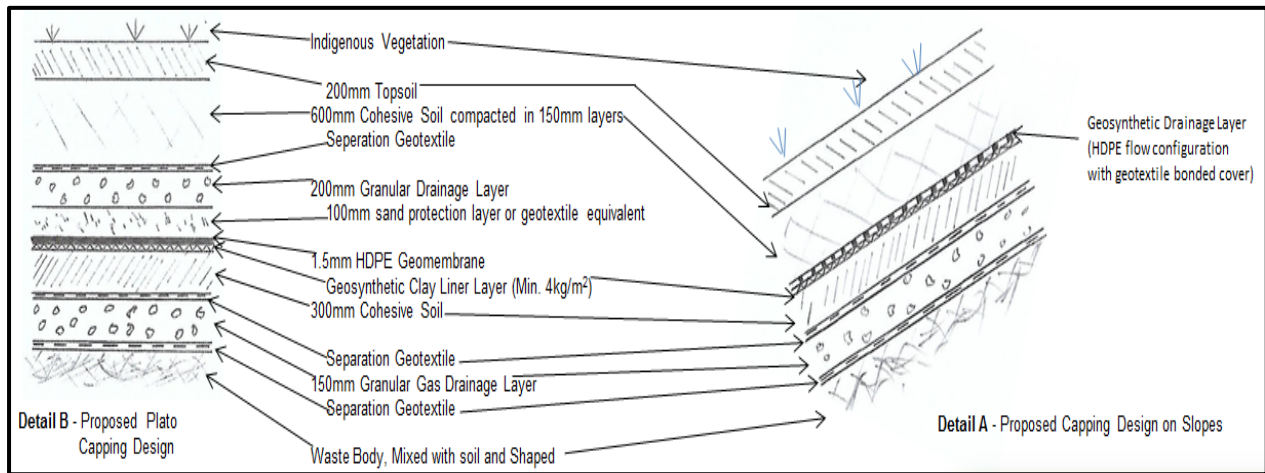


Figure 4: Proposed capping design

The various levels of the capping are described as follows:

- **Waste Body:** The final waste body is to be shaped as per the design drawings and compacted as well as possible with the equipment used during construction. It should be mixed with soil material where possible and shaped to a final profile that is as smooth as practically possible.
- **Separation Geotextile:** The separation geotextile separates the waste body from the capping layers and should be a non-woven geotextile with a typical thickness of about 2.5mm and unit weight of at least 1.5kg/m². This layer assists in preventing fine particles from the layer works entering the waste body.
- **150mm Granular Gas Drainage Layer:** This is a landfill gas venting layer having a minimum thickness of 150mm and consisting of single sized stone or gravel of between 25mm and 50mm in size. This layer needs to be connected to a gas management system with gas vents being installed in key areas.
- **Separation Geotextile:** The separation geotextile separates the drainage layer from the capping layers and should be a non-woven geotextile with a typical thickness of about 2.5mm and unit weight of at least 1.5kg/m². This layer assists in preventing fine particles from the layer works entering the drainage layer.
- **Cohesive Soil Layer:** This is a support layer to the below drainage system and should be 300mm thick consisting of in situ material compacted to a minimum density of 95% Standard Proctor maximum dry density at a water content of Proctor optimum to optimum +2%.
- **Geosynthetic Clay Liner (GCL):** A GCL is two geotextile layers with a layer of bentonite in the middle that acts as a containment barrier. The GCL should have minimum mass per unit area of 4kg/m²

and the permeability of the GCL must be such that an outflow rate of 1×10^{-6} cm/s will not be exceeded. These parameters are to be tested for the chosen material as per the construction Quality Assurance and Quality Control (QA/QC plan) that needs to form part of the detail design report before construction. The GCL and HDPE composite layer is considered to be the primary barrier layer.

