



DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED UMZIMKHULU LANDFILL SITE

October 2014

PREPARED BY:



Submitted by : NZINGWE CONSULTANCY

On behalf of : UMZIMKHULU LOCAL MUNICIPALITY

DAEA Ref No.: DC43/WML/0013/2013

Project No. : UMZIE/13/06

EXECUTIVE SUMMARY

BACKGROUND TO THE PROJECT

The Umzimkhulu Local Municipality proposes to licence and construct the new Umzimkhulu Landfill Site to ensure that the municipality satisfies the national requirements for waste management. The proposed new landfill site is located in the Umzimkhulu Local Municipality, in the Harry Gwala (formerly Sisonke) District Municipality. The proposed new waste disposal facility is considered a waste management activity that may have a detrimental effect on the environment and for which authorisation in the form of a Waste Management Licence is required in terms of the National Environmental Management: Waste Act (Act 59 of 2008) [NEM:WA]. The proposed development also comprises activities listed in the National Environmental Management Act (Act 107 of 1998) [NEMA] for which environmental authorisation is also required. For both the NEM:WA and NEMA activities, a Scoping and Environmental Impact Assessment (EIA) process is required, as described in the NEMA EIA Regulations in GN 543 of 2010.

Nzingwe Consultancy was appointed by the Umzimkhulu Local Municipality as the independent Environmental Assessment Practitioner (EAP) to undertake the Waste Management Licence and EIA processes for the proposed landfill. Nzingwe Consultancy meets the requirements for an independent EAP in terms of the EIA Regulations of 2010.

The relevant environmental authority is the KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (DEDTEA). The DEDTEA reference number for the waste management licence application (received on 11 October 2013) is DC43/WML/0013/2013

The Final Scoping Report including the Plan of Study for EIA was accepted by DEDTEA on 4 April 2014.

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The EIA process is currently in the EIA Phase and this report, the Draft EIA Report, documents the outcomes of the EIA Phase and the accompanying draft Environmental Management Programme (EMPr). The Draft EIA Report aims to address the potential

impacts associated with the proposed waste disposal facility and to provide an assessment of the project in terms of the biophysical, social and economic environmental factors.

This assessment aids both the environmental authority, in this case the DEDTEA, and the Applicant, Umzimkhulu Local Municipality, in making decisions regarding the future of the project.

Associated with the Draft EIA Report is a draft EMPr which will serve as a means to ensure that the issues highlighted in the Draft EIA Report that can be mitigated, are mitigated in a sustainable and effective manner. That is, the Draft EMPr acts as the constraints under which the construction, operation and potential eventual decommissioning phases of the project are controlled, monitored and assessed.

OVERVIEW OF THE PROJECT

The proposed landfill entails the development of a new Municipal owned and operated waste disposal facility and associated infrastructure with a classification for the disposal of general and non-hazardous waste.

The intention is to utilise previously undeveloped or undisturbed areas, for the disposal cells. This will provide a cost effective means of waste management
Three sites have been identified for the proposed waste disposal activities and all three sites are in the Clydesdale area, all owned by the municipality.

The Contract covers the work required to construct the New Landfill Site at Umzimkhulu.

Construction Phase

- Earthworks including the excavating and placing of cover soil in stockpile, excavating of a cut-of drain around the site and excavations for the leachate and contaminated storm water ponds.
- Construction of Toe berms for Cell 1.
- Construction of a 6m wide gravel road with associated storm water. Cut of drains and storm water drains.
- Construction of leachate detection and collection pipes connected to the lined leachate dam.
- Construction of Cell 1 including all layer works and a protection layer on top of the GCL.

- Construction of a 1.8m high flat razor fence using concrete poles at 3m intervals and entrance gates.
- Construction of a guard hut and weigh bridge.

This involves the following:

- Excavation and stockpiling of approximately 47 000m³ of in-situ material,
- Construction of 1.5 km of internal gravel roads and associated storm water
- Installation of concrete fencing of 1.1 km
- Construction of Cell no.1 lined with a GCL of 7500 m²

Lined leachate pond of 1000 m² and associated manholes and pipe work.

PROJECT ALTERNATIVES

The EIA process also requires the identification and analysis of alternatives in order to satisfy the project's need. Therefore, the following items have been identified and are included as part of this EIA Report:

- a) 'Do-Nothing' approach, i.e. no development.
- b) Waste management alternatives for waste minimisation, waste treatment, re-use, recovery and recycling and waste-to-energy.
- c) Buffer zone alternatives
- d) Site access alternatives.
- e) Location alternatives.

PUBLIC PARTICIPATION

The Public Participation Process (PPP) included the distribution of documents by post and electronic mail, printed media, meetings with stakeholders and I&APs. All the issues and concerns that have been raised by the I&APs, through the various channels during the EIA process to date, including I&AP registration forms and other communications were captured in the Issues and Response Report.

In keeping with environmental legislation, it is the responsibility of the EAP to ensure that the public is provided the opportunity to participate meaningfully in the environmental investigation process. This includes identification of issues and review of reports. Accordingly, interested and affected parties (I&APs) are invited to review the Draft EIA

Report and the site-specific EMPr from **17th October 2014** to Umzimkhulu library and other places which are listed in this document.

The comments received during the review period of the Draft EIA Report will be incorporated into the Final EIA Report and submitted to the DEDTEA for review, acceptance and potential authorisation.

EIA PHASE

All potential significant environmental issues (i.e. social, economic and biophysical) associated with the proposed waste disposal facility that were identified in the Scoping Phase have been further investigated through specialist studies in the EIA Phase, specifically for the proposed Umzimkhulu landfill.

Associated with the Draft EIA Report is a draft Site-Specific Environmental Management Programme (EMPr) which will serve as a means to ensure that the issues highlighted in the Draft EIA Report that can be mitigated, are mitigated in a sustainable and effective manner. That is, the EMPr acts as the constraints under which the construction, operation and potential eventual decommissioning (or closure) phases of the project are controlled, monitored and assessed.

THE WAY FORWARD (DECISION MAKING PHASE)

Once all issues have been addressed by the EAP and presented in the Final EIA Report, the report will be submitted to DEDTEA along with the draft EMPr for DEDTEA's decision as to whether or not to authorise the proposed Umzimkhulu landfill waste disposal facility.