- **HDPE Geomembrane Layer (Plateau only):** The High Density Polyethylene (HDPE) Geomembrane (GM) sheet needs to be in direct contact with the GCL and needs to be manufactured by a reputable company and installed according to the Engineer's specifications contained in the construction QA/QC plan. The thickness specified shall be minimum thickness, as measured with the SABS Specification 1526 test method. This layer is only considered for the top of the landfill cover and not the side slopes.
- **Sand Protection Layer (Plateau only):** The protection layer is placed directly above the GM to protect it from mechanical damage and can be in the form of a 100mm layer of fine to medium silty sand or a geotextile equivalent able to provide similar protection to the GM. If the geotextile option is chosen during detail design the total ballast layer above the GCL/GM composite should be carefully designed to still ensure full and proper contact between the GCL and GM. This layer is not required for the side slopes.
- **Geocomposite Drainage Layer:** There are a number of products on the market that could potentially be used here. The final design should replicate the specifications of a geocomposite drainage system similar to the ABG Pozidrain® product which consists of a high strength flexible polyethylene cusped drainage core (at least 4mm thick) with a non-woven geotextile filter fabric bonded onto one or either side. The geotextile filters a wide range of materials and is bonded to the core to ensure that it does not deform into the drainage channels under the load of the backfill material. The drainage composite allows fluids and gases to percolate into the core whilst supporting the backfill material. The collected fluids are then transported along the core to the leachate collection system at the landfill toe.
- **Cohesive Soil Layer:** This is a support layer to the below drainage system and should be 600mm thick consisting of in situ material compacted to a minimum density of 95% Standard Proctor maximum dry density at a water content of Proctor optimum to optimum +2%. The layers are to be placed and compacted in 150mm layers and also assist in providing the required pressure for the GCL/HDPE composite to function optimally. As indicated in the Geotechnical report the soils on site are predominantly weathered shales with a clay content and fairly low permeability. This soil will work well in conjunction with the other layers of the capping system.
- **Topsoil Layer:** This needs to be a minimum of 200mm topsoil layer to assist in the establishment of vegetative cover as soon as possible. The layer needs to be optimally compacted to assist plant growth and can contain a mixture of hydro seeding if required.
- **Indigenous Vegetation:** The vegetation layer assists with stability and run off and needs to be established as soon after construction as possible. The vegetation needs to be indigenous to the area in order to ensure optimal sustainability of the capping system.

2.5.1 Cover Material

According to the findings of the Geotechnical and Geohydrological Study undertaken for the Emadlangeni landfill, the residual deep red soil is suitable to use as capping material subject to further consolidation at optimum density and moisture content.

There is potentially enough cover material judging by the depth of soil erosion down to some 3-4m depth. A borrow pit to extract some 40,000m³ of soil to use as capping material needs to be identified in the vicinity.

The close proximity of the landfill to the river and dam 1.5km down slope presents a leachate pollution risk to surface water and possibly ground water.

The site does not reflect any risk for the formation of sinkholes or subsidence caused by the presence of water-soluble rocks (dolomite or limestone) and no evidence of mining activity beneath the site.

Refer to the Geotechnical and Geohydrological Study Report attached as **Appendix F2** of the Basic Assessment Report.

2.5.2 Erosion control

Erosion is one of the major sources of damage to both natural and man-made slopes. Erosion gulleys are already visible on site so indications are that the natural soils are prone to erosion. Erosion on slopes can be caused by detachment and movement of soil particles due to raindrop impact and surface runoff. Some recommendations for protection of the site from erosion may include but not limited to the following:

- Cover the sloped edge of the waste body and the top of the waste body with the capping layers as per the engineering design;
- Cover the capping layer with the topsoil and compact; and
- Seed all surfaces and banks with indigenous grass to allow vegetation growth and further protection and natural look.

Once the vegetation has established itself on the site possibilities of erosion are limited. Any signs of erosion should be reported and corrected immediately as part of the closure plan of the site.

2.5.3 Re-vegetation

Once the final topsoil layer has been placed on the site, it must be seeded with indigenous grass species and monitored to ensure that it successfully grows. Grassing must be used for revegetation.

Grassing is the covering of the ground with grass. It is crucial that all grassing be undertaken by a suitably qualified Contractor, making use of the appropriate equipment. Where seed is used in grassing, all seed supplied should be labelled in accordance with the Government Seed Act (Act No. 20 of 1961). One of the ways in which grassing can be undertaken is through hydroseeding or sodding. Each of these will be discussed in the next sections. It is expected that the Emadlangeni Local Municipality will use the most cost and time effective method for the revegetation of the Emadlangeni landfill subsequent to the application of the capping layer.

2.5.3.1 Hydroseeding

Hydro-seeding entails adding a specified seed mix to a slurry containing water, seed, fertilizer and other approved materials to enhance plant growth potential. This mixture is applied by means of a spraying device onto the prepared ground areas to be seeded. Hydroseeding is a quick and cost-effective method of seeding and is especially suited to slopes associated with landfills. It provides homogenous cover which

is key in rehabilitation efforts and also prevents possible erosion. The following must however be borne in mind for hydroseeding:

- The soil should be loose and uniformly wet to a specified depth before any seeding commences.
- Add the specified seed mix and necessary fertiliser to the required amount of water and apply using an approved hydro-seeding machine.
- Unless otherwise specified, the rate of application of the slurry will not be less than 30 cubic metres per hectare and will be applied in such a manner as to ensure even distribution of seed and fertiliser throughout.
- Additional ingredients to be added to the slurry may be specified.
- In certain cases, the specification may require that mulch be applied by hand to the area to be hydro-seeded, prior to hydro-seeding.
- If possible, keep the seedbed moist after hydro-seeding, to ensure good germination.
- Irrigate as required until the grass is able to survive independently (i.e. depending on the rainfall).