Table of Contents

.....	1
DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED UMZIMKHULU LANDFILL SITE.....	1
EXECUTIVE SUMMARY	2
BACKGROUND TO THE PROJECT	2
Table of Contents.....	6
List of Tables	10
Table 2.2: Environmental Consultant Details	10
ABBREVIATIONS & ACRONYMS.....	11
1. Introduction	12
1.1. Background of study	12
1.1.1. Project background.....	12
1.1.2. Environmental Assessment Practitioner.....	12
1.1.3. Environmental Authority	12
1.2. Purpose of Study	13
1.3. Purpose of this Report	13
1.4. Structure of this report	14
Table 1.1. Structure of This Report.....	15
2. Project Team	15
2.1. The Applicant	15
2.2. Environmental Consultant	15
Table 2.2: Environmental Consultant Details.....	16
2.3. Details of the Authors	16
2.4. Project Team	16
3. Overview of the Proposed Project	17
3.1. Need and Desirability.....	17
3.2. Proposed Areas for Development.....	18
3.3. Requirements for the Design and Classification of Landfills.....	19
4. Legal Framework.....	20
4.1. Introduction	20
The Constitution of South Africa Act, 1996 (Act No.108 of 1996).....	20
The Environmental Clause	20
Access to Information	21
Just Administrative Action	21
Enforcement of Rights	21

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended	21
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	23
National Environmental Management: Air Quality Act, 39 (Act 39 of 2004)	25
The National Water Act, 1998 (Act No. 36 of 1998)	25
Environmental Conservation Act, (Act No 73 of 1989).....	26
The White Paper on Integrated Pollution and Waste Management for South Africa.....	26
Occupational Health and Safety Act, 1993 (Act 85 of 1993)	27
5. Environmental Impact Assessment Phase	28
5.1. Study Approach.....	28
5.2. Scoping Phase	29
5.3. Environmental Impact Assessment Phase	29
Steps Undertaken In the Public Participation Process.....	30
Process	31
Announcing the availability of the Draft EIR and the EMPr.....	32
Public review of Draft EIR and EMPr.....	32
Progress feedback.....	33
Announce authorities decision	33
5.4. Decision Making Phase	33
5.5. Post Authorisation Phase.....	34
6. Description of the Affected Environment.....	34
6.1. Study Area Context	34
6.1.1. Regional Context.....	34
6.1.2 Local Context.....	34
6.2. Climate and Atmospheric Conditions	35
6.3. Geology	35
6.4. Topography	36
6.5. Water Resources.....	36
6.6. Ecology	37
6.6.1. Terrestrial Vegetation	37
6.6.2. Red data Listed Species.....	37
6.6.3. Fauna and Avifauna.....	38
6.7. Landuse	38
6.8. Physical Infrastructure	38
6.9. Social and Economic.....	38
6.10. Heritage/ Cultural Environment.....	38

7. Summary of Specialist Studies	39
7.1. Introduction	39
7.2. Heritage Impact assessment.....	39
7.2.1. Method	39
7.2.2. Findings	40
7.2.3. Recommendations and Mitigation Measures.....	40
7.3. Visual Impact Assessment.....	40
7.3.1. Method	40
7.3.2. Findings	41
7.3.3. Recommendations and Mitigation Measures.....	41
7.4. Wetland delineation	42
7.4.1 Method	42
7.4.2. Findings	44
7.4.3. Recommendations and Mitigation Measures.....	44
7.5. Noise Impact Assessment	44
7.5.1. Method	44
7.5.2. Findings	45
7.5.3. Recommendations and Mitigation Measures.....	45
7.6. Fauna.....	46
7.6.1. Method	46
7.6.2. Findings	47
7.6.3. Recommendations and Mitigation Measures.....	47
7.7. Agricultural impact assessment	48
7.7.1. Method	48
7.7.2. Findings	48
7.7.3. Recommendations and Mitigation Measures.....	49
7.8. Air Quality	49
7.8.1. Method	49
7.8.2. Findings	49
7.8.3. Recommendations and Mitigation Measures.....	51
7.7. Flora Impact Assessment	Error! Bookmark not defined.
7.8 Traffic Impact Assessment	51
7.9. Geological and Geotechnical Investigation.....	52
7.9.1. Method	52
7.9.2. Findings	53

7.9.3. Recommendations and Mitigation Measures.....	54
7.10. Geohydrological Assessment	54
7.10.1. Method	54
7.10.2. Findings	54
7.10.3. Recommendations and Mitigation Measures.....	55
8. Description & Comparative Assessment of Alternatives	55
8.1. Overview	55
8.2. “No Go” Alternative	55
8.3. Location Alternatives	56
9. Impact Assessment Methodology.....	56
9.1. Overview	56
9.2. Impact Assessment Criteria	57
9.2.1. Nature and Status	57
9.2.2. Extent	57
9.2.3. Duration	58
9.2.4. Intensity	59
9.2.5. Probability	59
9.2.6. Confidence	60
9.2.7. Significance	60
9.3. Identification of Mitigation Measures	61
9.4. Cumulative Impacts	61
10. Assessment of Impact	61
10.1. Overview	61
10.2. Heritage Resources Impacts	62
10.3. Visual Impact Assessment.....	64
10.4. Air Quality Assessment	66
10.5. Groundwater Impact Assessment.....	67
10.6. Biodiversity Impact Assessment	69
10.7. Traffic Impact Assessment	71
10.8. Summary of Impacts	72
11. Environmental Management Programme	73
Environmental Impact Statement.....	74
Conclusion and Recommendations	76

List of Tables

Table 1.1. Structure of Report

Table 2.1: Applicant Details

Table 2.2: Environmental Consultant Details

Table 5.1: List of departments included in circulation of BID

Table 9.1. Impact Assessment Criteria

Table 9.2. Extent

Table 9.3. Duration

Table 9.4. Intensity

Table 9.2. Extent

Table 9.3. Duration

Table 9.4. Intensity

Table 10.1. Identified Potential Impacts

Table 10.2 Heritage Impact Assessment.

Table 10.3. Visual Impact Assessment

Table 10.4. Air Quality Assessment

Table 10.5. Groundwater Impact Assessment.

Table 10.6. Biodiversity Impact Assessment

Table 10.7. Traffic Impact Assessment

Table 10.8: Summary of Impacts

ABBREVIATIONS & ACRONYMS

DEDTEA	Department of Economic Development, Tourism & Environmental Affairs
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
GNR	General Notice Regulations
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
NEMA	National Environmental Management Act
NEMWA	National Environmental Management: Waste Act
NWA	National Water Act
PI	Public Involvement
PPP	Public Participation Process

Proposed Construction of uMzimkhulu Landfill Site

Environmental Impact Assessment Report

Introduction

1.1. Background of study

1.1.1. Project background

The Umzimkhulu Local Municipality proposes to develop the new Umzimkhulu Landfill Site for the disposal of general waste at Umzimkhulu, in the Harry Gwala (formerly Sisonke) District Municipality. The proposed new waste disposal facility is considered a waste management activity that may have a detrimental effect on the environment and for which authorisation in the form of a Waste Management Licence is required in terms of the National Environmental Management: Waste Act (Act 59 of 2008) [NEM:WA]. The proposed development also comprises activities listed in the National Environmental Management Act (Act 107 of 1998) [NEMA] for which environmental authorisation is also required. For both the NEM:WA and NEMA activities, a Scoping and Environmental Impact Assessment (EIA) process is required, as described in the NEMA EIA Regulations in GN 543 of 2010.

1.1.2. Environmental Assessment Practitioner

To ensure that the process for the construction and licensing of the uMzimkhulu Landfill site meets the environmental requirements in line with National Environmental Management Act (NEMA) 107 of 1998 as amended in 2010, and the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008), Nzingwe Consultancy was appointed by the Umzimkhulu Local Municipality as the independent Environmental Assessment Practitioner (EAP) to undertake the Waste Management Licence and EIA processes for the proposed landfill. Nzingwe Consultancy meets the requirements for an independent EAP in terms of the EIA Regulations of 2010.