Companies such as Hydromulch (<http://www.hydromulch.co.za>) and Instaturf <http://www.instantturf.co.za/> can be consulted to obtain quotes for hydroseeding.

2.5.3.2 Sodding

Sodding is defined as the laying of grass sods. Sodding may be done at any time of the year, but seeding must be done during the summer when the germination rate is better. The following is key for sodding:

- The soil should be uniformly wet to a depth of at least 150mm before planting of grass sods;
- Protect sods against drying out: keep these moist from the time of harvesting until final placement;
- Rake or spike the area to give a loose surface to a depth of 100mm;
- Lay the first row of sods in a straight line, starting at the bottom of a slope, where possible;
- Place the next row of sods in the same way, tightly against the bottom row with the joints staggered, until the full area is covered with sods;
- Tightly butt sods together, taking care not to stretch or overlap sods;
- Where a good fit cannot be obtained, the intervening spaces may be filled with parts of sods or topsoil;
- On steep slopes the sods must be secured using timber stakes of at least 300 mm in length;
- After planting, water sods to prevent drying out; and
- Irrigate as required until the grass is able to survive independently (i.e. depending on the rainfall).

2.5.3.3 Grassing mix for vegetative cover

The vegetative cover must comprise grasses that are indigenous to the Emadlangeni area. According to SANBI Vegetation Data, the Emadlangeni landfill is located within Moist Coast Hinterland Grassland Vegetation Type. The Graminoids that naturally grow in this area and which can form part of the grassing mix include the following:

- *Themeda triandra*;
- *Hyparrhenia hirta*

Local nurseries must be consulted to check the availability of seeds or sods for any of the above. Where these are not available, equivalent and suitable indigenous species can be used subject to the approval of a reputable nursery and/or Contractor or Hydroseeding Company. Instructions for application must also

be checked with these persons prior to the commencement of grassing.

2.5.4 Maintenance of rehabilitation

- Allow for a maintenance period of at least one year following practical completion,
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- Re-vegetation must match the vegetation type which previously existed.
- A minimum grass cover of 80% is required, and individual plants must be strong and healthy growers at the end of the Maintenance Period.
- In the case of sodding, acceptable cover entails that 100% cover is attained by the specified vegetation.
- Bare areas that show no specified vegetation growth after three months of the Rehabilitation Work are to be spread with additional topsoil, ripped to a depth of 100mm and re-planted, re-sodded, re-hand sown or re-hydroseeded.

2.5.5 Access Control

A 1,8m high wired fence and lockable gate should be constructed for access control purposes.

2.5.6 Stormwater and Leachate Management

Storm water management shall be by means of proper landscaping, allowing the surface run off to flow naturally away off the site in accordance with the design measures proposed. Once the site is properly vegetated the management of stormwater becomes less problematic. The site does not generate any significant amount of leachate at this stage but the proposed leachate management system of collection, trenching and storage should be monitored regularly and the leachate sump cleaned out at regular intervals.

2.5.7 Post Closure Monitoring

A post closure monitoring plan shall be developed to ensure that certain critical aspects are monitored continuously even after closure as may be required by the waste permit or license for the site. These aspects may include but are not limited to the following as listed in **Table 3**.

Table 3: Specifications for Monitoring

Environmental Aspect	Description	Frequency and record keeping method
Soil erosion	Monitoring of the site to ensure that topsoil is not eroded especially on the slopes of the capped cells and in other vulnerable areas.	<ul style="list-style-type: none"> • Weekly inspection for the first 2-3 months after establishment of vegetation • Photographic record
Water quality	Surface and groundwater monitoring in accordance with the site permit conditions for closure.	A scientist must take samples at the timeframes specified in the Waste Management Licence The analysis must be undertaken by an accredited laboratory.
Landfill gas	Most likely not applicable	Timeframes specified in the Waste Management Licence
Fire break	A 5 meter fire break must be maintained around the site	<ul style="list-style-type: none"> • Monthly inspection • Photographic record