1.1.3. Environmental Authority

The relevant environmental authority is the KwaZulu Natal Department of Economic Development Tourism, & Environmental Affairs (DEDTEA). The reference number for the waste management licence application (received on 11 October 2013) is DC43/WML/0013/2013

The Final Scoping Report including the Plan of Study for EIA was accepted by KZNDAEA (now DEDTEA) on 4 April 2014.

1.2. Purpose of Study

An EIA is a planning and decision-making tool. It identifies potential negative and positive impacts of a proposed Umzimkhulu Landfill and recommends ways to enhance the positive impacts and minimise the negative ones. The EIA addresses the impacts associated with the project, and provides an assessment of the project in terms of the biophysical, social and economic environments to assist both the environmental authority (i.e. the DEDTEA) and the applicant (i.e. Umzimkhulu Local Municipality) in making decisions regarding implementation of the proposed Umzimkhulu waste disposal facility.

An EIA consists of three phases:

- a) Scoping Phase;
- b) EIA Phase; and
- c) Decision-Making Phase.

The main purpose of the Scoping Phase of the project was to identify and define the issues that need to be addressed in the EIA Phase. In this regard, inputs from the project team, the authorities, specialists and Interested and Affected Parties (I&APs) were considered and integrated into the Final Scoping Report.

The main purpose of the phase at hand, the EIA Phase, is to undertake the specialist studies identified in the Scoping Phase, to integrate the findings and present recommendations for the project.

The draft Environmental Management Programme (EMPr) is also generated during this phase, which takes the findings of the EIA Report and presents these in a series of measurable controls that will serve to mitigate impacts to acceptable levels through the provision of controls for the construction, operation and decommissioning phases of the project's life cycle. The information provided from the EIA Phase is passed on to the competent authority, DEDTEA, for consideration during the decision-making phase.

1.3. Purpose of this Report

Essentially, the aim of Environmental Impact Assessment is to protect the environment by providing a sound basis for effective and sustainable development and to ensure that the public are given early and effective opportunities to participate in the decision making procedures. An Environmental Impact Report discusses the identified and foreseen environmental consequences (positive or negative) of the proposed project prior to implementation and proposes measures to mitigate and where possible minimise and

eliminate impacts to acceptable levels. It also ensures that decision makers consider the environmental impacts when deciding whether or not to proceed with a project

The Environmental Impact assessment phase is the final stage of a full Scoping and EIA process and following the approval of a Scoping report and plan of study, the draft EIR aims to provide:

- ✓ a detailed description of the proposed activity
- ✓ a description of environment that may be affected
- ✓ details of the public participation process conducted
- ✓ issues and concerns raised by Interested and Affected Parties (I&APs) during the public participation process
- ✓ need and desirability of the proposed activity
- ✓ description, advantages and disadvantages of potential alternatives identified
- ✓ Impact assessment methodology for direct, indirect and cumulative impacts
- ✓ summaries and recommendations of specialist studies conducted

This report will be submitted to I&APs for comment and thereafter to the relevant authority for decision-making. An EIR is extremely important as it wraps up all the issues of the EIA process and gives the competent authority all the information needed to reach a decision on whether to grant environmental authorisation or not.

1.4. Structure of this report

The structure of the EIA Report is presented in Table 1.1 and includes a cross-reference to the information requirements per Section 31 of Government Notice R.543 (of 18 June 2010, NEMA EIA Regulations).

Description	NEMA EIA Regulations (GN R543) Sect 31
Introduction and background to the project.	(2)(b)
Details of the Applicant, EAP (including expertise) and project team	(2)(a)
A description of the proposed project, including the need and desirability.	(2)(b), (c) & (f)
Legislation and guidelines that pertain to the project.	(2)(r)

A description of the EIA process including the PPP, assumptions, uncertainties and gaps in knowledge	(2)(e) & (m)
A description of the receiving affected environment	(2)(c) & (d)
A summary of the findings and recommendations of the specialist studies, the studies included in the Appendices	(2)(j) & (q)
A description and comparative assessment of all project alternatives identified	(2)(g) & (i)
A description of the methodology used to determine significance ratings	(2)(h)
A description of all environmental issues identified and an assessment of significance	(2)(k) & (l)
A consideration of the draft Environmental Management Programme, the draft EMPr included in the Appendices	(2)(p)
Environmental Impact Statement, including a summary of key findings	(2)(o)
Conclusion and recommendations.	(2)(n)

Table 1.1. Structure of This Report

2. Project Team

2.1. The Applicant

Details of the Applicant are presented in **Table 2-1**.

Applicant	Umzimkhulu Local Municipality
Contact Person	Mr. Zweliphansi Sikhosana
Postal Address	P.O. Box 53, Umzimkhulu, 3297
Telephone	039 259 5321
Fax	039 259 0223
Email Address	zsikhosana@umzimkhululm.gov.za

Table 2.1: Applicant Details

2.2. Environmental Consultant

The independent EAP for the project is Nzingwe Consultancy, further details are presented in **Table 2-2**.

Environmental Assessment Practitioner	Nzingwe Consultancy
Contact Person	Ms. Silindile Nqoko
Postal Address	P.O. Box 939, Shelly Beach, 4265
Telephone	039 315 7751
Fax	086 662 1789
Email Address	silindile@nzingwe.co.za

Table 2.2: Environmental Consultant Details

2.3. Details of the Authors

The EAP was appointed in accordance with according to the requirements of the National Environmental Management Act (Act No. 107 of 1998). Ms. Silindile Nqoko heads the project team and acts as the Project Manager for all phases of the project. Silindile holds a BSc. Environmental Sciences (Hons). She is an Environmental Scientist with 8 years of experience. Silindile specialises in Integrated Environmental Management (IEM), Environmental Impact Assessments (EIAs), Rural Development, land use issues and socio-economic surveys. Silindile has been a project scientist for various EIA's in KwaZulu Natal, Eastern Cape and Mpumalanga provinces of South Africa. Silindile is currently a Project Manager and Senior Environmental Scientist at Nzingwe Consultancy.

2.4. Project Team

Name	Role on the Team	Company
Applicant Team		
Mr. Zweliphansi Sikhosana	Municipal Manager	Umzimkhulu Municipality
Environmental Team		
Ms. Silindile Nqoko	Project Manager & EAP	Nzingwe Consultancy
Mr. Lungelo Ncwane	Environmental Consultant	Nzingwe Consultancy
Ms. Anelisa Mhatu	Environmental Consultant	Nzingwe Consultancy
Ms. Kudakwashe Zhandire	Environmental Consultant	Nzingwe Consultancy
Specialists		
Leonie Marais-Botes	Heritage Impact Assessment	Archaetnos Archaeologists and Heritage Consultants
Gerhard Griesel	Visual Impact Assessment	Axis Landscape Architecture
David Styles	Flora Impact Assessment	Vegetation Surveys, Advice

		and Consulting
M. de Jager	Noise Impact Assessment	Enviro-Acoustic Research
Ross M. Manson	Wetland Impact Assessment	MacKenzie Manson Environmental
Sophia Valsamakis	Air Quality Impact Assessment	Rayten Engineering Solutions
Bertie Phillips	Traffic Impact Assessment	Kantey & Templer (Pty) Ltd
G.J. McDonald	Fauna Impact Assessment	GJ McDonald Consulting
J S Phipson	Agricultural Impact Assessment	Mzansi Agriculture
Andile Gumbi	Social Impact Assessment	QKG Consulting

3. Overview of the Proposed Project

3.1. Need and Desirability

The Umzimkhulu Local Municipality entails the development of a new waste disposal facility and associated infrastructure for the disposal of general and non-hazardous industrial waste. A sanitary landfill is a facility for the disposal of waste on land using technologies that reduce impacts on the environment and nuisances or hazards to public health and safety by using the principles of engineering to confine waste to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of soil or other suitable material at the conclusion of each day's operations, or at more frequent intervals, if deemed necessary. Once cells are full, they are covered or "capped" with amongst others a clay layer and vegetated. Note that capping is described simplistically in the previous sentence; the full capping layer consists of a landfill gas layer, a clay layer and finally a topsoil layer, which is vegetated so as to limit / prevent erosion of capping material.

The National Department of Environmental Affairs (DEA) has, in general, established that waste disposal is becoming a problem due to the rapid increase in population and the resultant decline in available disposal capacity. The proposed Umzimkhulu Landfill will assist in addressing this problem in waste management capacity, while providing an environmentally acceptable waste facility for its growing population.

Based on the current demand, the proposed Umzimkhulu Landfill site will ensure sufficient waste disposal capacity for a long time.

In addition to addressing the waste disposal needs, limited employment will be created during the construction and operational phases. Some short term (temporary) positions will

be created during the construction of the proposed Umzimkhulu Landfill Site. Permanent positions will be created as part of the operations. Therefore, the need for the landfill site is high not just for environmental protection but also as an economic activity.

3.2. Proposed Areas for Development

The three candidate sites are located within the uMzimkhulu Local Municipality within the Harry Gwala District Municipality. Two of the candidate sites (Site No. 8 and 9) are located in East Clydesdale which is in Ward 17 of the Municipality and Site 11 is located in South Clydesdale which is in Ward 9 of the Umzimkhulu Municipality. The candidate sites are all within 5 km of the town of uMzimkhulu CBD.

Site No. 8: This site is located on the lower part of a gentle north facing slope. The site is bounded by the KwaNkuku River 200m to the north-west, the Umzimkhulu River 300m to the east, and an unnamed non perennial stream to the west. The site can be accessed by a gravel road off the R56.

Site No. 9: This site is located on a gentle north east facing slope. The site is bounded by the Umzimkhulu River 800m to the north and north east, with an unnamed stream 650m to the south east, and an unnamed non perennial stream 600m to the north-west. The site can be accessed by a gravel road off the R56

Site No.11: This site is located on the south west of the Clydesdale community. The site is bounded by D2425 immediately to the east, with an unnamed non perennial stream 540m further to the south east. The site is located on unimproved grassland. The site can be accessed by the D2425 from the R56.

The central geographical coordinates for the three proposed sites are as below:

Site No. 8	S 30° 16' 39.95"	E 29° 56' 40.13"
Site No. 9	S 30° 17' 14.44"	E 29° 57' 07.33"
Site No. 11	S 30° 18' 35.24"	E 29° 55' 44.55"

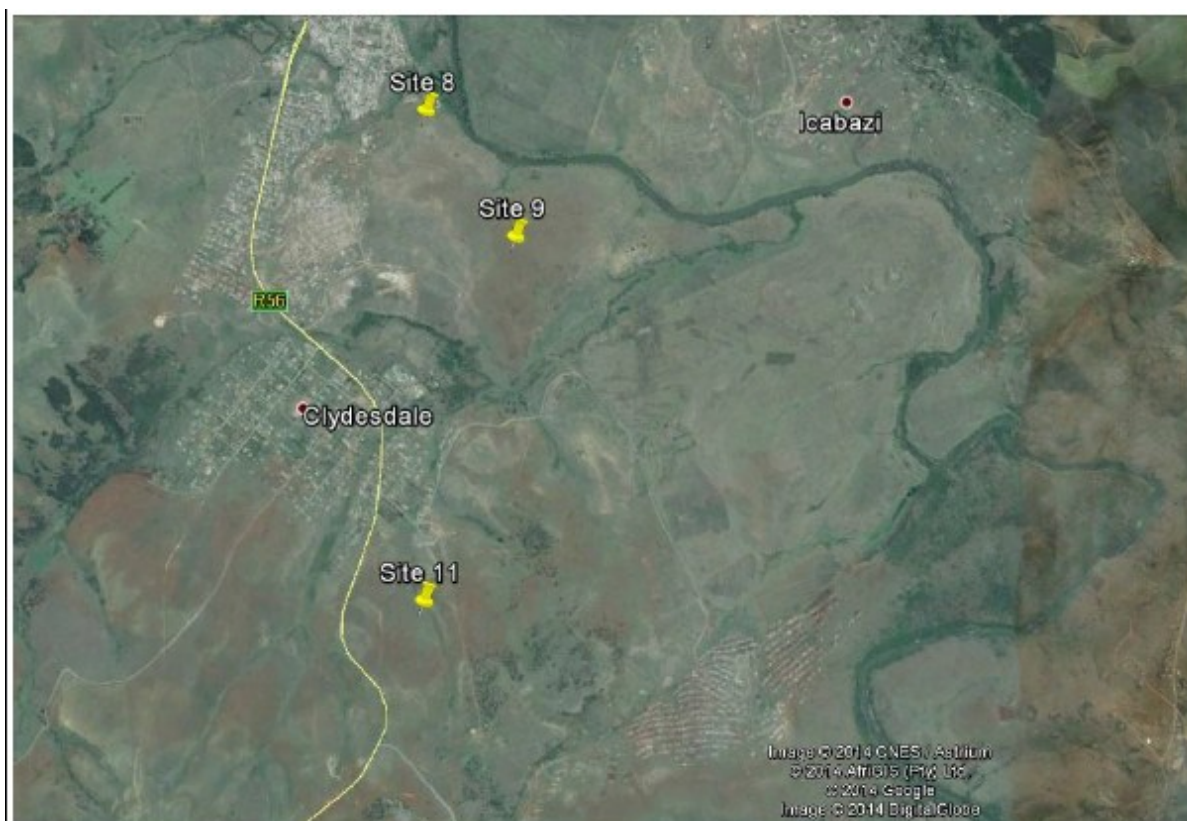


Figure 3.1 Proposed Sites for the proposed Umzimkhulu Landfill

3.3. Requirements for the Design and Classification of Landfills

Umzimkhulu Municipality proposes to develop an environmentally sound general waste disposal facility to serve public and industrial waste generators in the Umzimkhulu municipality and surrounding areas. Currently the legal requirements for the design and classification of landfills within South Africa are as per the Department of Water Affairs' (DWA) "*Minimum Requirements for Waste Disposal by Landfill*" (DWA, 2009, 2nd Edition) (Minimum Requirements). The Design for the proposed Umzimkhulu landfill will adhere to the requirements set out in the Minimum Requirements but will also meet the requirements detailed in the National Standards described in Government Gazette Notice Regulations as well as the National Environmental Management: Waste Act (Act 59 of 2008, as amended).