Environmental Aspect	Description	Frequency and record keeping method
Alien vegetation	Alien vegetation must be eradicated from the site	<ul style="list-style-type: none"> • Monthly inspection • Photographic record
Access control	The fence and gate should remain intact and the site must not be accessed by unauthorized persons.	<ul style="list-style-type: none"> • Monthly inspection • Photographic record

2.6 Monitoring and Auditing

In order to monitor the rehabilitation of the Emadlangeni landfill, the Emadlangeni Municipality must either undertake internal audits or appoint an external party. A checklist relevant to the aspects that will be monitored must be created and used during the audit. Furthermore, photographs must be taken to indicate site conditions. In order to record the findings of the audits, monthly reports with photographic records must be compiled. The reports must indicate the following minimum information:

- Date/s of audit;
- Name of auditor;
- Areas audited;
- Areas of concern and suggested corrective measures accompanied by timeframes;
- Feedback on previous requests for the implementation of corrective measures;

2.7 Environmental Management Programme

The Environmental Management Programme (EMPr) is attached **Appendix I** of the Draft Basic Assessment Report.

3 FINANCIAL PROVISION FOR CLOSURE AND REHABILITATION

As the closure and rehabilitation of the Emadlangeni landfill will involve numerous activities in order to ensure that legislative requirements are met, the Emadlangeni Local Municipality has to ensure that funds are available for the planned activities.

Capping designs that adhere to the legislative framework can be considered expensive and even with the best efforts of the design engineer and construction contractor, this could result in high budget allocations. There are sources of funding that the municipality can use, other than its own funds and these have been widely used with great success. A large number of most small municipal landfill sites, such as the Emadlangeni landfill have no base liner which is mostly due to the age of the facility (liners became a requirement from 1998) and /or the budgets of the municipality at the time of the establishment of the landfill. The requirements of capping designs for landfills with no base liner is stricter than for facilities with operational base lining systems.

The costs given in this chapter is an **estimate** of construction costs for the establishment of the landfill cap and is not be considered a final value since it needs to be confirmed during the detail design stage prior to development of tender documentation for municipal procurement of construction contractors. The breakdown of the cost estimate is attached as **Appendix B**.

4 CONCLUSIONS

The closure of the Emadlangeni landfill must adhere to the following requirements:

- The Municipality must adhere to all conditions of the Waste Management Licence and read the conditions along with the contents of this Closure report.
- Ongoing monitoring and maintenance of rehabilitated areas must be undertaken as per the timeframes specified in this report;
- There must be ongoing monitoring of the groundwater, surface water, leachate must be undertaken
- The site must be fenced to: prevent possible disposal of waste and unauthorized access to the site as this can compromise the rehabilitation process;
- The recommended end use for the site is as an open space that can be used for sport and recreation although with light and not heavy infrastructure that can be affected by settlement and methane gas that is common in former landfills. However, as the Emadlangeni Local Municipality has stated that they wish to construct a Stadium with heavy infrastructure on the site, it is imperative that all relevant studies are undertaken to ensure the stability of the proposed infrastructure. Furthermore, all the relevant environmental authorisations and other permits and/or licences must be obtained prior to the construction of the infrastructure.
- A detailed cost breakdown for the proposed activities must be undertaken prior to the commencement of construction.

5 REFERENCES

- 1) Bolton, Neal; **Handbook of landfill operations a practical guide for landfill engineers, owners and operators.**
- 2) DWAF, Minimum Requirements for Waste Disposal by landfill (Second Edition, 1998).
- 3) DEA, NEMA EIA Regulations (2014) Appendix 5 (Closure plan)
- 4) North Arrow Consulting, (2017), **Geotechnical and Geohydrological Investigations for the proposed Decommissioning (closure) of the Emadlangeni Landfill Site**, Pretoria.
- 5) RAPIenaar Consulting (Pty) Ltd (2017), **Engineering Needs Assessment and Preliminary Closure Design Report**, Johannesburg.
- 6) U.S. EPA, 1991. **Design and Construction of RCRA/CERCLA Final Covers.** Report Number EPA/625/4-91/025. U.S. Environmental Protection Agency, Cincinnati, OH. May 1991.