The DEA has established Regulations and Standards to regulate various aspects of waste management, including the design and classification of landfills. In addition to the existing Minimum Requirements, the following documents are applicable:

- i. National Environmental Management: Waste Amendment Act (588 of June 2014)
- ii. National Waste Information Regulations, (GNR 625 of August 2012)
- iii. Waste Classification and management (GNR 634 of August 2013)

- iv. National Norms and Standards for the assessment of Waste for landfill disposal (GNR 635 of August 2013)
- v. National Norms and standards for Disposal of Waste to landfill (GNR 636 of August 2013)
- vi. List of waste management activities that have, or are likely to have a detrimental impact on the environment (GNR 921 of November 2014)

As a result of the above, the design and classification of the proposed new waste disposal facility will take the existing Minimum Requirements as well as the new Regulations and Standards (future) into account. Until the new standards and regulations are legislated, the exact requirements can only be approximated. However, the design of the Umzimkhulu landfill as proposed complies with the latest revision of the draft regulations as well as recommendations from the authorities based on those proposed regulations, and will be amended during final design of the Umzimkhulu Landfill Site to meet the required standards once legislated.

4. Legal Framework

4.1. Introduction

The dominant legislation of reference to the project and the Draft EIA Report is by default that of the National Environmental Management [NEM] suite of acts. This is due to the fact that the aim of the Draft EIA Report is to provide sufficient relevant information to DEDTEA such that they are able to reach an informed decision as to whether an Environmental Authorisation (EA) should be granted with an accompanying waste permit for the proposed Umzimkhulu Landfill Site.

The Constitution of South Africa Act, 1996 (Act No.108 of 1996)

The Constitution is the supreme law of South Africa, against which all other laws are measured; any laws in conflict with it are therefore invalid. It protects certain fundamental rights which are, however, not absolute, and may be limited 'in terms of law of general application to the extent that the limitation is reasonable and justifiable in an open and democratic society based on human dignity, equality and freedom' (Section 36).

The Environmental Clause

One such fundamental right in Section 24 provides the basic framework for all environmental policy and legislation, and it states:

“Everyone has the right –

- a) to an environment that is not harmful to their health or well-being; and
- b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –
 - i. Prevent pollution and ecological degradation;
 - ii. Promote conservation; and
 - iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

It is however important to note that though an activity may be allowed in terms of an Act of Parliament or a permit issued under a statute, **it may still be declared unlawful if it is harmful to human health or well-being.**

Access to Information

Section 32 provides that everyone has the right of access to any information held by the State or another juristic person and that is required for the exercise or protection of any rights.

Just Administrative Action

Section 33 of the Constitution entrenches the right to lawful, reasonable and procedurally fair administrative action, as well as written reasons for administrative actions that have adversely affected a person’s right.

Enforcement of Rights

In terms of Section 38, if any rights in the Bill of Rights have been infringed or threatened, a court may be approached for assistance by a person acting individually; on behalf of another who is incapacitated; on behalf of a group or class of persons; in the public’s interest, or as an association in the interests of its members.

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

The National Environmental Management Act (NEMA) provides the legislative framework for Integrated Environmental Management (IEM) in South Africa. Section 24 provides that all activities that may significantly affect the environment and require authorisation by law must be assessed prior to approval. NEMA also provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the

environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of the State and to provide for matters connected therewith. Section 2 of NEMA establishes a set of principles that apply to the activities of all organs of state that may significantly affect the environment.

These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised; and
- Responsibility for the environmental health and safety consequences of a policy, project, product or service exists throughout its life cycle.

These principles are taken into consideration when a government department exercises its powers, for example during the granting of permits and the enforcement of existing legislation or conditions of approval.

Section 28(1) of NEMA states that “every person who causes, has caused may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”. If such pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. These measures may include:

- ✓ Assessing the impact on the environment;
- ✓ Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- ✓ Ceasing, modifying or controlling actions which cause pollution/degradation;
- ✓ Containing pollutants or preventing movement of pollutants;
- ✓ Eliminating the source of pollution; and
- ✓ Remedying the impacts of the pollution.

The authorities may direct an industry to rectify or remedy a potential or actual pollution problem. If such a directive is not complied with, the authorities may undertake the work and recover the costs from the responsible industry.

National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

The National Environmental Management: Waste Act No 58 of 2008 together with the National Environmental Management: Waste Amendment Act No 26 of 2014 regulates waste management in South Africa.

The main objectives of the Waste Act are to:

- ✓ Give effect to everyone's right 'to an environment that is not harmful to his or her health
- ✓ Protect the environment by providing reasonable legislative and other measures that
 - (i) prevent pollution and ecological degradation,
 - (ii) promote conservation and
 - (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development;
- ✓ Provide for institutional arrangements and planning matters;
- ✓ Provide for national norms and standards for regulating the management of waste by all spheres of government;
- ✓ Provide for specific waste management measures;
- ✓ Provide for the licensing and control of waste management activities;
- ✓ Provide for the remediation of contaminated land;
- ✓ Provide for the national waste information system;
- ✓ Provide for compliance and enforcement; and
- ✓ Provide for matters connected therewith.

The general duty in respect of waste management is outlined in Chapter 4, Part 2 of the Act and states that:

A holder of waste must, within the holder's power take all reasonable measures to:

- a. Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;
- b. Reduce, re-use, recycle and recover waste;
- c. Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;
- d. Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;
- e. Prevent any employee or any person under his or her supervision from contravening this Act; and

- f. Prevent the waste from being used for an unauthorised purpose.
- 2) Any person who sells a product that may be used by the public and that is likely to result in the generation of hazardous waste must take reasonable steps to inform the public of the impact of that waste on health and the environment.
- 3) The measures contemplated in this section may include measures to –
- a. investigate, assess and evaluate the impact of the waste in question on health or the environment;
 - b. Cease, modify or control any act or process causing the pollution, environmental degradation or harm to health;
 - c. Comply with any norm or standard or prescribed management practice;
 - d. Eliminate any source of pollution or environmental degradation; and
 - e. Remedy the effects of the pollution or environmental degradation.
- 4) The Minister or MEC may issue regulations to provide guidance on how to discharge this duty or identify specific requirements that must be given effect to, after following a consultative process in accordance with sections 72 and 73.
- 5) Subsection (4) need not be complied with if the regulation is amended in a non-substantive manner.

A draft National standard for disposal of waste to landfill has been issued by the Department of Environmental Affairs on 1 July 2011. The standard outlines the landfill classification and containment barrier design requirements, waste acceptance criteria for disposal to landfill and waste disposal restrictions. In terms of the waste acceptance criteria, waste may only be accepted and disposed of at appropriately designed and operated landfills as stipulated in Government Notice Number R921 of 29 November 2013.

Furthermore, the Waste Act (Act 58 of 2008) aims to;

- reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development;
- provide for institutional arrangements and planning matters;
- provide for national norms and standards for regulating the management of waste by all spheres of government;
- provide for specific waste management measures;

- provide for the licensing and control of waste management activities;
- provide for the remediation of contaminated land;
- provide for the national waste information system;
- provide for compliance and enforcement; and
- provide for matters connected therewith.

These activities are listed as a result of their potential to have a significant detrimental impact on the environment.

National Environmental Management: Air Quality Act, 39 (Act 39 of 2004)

The National Environmental Management: Air Quality Act 39 of 2004 provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures so as to protect the environment and human health or well-being by:

- ✓ Preventing pollution and ecological degradation; and
- ✓ Promoting sustainable development through reasonable resource use.

It also includes reference to the control of offensive odours whereby reasonable steps to prevent the emission of any offensive odours caused by activities on a premises are required. Also relevant is the establishment of national ambient dust fall out levels that may be relevant to the construction and operation of the facility.

The National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act (NWA) administered by DWA aims to manage and protect the national water act resources to achieve sustainable use of water for the benefit of all water users. The purpose is to achieve sustainable use of water for the benefit of all water users. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved and managed in ways that take into account:

Promoting equitable access to water;

- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for the growing demand water use;

- Protecting aquatic and associated ecosystems their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and drought.

Environmental Conservation Act, (Act No 73 of 1989)

In terms of section 20 (1) of the Environmental Conservation Act, 1989, (Act 73 of 1989), waste can only be disposed of at a facility that has a permit issued by the Minister of Water Affairs and Forestry. The facility must be sited, designed, operated and monitored strictly in accordance with the permit conditions. These conditions will include the requirements, standards and procedures set out in the DWAF's waste management series.

It should be noted that section 20 (1) of the Environmental Conservation Act, 1989 has been amended in terms of the issuing of waste disposal permits and exemptions is now the responsibility of the minister of Environmental Affairs.

Section 24 of the Act allows the Minister to make regulation with respect to a number of waste management issues and include the following regulations:

- Disposal site application;
- Directions for control and management of general and small waste disposal sites
- Noise control regulations; and plastic bag Regulations

The waste will thus be subject to a permit issued under section 20 of the ECA.

The White Paper on Integrated Pollution and Waste Management for South Africa

Integrated of pollution and waste management is a holistic and integrated system and process of management aimed at pollution prevention and minimisation of source, managing the impact of pollution and waste of the receiving the environment and remediation damaged environments.

The White Paper on Integrated Pollution and Waste management for South Africa represent a paradigm shift from dealing with waste only after it is generated (i.e." end of pipe towards)

- Pollution prevention
- Waste minimisation
- Cross media integration

- Institution integrated both horizontal and vertical, of department and spheres of government; and
- Involvement of all sectors of society in pollution and waste management.
- The government believes that pollution prevention is one of the most effective means of protecting South Africa people and environment. Pollution prevention eliminates costly and unnecessary waste and promotes sustainable development. It aims to reduce risks to human health and environment by trying to eliminate the causes rather than treating the symptoms of pollution.

This Integrated Pollution and Waste Management for South Africa apply to all government institutions, society at large and to all activities that impact on pollution and waste management. One of the fundamental approaches of this policy is to prevent pollution, minimise waste and to control and remediate impacts. The management of waste will be implemented in a holistic and integrated manner, and will extend over the entire waste cycle, from “cradle to grave” including the generation, storage, collection, transportation, treatment and final disposal of waste.

The government aims to:

- Encourage the prevention and minimisation of waste generation and thus pollution at source;
- Encourage the management and minimization of the impact of unavoidable waste from its generation to its final disposal;
- Ensure the integrity and sustained “fitness for use” of all environmental media , i.e. air, water and land;
- Ensure that any pollution of the environment is remediated by holding the responsible parties accountable;
- Ensure environmental justice by integrating environmental considerations with the social, political and development needs and rights of all sectors, communities and individuals; and
- Prosecute non-compliance with authorizations and legislation.

Occupational Health and Safety Act, 1993 (Act 85 of 1993)

The Occupational Health and Safety Act 85 of 1993 is South Africa’s principle legislation concerning health and safety of employees. It also aims to protect persons who are not at work against hazard to health and safety arising out of or in connection with the activities of

persons at work. The Act places the responsibility on the employer to ensure a safe and healthy working environment and to cause every employee to be made conversant with health and safety requirements relevant to their work. At the same time the Act places the responsibility on the employee to follow its employer's health and safety procedures and instructions. A number of Regulations have been promulgated under the Act that is relevant to development including the following:

- General Administrative Regulations, 1994
- Asbestos Regulations, 2001
- Lead Regulations, 2003
- Regulations for Hazardous Chemical Substances, 1995
- Hazardous Biological Agents of 2001;
- General Safety Regulations, 1986
- Environmental regulations for workplaces (Department of Labour, 1994); and
- Construction Regulations, 2003.

All waste management activities need to be carried out in accordance with the requirements of the OHS Act and must include the following activities:

- Waste Management Practices must be safe and without risk;
- Risk Assessments conducted should include waste related activities;
- Waste management training should be provided to employees and contractors;
- Written work instructions should be provided where necessary; and
- Relevant personal protective equipment and respiratory protective equipment must be provided as last resort after all mitigatory measures have been reviewed.

5. Environmental Impact Assessment Phase

5.1. Study Approach

The EIA process is a planning and decision making tool that identifies the potential negative and positive impacts of a proposed development. It also recommends ways to enhance the positive impacts and to minimize the negative ones. The environmental studies that will be undertaken will address the impacts associated with the proposed development, and provide an assessment in terms of the biophysical, social, cultural-historic and economic environments. This will assist in the decision making regarding potential environmental authorisation and implementation of the proposed Umzimkhulu Landfill Site.

The EIA has been undertaken in compliance with the NEMA, specifically Government Regulations Notice (GNR) 543, 544, 545 and 546 of 18 June 2010 (as amended), and the National Environmental Management Waste Act and its regulations. Cognisance will also be taken of related guideline documents and other relevant legislation.

5.2. Scoping Phase

The aim of the Scoping Phase of the project was to identify and define the issues that needed to be addressed in the EIA Phase.

During the PPP, I&APs were identified and given the opportunity to list issues and concerns relating to the proposed Umzimkhulu Landfill and study area. A first round of public participation was undertaken to identify I&APs, notify them of the proposed development and to afford them the opportunity to identify issues and concerns that should be addressed in the EIA study.

Input from the technical team, the authorities, specialists and I&APs were considered and integrated into the Scoping Report. The Draft Scoping Report (DSR) was circulated for public comment over a period of 60 days, from 13 November 2013 to 31 January 2014. The objective of the public comment period was for I&APs to raise issues about the information presented in the DSR and for them to raise any other issues related to the proposed Umzimkhulu Landfill. For the PPP Report which includes the issues and response register as well as proof of all interactions with the I&APs, (see Appendix 2).

The Final Scoping Report (FSR) incorporated all comments that were received during the public review period and submitted to the KwaZulu Natal Department of Agriculture and Environmental Affairs on 4th March 2014 for review and acceptance letter issued on the 14th March 2014. The FSR including the Plan of Study for the EIA was approved by KZNDAEA on 4th April 2014.

5.3. Environmental Impact Assessment Phase

The EIA for the proposed Umzimkhulu Landfill was conducted in accordance with the process as described in Section 26 to 35 of the EIA Regulations (2010) as promulgated in terms of section 24(5) of the NEMA. Nzingwe Consultancy is responsible for the process and collation of information from the specialists reports including the issues raised from the PPP.