APPENDIX A

MINUTES OF THE MEETINGS HELD BY THE EAP WITH INTERESTED AND AFFECTED PARTIES AND
OTHER ROLE PLAYERS



MINUTES OF MEETING

PROJECT NAME: DEA WASTE MANAGEMENT LICENSE APPLICATIONS – KWAZULU NATAL LANDFILL SITES

MEETING: Provincial Authority Consultation Meeting

CHAIRPERSON: B.R Dlamini

RECORDED BY: Nkhensani Khandhela

DATE: 1 September 2017

TIME: 10:30-12:30

VENUE: EDTEA, 217 Burger St, Pietermaritzburg

ATTENDANCE			
Name	Organization	Email address	Office Contacts
Bonginkosi Dlamini (BR)	Department of Environmental Affairs	BRDlamini@environment.gov.za	071 882 4637
Nomathamsanqa Mzozo (NM)	uMzimkhulu Local Municipality	mzozon@umzimkhulu.gov.za	039 259 5000/ 076 870 4439
K Dweba (KD)	uMzimkhulu Local Municipality	dwebak@umzimkhulu.gov.za	039 259 5000
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Nkhensani Khandhela (NK2)	GA Environment (Pty) Ltd	nkhensanik@gaenvironment.com	011 312 2537/ 073 171 7979
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Evelyn Shogole (ES)	GA Environment (Pty) Ltd	evelyns@gaenvironment.com	011 312 2537/ 071 231 4470
APOLOGIES			
DISTRIBUTION			



MINUTES OF MEETING

Item	Description	Responsible	Due Date
1.	Welcome, Attendance & Apologies		
	<ul style="list-style-type: none"> - BR welcomed all before handing over to NX to welcome the Local Municipalities and thank them for attending the meeting. - NX acknowledged DEA's role in assisting the municipalities to obtain Waste Management Licenses and ensuring compliance to alleviate concerns raised by the MEC and the KZN Premier. - BR requested each attendee to introduce themselves before proceeding with the meeting. 	BR NX	
2.	Purpose and Background of the Project	BR	
	<ul style="list-style-type: none"> - BR explained the purpose of meeting which was to introduce the appointed Consultant to the Municipalities and explain the process that led to their appointment which would provide each municipality background and allow them to report back to their various councils. - The Licensing of Municipal Landfills was started in 2007 when the government realized that numerous Municipal Landfills across the country were unlicensed. A consultant was appointed to identify illegal dumpsites across the country and gaps were noted when the actual work started some years later as some sites were not identified or incorrectly classified. - In total 348 unlicensed landfills were identified which were then licensed in batches - Fifty six (56) sites were licensed in 2011-2012 and fifteen (15) were planned for 2013, this number was regarded as too low and thus resulted in a big rollout in 2013-2015. COGTA became involved in 	BR Info.	



MINUTES OF MEETING

Item	Description	Responsible	Due Date
	<p>the project and DEA assisted with the licensing of 112 landfills and another agency assisted with 80.</p> <ul style="list-style-type: none"> - BR indicated that one of the the shortcomings of this current project is that there will be no funding for infrastructure to develop the landfills. A Department EPIP has been setup to assist in funding of licensed landfills which have had challenges. - Only 12 landfills remain unlicensed in the country excluding two sites in North West where challenges were encountered due to a lack of cooperation from landowners. The two (2) sites could not be finalized and these sites have been handed over to the MEC to resolve. - Other challenges encountered was that some Municipalities were not interested in the licensing of their landfills in fear of having to comply with the conditions. They then advised that the Municipal Manager refuses to sign application forms. This then resulted and this resulted in project delays. - Despite the above, the Licensing projects continued to make progress and continues to receive support from Government and the various stakeholders involved. 		
3.	Roles and responsibilities of Stakeholders	BR	
	<ul style="list-style-type: none"> - The responsibility of DEA is to obtain funding and appoint a service provider that will license the site. There are no costs that will be borne by any Municipalities for this project. - The provision of funding for this project is limited and when the province and other authorities make demands for specialist studies they must take this into consideration. 	BR Info.	



MINUTES OF MEETING

Item	Description	Responsible	Due Date
	<ul style="list-style-type: none"> - BR raised a concern about the absence of officials from DWS as they request certain detailed studies that they don't review or make reference to. - BR stressed the issue of financing from DEA as in the past, some Municipalities would assume the role of financier for this project resulting in DEA having to provide clarifications to auditors. - For this current project, appointment of Consultants was through a Tender where 47 companies applied of which 15 companies progressed from stage 1 to stage 2. At stage 2, the evaluation was price based and eventually 3 companies were shortlisted. GA Environment is one of the companies that were shortlisted. - GA Environment therefore needs cooperation from the Municipalities and assistance when they visit the various communities. - The Provincial Authority in KZN have a different structure as they have Provincial Head Offices in PMB and in district offices represented by officials also present in the meeting. Although they will issue the Licenses, they remain independent. - The Jozini landfill site has been discussed and has appeared in reports submitted by Afriforum as an issue hence the EIA process must be followed carefully to ensure that the correct decision is made. - It is important for the consultant to ensure that the reports are of good quality and avoid issues of "copy of paste" to ensure provincial officials do not unnecessarily delay the applications. - The municipalities must support the Consultants to ensure forms are signed and they must engage 		