From the various sources (i.e. site visits, PP, and the expertise of the EAP and the technical team) a range of issues (i.e. biophysical, social and cultural) were identified and assessed during the EIA phase. Included in the EIA process was the identification of mitigation measures. How these mitigation measures are implemented is included in the draft EMPr (see Appendix 3) compiled specifically for the design, construction, operation and maintenance, and eventual decommissioning of the proposed Umzimkhulu Landfill.

The objective of the PPP in the EIA phase of the project is to present the findings of the investigations to the stakeholders and to provide them with an opportunity to comment on these. In order to achieve this, this Draft EIA Report will be available for review by registered I&APs for a period of 40 days, from 20 October – 1st December 2014. Refer to Appendix 2 for additional information on the PPP.

On closure of the public review period, comments and issues raised will be noted and the EIA Report and EMPr will be updated, finalised and submitted to the DEDTEA for review and issuing of the Environmental Authorisation (whether positive or negative).

The public participation process for the EIAs will involve the following proposed steps:

- ✓ Announcement of the availability and public review of the Draft EIR and EMPr;
- ✓ Host a public meeting for the stakeholders to review the Draft EIR and EMPr;
- ✓ Announcement of the availability of the Final EIR;
- ✓ Notification of the authorities' decision with regard to EAs

Steps Undertaken In the Public Participation Process

The Public Participation Process (PPP) is an integral part of the environmental investigations that were undertaken for the proposed landfill. The PPP runs both during and after the EIA process – with only the focus shifting over the lifespan of the project. That is, the relationships between the Applicant and the I&APs continue once the EA has been granted during the implementation phase of the project, and then extending into the operational phase. This typically takes the form of a Monitoring Committee comprising of representatives of DEDTEA, DWA, the owner, the operator and representatives of those affected by the Umzimkhulu Landfill Site. On-going engagement is an important tool in best practice landfill management.

The PPP is presented in a detailed set of documents in Appendix 2, and includes the Issues and Response Report, as well as proof of all interactions with the I&APs. Please refer

thereto for more information. It should be noted that the PPP is in compliance with the relevant EIA Regulations, 2010, and the related guideline documents.

The process is aimed at identifying all Interested and Affected Parties (I&APs) about the full Scoping report and processes to be taken. The scoping process assists I&APs in identifying issues related to the project relevant to the society in general.

Process

- ✓ Distribution of a background information document to surrounding communities within the 100 m radius was done on the 18th July 2013.
- ✓ A background information document was distributed by email, postage to identified non-governmental organizations, governmental departments and stakeholders see **Table 5.1** for details of recipients of the BID.
- ✓ Eight site notices were placed at various places around the proposed sites on the 21st October 2013.
- ✓ The notice announced the proposed project and availability of Scoping Report whilst inviting them to participate in the environmental process by registering with the EAP.
- ✓ Advertisements of the draft scoping report and the availability of the draft scoping report inviting them to register on the project database was placed in the Isolezwe, and Mercury on the 23rd October 2013
- ✓ Advertisements of the draft EIR and the availability of the draft EIR inviting them to register on the project database was placed in the Isolezwe, and Mercury on the 10th October 2014.
- ✓ Various public meetings with the public representatives were conducted to afford the community a chance to comment on the available draft Scoping Report. Copies of the minutes and register of the meetings have been included in this report under the public participation details. It was agreed that in future meetings the ward Councillor will form part of the stakeholder consultation forum.

Name of Department	Contact Person	Address
Ezemvelo KZN Wildlife	Mr A. Blackmore	P.O. Box 13053 Cascade 3202
Amafa	Mrs B. Pawandiwa	PO Box 2685 Pietermaritzburg 3200

Department of Water Affairs	Ms. R. Pillay	P.O. Box 1018 Durban 4000
Department of Agriculture, Forestry and Fisheries	Mr R. Baca	(Land use and Soil management) P.O. Box 345 Pietermaritzburg 3200
Department of Transport	Mr C. Dewar	Private Bag X552 Ixopo 3276
Department of Health	Mr S Makhaye	Private Bag X502 Ixopo 3276
Sisonke District Municipality (Environmental Health)	Mr E Mlomo	Private Bag X501 Ixopo 3276

Table 5.1: List of departments included in circulation of BID

Announcing the availability of the Draft EIR and the EMPr

A letter will be circulated to all I&APs, informing them in terms of progress made with the study and that the Draft EIR and EMPr are available for comment. The report will be distributed to public places and also presented at a stakeholder meeting. Advertisements will be placed in the same newspapers used in the scoping phase to announce the public review period of the Draft EIR.

Public review of Draft EIR and EMPr

The EIA Guidelines specify that stakeholders must have the opportunity to verify that their issues have been captured and assessed before the EIA Report will be approved. The findings of the specialist assessment will be integrated into the final EIR. The report will be written in a way accessible to stakeholders in terms of language level and general coherence. This Draft EIR has a comprehensive project description, motivation and alternatives being considered and also the findings of the assessment and recommended mitigation measures. It will further include the Issues and Responses Report, which lists every issue raised with an indication of where the issue was dealt with in the draft EIR. The

findings of the assessment and recommended mitigation measures will also be incorporated into the final EIR.

Progress feedback

After comments from I&APs have been incorporated, all stakeholders on the database will receive a personalised letter to report on the status of the process, to thank those who commented to date and to inform them that the Final EIR and EMP have been submitted to the lead authority for consideration. I&APs will be advised on the next steps in the process.

Announce authorities decision

Registered I&APs will be notified by individual letters of the results from the authorities. Should it be a requirement from the authorities an advertisement will be placed in the same newspapers which were used during the scoping and impact assessment phases.

5.4. Decision Making Phase

On conclusion of the public review period, the EIA Report and EMPr will be finalised and submitted to DEDTEA, the competent authority. The report will be reviewed by officials from the competent authority and an EA will be drafted with possible specific conditions that must be adhered to by the Applicant during the design, construction, operation and maintenance and eventual decommissioning. As part of the review process of the EIA Report and associated documents, the documentation will be submitted to the DWAS for review in evaluating the risk to water pollution and technical review of the designs. The DWAS will provide information to the environmental competent authority, i.e. DEDTEA, for inclusion into the EA that will lead to a landfill-specific Waste Licence forming and integrated part of the EA.

The EA may be granted for the entire proposal as submitted (i.e. positive EA), or only part thereof (i.e. positive EA for only some of the listed activities specified, part of the site, etc.) with specific conditions imposed thereon, or may decide that the risk is too high and reject the proposal (i.e. negative EA). If additional information is required, which will be requested, an EA would not be granted under that situation at that time. Once the draft authorisation is approved at the various required levels within the DEDTEA, a decision in the form of an EA is sent to the Applicant.

5.5. Post Authorisation Phase

Once an EA is granted, the EAP must notify all I&APs of the contents of that EA, and notify the I&APs of the fact that an appeal may be lodged – that is, should I&APs or the Applicant disagree on the grounds of the decision taken they may enter into an appeal process. If no appeal(s) are lodged, proof of compliance with post-authorisation conditions (as relevant) would then be submitted to the DEDTEA along with a request to commence construction (within the validity periods included in the EA). Once the DEDTEA has approved such submissions, final detailed planning and then construction (i.e. from pegging-out of the first cell and infrastructure on the site) would then be allowed to proceed. Detailed designs will also be submitted to the DWAS for approval of each phase of development over the life of the Umzimkhulu Landfill Site. The DWAS will then be able to ensure that all future cell developments comply with the latest standards set for landfill cell development. If an appeal is lodged, a separate appeal process to the EIA process currently being carried out would be initiated.