MINUTES OF MEETING

Item	Description	Responsible	Due Date
	<p>and assist them when they have to visit their communities.</p> <ul style="list-style-type: none"> - Previously DEA would invite the Municipal Managers to these meetings to clear issues regarding this project. - In the past, there were issues related to misunderstandings by Provincial Authorities but this has recently changed as a result of the meetings between Departments. <p>Questions regarding the roles of Stakeholders</p> <ul style="list-style-type: none"> - SS sought clarification regarding the abbreviation GA. NK2 proceeded to explain that GA Environment is part of a group of companies within the GladAfrica Holdings Group where the name GA has been adopted. - NK indicated she would require further engagement as the Mayor of Jozini would want a full report on the project. - KD sought to find out the timeframes of the project and what processes will take place from this period going forward. KD further sought clarity about the background of the Consultants. - BR stated that timeframes will be presented in detail by GA as they outline their process but the process would not take no longer than 18 months. BR also raised his concern with regards Mkhuze and Emadlangeni sites. - KD sought clarity from DEA about when they will be expected to close the uMzimkhulu landfill given the fact that they are still only developing a new Landfill site. - BR outlined that the conditions of a Closure License would have to take into account such concerns to enable the municipality to effectively manage their transition from the existing landfill to the new landfill. 		



MINUTES OF MEETING

Item	Description	Responsible	Due Date
	<ul style="list-style-type: none"> - NK sought clarity in terms of the landfill design requirements and what the final outcome for the landfill will be. - BR responded by stressing that the Consultants cannot dictate what must happen to a landfill and the EIA process in consultation with the municipality officials should determine the correct outcome for each landfill. This consultation process must be minuted. 		
4.	Outline the Process (Procedures) of the Project	NK2	
	<ul style="list-style-type: none"> - BR handed over this aspect to GA Environment to outline the process to be followed in this project. - NK reiterated that GA Environment's appointment is for four Landfills in KZN for Operation and Closure. The process to be followed is a legislated process which will follow 2 key legislation namely the National Environmental Management Act (NEMA) and the National Environmental Management Waste Act (NEM:WA). - The processes vary with the closure process which is a relatively shorter process than the process required for sites that will be licensed for operation. - Alternatives must be considered in order to present a proposal with the least Environmental impact and beneficial to the communities. - Municipalities will be called upon to assist GA Environment during public participation and identify key issues in the stakeholder engagement process. - Municipalities must also assist with the correct contact people for the signing of application and contact details for relevant stakeholders. 	NK2 Info.	



MINUTES OF MEETING

Item	Description	Responsible	Due Date
	<ul style="list-style-type: none"> - GA Environment are independent consultants and hence will assess the issues and provide a report that is not biased. - NK2 indicated that she will require background information, existing studies or historical information on the landfills from each municipalities. - Site confirmation with municipal officials will also be required during this process. - The Province must also advise with regards to the application process if there are integrated forms and if a Basic Assessment Report template is available or the process has changed in this regard. - HT also mentioned information requirements from municipalities such as site boundaries, volumes of waste to determine threshold levels. - HT also highlighted the need for the IDP which will be required from the municipalities to determine the future development plans of the municipalities and draw information about potential end uses for each landfill. 		
5.	Inputs from Authorities		
	<ul style="list-style-type: none"> - NK enquired about the duration of the project of which NK2 clarified that it is 12 months. BR further clarified that it should not go beyond 18 months. - BR also highlighted the issues that Province face as they bear certain responsibilities to this project even though they are the competent authority making the final decisions. - KD sought further clarity regarding the time frames in more detail. These timeframes will assist the municipality to support the consultant, 	<p>NK</p> <p>BR</p> <p>KD</p>	<p>To be confirmed</p>



MINUTES OF MEETING

Item	Description	Responsible	Due Date
	<p>and must inform ward councilors. In uMzimkhulu the Municipal Manager requires all service providers to be introduced before they proceed to undertake work in the area.</p> <ul style="list-style-type: none"> - NK2 advised that site visits will be undertaken in September 2017. - BR then inquired when GA Environment would want the forms to be signed. NK2 then responded by addressing the different requirements of each Municipality. Their preference will also dictate how the form can be signed and collected. - KD also requested that blank forms be sent to each Municipality. - NX suggested that GA Environment be given up to Monday to decide when they will undertake site audits. - BR recommended that GA Environment must undertake site visits between 18-22 September where each municipality will receive a day to introduce the consultants, and accompany the team to the site. - BR noted challenges that could be experienced with the Department of Water Sanitation and it was a concern that they were not represented. Nevertheless, DWS National were engaged and they have received a list of the sites particularly with challenges anticipated at Mkhuze and uMzimkhulu. - HT followed up on the IWMP's for each Municipality of which BR highlighted the need to search deep as most municipalities do not have such documents. 	<p>BR</p> <p>KD</p> <p>BR</p>	<p>To be confirmed</p> <p>To be confirmed</p> <p>18-22 September 2017</p>
6.	General and Closing		



MINUTES OF MEETING

Item	Description	Responsible	Due Date
	<ul style="list-style-type: none"> - KD requested that province must be present when GA Environment is introduced to the Municipalities. - BR requested that GA Environment must provide a schedule for site visit days to assist the municipalities to arrange for meetings with the respective stakeholders. - NX requested GA Environment must copy the province in some communication to the municipality in case some information can be provided by the province. - BR provided the key contact people at each district as follows: <ul style="list-style-type: none"> (1) Harry Gwala DM – Hlengiwe Dladla (2) Amajuba DM - Mr Nkosi (3) Umkhanyakude DM – Mr Mathenjwa (4) Ilembe DM – Mrs Zungu - BR thanked all stakeholders and closed the meeting 	<p>KD</p> <p>BR</p> <p>NX</p>	<p>To be provided on 6 September 2017</p>

APPENDIX B

FINANCIAL PROVISION FOR THE REHABILITATION, CLOSURE AND ONGOING POST DECOMMISSIONING MANAGEMENT

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1.0		PART 1: PRELIMINARY AND GENERAL				
1.1	SANS 1200A	GENERAL				
	8.3	Scheduled Fix-charge and Value-related Items				
1.1.1	8.3.1	Contractual Requirements	Sum			2 000 000.00
	8.3.2	Establishment of Facilities on the Site				
1.1.2	PSA- 8.3.2.2	Facilities for Contractor	Sum			
1.1.3	8.3.3	Other Fixed-charge Obligations	Sum			
1.1.4	8.3.4	Removal of Site Establishment	Sum			
	8.4	Scheduled Time-related Items				
1.1.5	8.4.1	Contractual Requirements	Sum			1 000 000.00
	8.4.2	Operation and Maintenance of Facilities on Site, for Duration of Construction, except where otherwise stated				
1.1.6	PSA- 8.4.2.2	Facilities for the Contractor	Sum			
1.1.7	8.4.3	Supervision for Duration of Construction	Sum			
1.1.8	8.4.4	Company and Head Office Overhead Costs for the Duration of the Contract	Sum			
1.1.9	8.4.5	Other Time-related Obligations	Sum			
	8.5	Sums Stated Provisionally by Engineer				
	(PSA)	(c) Additional Tests				
1.1.10		1) Additional tests ordered by the Engineer	Prov Sum	1		20 000.00
1.1.11		2) Handling cost and charges on (c)(1)	%	20 000		
		(d) Survey in terms of Land Survey Act				
1.1.12		1) Provisional allowance for survey	Prov Sum	1		40 000.00
1.1.13		2) Handling cost and charges on (d)(1)	%	40 000		
TOTAL CARRIED FORWARD TO SUMMARY						3 060 000.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
2.0		<u>PART 2: EARTHWORKS: EMADLANGENI</u>				
2.1	SANS 1200D	SECTION: EARTHWORKS				
	8.3.1	Site Preparation				
2.1.1	8.3.1.1	Clear and Strip Site	m ²	54 000	7	378 000.00
	8.3.2	Bulk Excavation				
2.1.3	PSD 8.3.2	a) Excavate in all materials and use for embankment or backfill or dispose, as ordered	m ³	18 000	40	720 000.00
		b) Extra over for				
2.1.4		1) Intermediate Excavation	m ³	80	100	8 000.00
	PSD 8.3.4	Importing of Materials				
2.1.5		a) Extra over for importing materials from commercial sources or from Borrow pits for use in capping	m ³	40 000	80	3 200 000.00
2.1.6		b) Opening up and closing down designated borrow pits	Sum	1	50000	50 000.00
	8.3.6	Overhaul				
2.1.7		a) Limited Overhaul	m ³	200	100	20 000.00
2.1.8	PSD 8.3.14	Stormwater chutes as shown on drawings	m	200	1500	300 000.00
2.2	SANS 1200 DE	<u>PART 2: SECTION : SMALL EARTH DAMS</u>				
	PSDE-8.3.5	Forming embankment				
		(i) Cut from excavation and/or stockpile				
2.2.1		(1) Suitable as fill material for stormwater berm	m ³	1 200	120.00	144 000.00
	PSDE- 8.3.11	Forming Site Capping				
2.2.2		(a) Shape and Compact In situ Waste Material	m ³	135 000	10.0	1 350 000.00
2.2.3		(b) Cut to fill from commercial sources a Drainage layer comprising of single sized crushed stone or gravel having a size of between 38 mm and 50 mm as shown on drawings	m ³	8 738	250.00	2 184 375.00

2.2.4		(c) Cut to fill from commercial sources silty sand material for use in protection layer as shown on drawings	m ³	2 400	300.00	720 000.00
2.2.5		(d) Cut to fill from commercial sources Topsoil layer as shown on drawings	m ³	7 800	120.00	936 000.00
2.2.6	PSDE- 8.3.12	160 mm dia perforated HDPE pipes placed inside gravel drainage layer on plato as shown on drawings including all bends, tees, corrections etc.	m	320	250.00	80 000.00
2.3	PART SPEC PCI	<u>PARTICULAR SPECIFICATION PCI: GEOTEXTILES</u>				
	PCI-5.1	Supply and install geotextile				
2.3.1		(a) Separation Geotextiles in capping works as shown on drawings, 2.5mm thick, minimum 1.5kg/m ²	m ²	117 000	12.00	1 404 000.00
2.3.2		(b) Around drainage pipes	m ²	1 240	12.00	14 880.00
2.4	PART SPEC PDI	<u>PARTICULAR SPECIFICATION PDI : GEOSYNTHETIC MEMBRANES</u>				
	PDI-15.1	Supply and Installation of geosynthetic membranes				
2.4.1		(a) 1.5mm HDPE geomembrane for use in plato capping	m ²	24 000	55.00	1 320 000.00
2.4.2		(b) Geosynthetic Clay Liner (GCL) as per drawings	m ²	39 000	60.00	2 340 000.00
2.4.3		(c) Geocomposite Drainage Layer (ABG Pozidrain® or similar)	m ²	15 000	65.00	975 000.00
2.4.3	PDI-15.2	Geomembrane Guarantee	Sum	1	20 000.00	20 000.00
2.5	PART SPEC PNE	SECTION: ESTABLISHMENT OF VEGETATION ON LANDFILL				
2.5.1	PNE-7.1	The preparation, application and maintenance of vegetation	m ²	39 000	25	975 000.00
TOTAL CARRIED FORWARD TO SUMMARY						17 139 255.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
3.0		<u>PART 3: DAYWORKS</u>				
3.1	DW-1	Labour				
3.1.1		(a) Net cost of labour	Prov Sum	1		100 000
3.1.2		(b) Contractor's charges and profit associated with administration of the above item 3.1.1	%	100 000	15	15 000
3.2	DW-2	Plant				
3.2.1		(a) Net cost of plant (including operator, assistance, fuel, oil, maintenance, etc)	Prov Sum	1		100 000
3.2.2		(b) Contractor's charges and profit associated with administration of the above item 3.2.1	%	100 000	15	15 000
3.3	DW-3	Material				
3.3.1		(a) Net cost of material	Prov Sum	1		100 000
3.3.2		(b) Contractor's charges and profit associated with administration of the above item 3.3.1	%	100 000	15	15 000
TOTAL CARRIED FORWARD TO SUMMARY						345 000.00

SUMMARY OF BILL OF QUANTITIES

PART	DESCRIPTION	AMOUNT
		R-c
PART 1	PRELIMINARY AND GENERAL	3 060 000.00
PART 2	EARTHWORKS: EMADLANGENI LANDFILL	17 139 255.00
SUB-TOTAL A		20 199 255.00
PART 3	DAYWORKS	345 000.00
SUB-TOTAL B		20 544 255.00
CONTINGENCIES Add 10 % for Sub-total B (Provisional sum)		2 054 425.50
SUB-TOTAL C		22 598 680.50
VALUE ADDED TAX Add 14 % for Sub-total C (Provisional sum based on current rate of VAT)		3 163 815.27
ESTIMATE TOTAL AMOUNT (INCL VAT)		25 762 495.77