6. Description of the Affected Environment

6.1. Study Area Context

6.1.1. Regional Context

The study area falls within the Umzimkhulu Local Municipality (ULM), one of five local municipalities within the Harry Gwala District Municipality in South Western KwaZulu Natal Province of South Africa.

6.1.2 Local Context

The proposed new landfill site will be located on one of three portions of land. The three candidate sites are located within the Umzimkhulu Local Municipality within the Sisonke District Municipality. Two of the candidate sites (Site No. 8 and 9) are located in East Clydesdale which is in Ward 17 of the Municipality and Site 11 is located in South Clydesdale which is in Ward 9 of the Umzimkhulu Municipality. The candidate sites are all within 5 km of the town of Umzimkhulu CBD.

Site No. 8: This site is located on the lower part of a gentle north facing slope. The site is bounded by the KwaNkuku River 200m to the north-west, the Umzimkhulu River 300m to the east, and an unnamed non perennial stream to the west. The site can be accessed by a gravel road off the R56.

Site No. 9: This site is located on a gentle north east facing slope. The site is bounded by the Umzimkhulu River 800m to the north and north east, with an unnamed stream 650m to the south east, and an unnamed non perennial stream 600m to the north-west. The site can be accessed by a gravel road off the R56

Site No.11: This site is located on the south west of the Clydesdale community. The site is bounded by D2425 immediately to the east, with an unnamed non perennial stream 540m further to the south east. The site is located on unimproved grassland. The site can be accessed by the D2425 from the R56.

The central geographical coordinates for the three proposed sites are as below:

Site No. 8 : S 30° 16' 39.95" E 29° 56' 40.13"

Site No. 9 : S 30° 17' 14.44" E 29° 57' 07.33"

Site No. 11 : S 30° 18' 35.24" E 29° 55' 44.55"

6.2. Climate and Atmospheric Conditions

The study area receives summer rainfall with drier winters. The mean annual precipitation is 920mm and an average annual temperature of 15.6°C. Short periods of frost do occur in the winter months.

6.3. Geology

East Clydesdale (Site 8): The site is covered by colluvial soils which are underlain by the residual shale of the Pietermaritzburg Formation. The residual material is underlain by soft to medium hard rock shale. East Clydesdale 8 is surrounded closely by three notable structural features on the up and downslope sides. Due to their proximity and occurrence, these features would need to be assessed further with geophysics to determine groundwater potential beneath the site. The close proximity of these features is considered a negative aspect for site development due to possible groundwater contamination.

East Clydesdale (Site 9): The site is covered by colluvial soils which are underlain by residual shale and subsequently weathered soft to medium hard rock shale. The host rock has been intruded locally by dolerite 350m on the downslope side to the east. Groundwater potential may be heightened along fracture zones associated with the dolerite intrusion. Groundwater flow in this area may be complex and multidirectional, but in general towards

the Mzimkhulu River. East Clydesdale 9 is adjacent to one of the same structural features passing site 8 but 200m upslope of the site. The proximity of the dolerite intrusion is partly considered a negative aspect for site development due to possible groundwater contamination; however, groundwater flow is expected to be in a northerly direction bypassing this feature.

South Clydesdale (Site 11): The site is covered by colluvial soils which are underlain by residual and soft to medium hard shale. Post Karoo dolerite has intruded the host shale to the north east and south east but in the range 350 to 450m. The host rock has further been intruded locally by dolerite 200m on the downslope side to the north. Groundwater potential may be heightened along fracture zones associated with the dolerite intrusion. Groundwater flow in this area may be complex and multidirectional. The dyke may further act as a cut off of groundwater flow in a northerly direction towards known groundwater users. No other structural features were evident near the site. The proximity of the dolerite intrusion is partly considered a negative aspect for site development due to possible groundwater contamination, however, groundwater flow may be cut off in a northerly direction, thus protecting downstream users.

6.4. Topography

East Clydesdale (Site 8): The surface gradient is approximately 1:11 in a northerly direction towards the Kwankuku/Mzimkhulu confluence, with the ground dropping away to the west and east at similar gradients.

East Clydesdale (Site 9): The surface gradient is approximately 1:12.6 in a northerly direction towards the Mzimkhulu River.

South Clydesdale (Site 11): The surface gradient is approximately 1:18 in a north westerly direction towards the invert of the non-perennial stream and towards the Clydesdale community.

6.5. Water Resources

East Clydesdale (Site 8) Groundwater is anticipated to flow radially from the site in a north west, north, and north easterly direction. The groundwater gradient will mirror the surface topography but be slightly flatter at an expected maximum gradient of 1:20. The resulting groundwater flow velocity will be moderate to high. The elevation difference to the

Mzimkhulu River is 45m. With such a large river, baseflow is expected to contribute to the river flow, thus groundwater levels beneath the site will be in the range 10 to 30m below ground level. The inferred groundwater flows are considered a negative aspect for site development due to inferred travel times of potential contaminants in the groundwater to the receiving surface waters.

East Clydesdale (Site 9) - Groundwater is anticipated to flow in a northerly direction along the shallow valley depression of the unnamed non perennial stream towards the Umzimkhulu River. The groundwater gradient will mirror the surface topography but be slightly flatter at an expected maximum gradient of 1:25. The resulting groundwater flow velocity will be moderate. The elevation difference to the Umzimkhulu River is 62m. With such a large river, base flow is expected to contribute to the river flow, thus groundwater levels beneath the site will be in the range 20 to 50m below ground level. The inferred groundwater flows are considered a negative aspect for site development due to inferred travel times of potential contaminants in the groundwater to the receiving surface waters.

South Clydesdale (Site 11) - Groundwater is anticipated to flow in a northerly direction. The groundwater gradient will mirror the surface topography but be slightly flatter at an expected maximum gradient of 1:40. The resulting groundwater flow velocity will be moderate to low. The elevation difference to the stream is 70m. Being non perennial, baseflow not always contributing hence the inferred depth to groundwater will be greater. Inferred groundwater levels beneath the site will be in the range 20 to 60m below ground level.

6.6. Ecology

6.6.1. Terrestrial Vegetation

The prevailing vegetation of the uMzimkhulu area can be divided into three vegetation types; the Midlands Mistbelt Grassland (Gs9), the Drakensberg Foothill Moist Grassland (Gs10) and the Ngongoni Veld (SVs4). The soil cover for the Midlands Mistbelt comprises slightly sandy clayey silts to silty clay, while expansive silty clay or sandy clayey silt derived from dolerite intrusions and mudstone, form the cover of the Drakensberg Foothill Moist Grassland and the Ngongoni Veld. The colluvial silty sand to sandy silt soils are expected in valley bottoms and depressions.

6.6.2. Red data Listed Species

The area is not associated with a high number of endemic or Red Listed species.

6.6.3. Fauna and Avifauna

The avifauna displays the highest number of Red Listed species, but birds are highly mobile and capable of moving away from areas that do not suit them.

6.7. Landuse

Site No. 8: Small scale commercial agriculture is located immediately North West of the site. A residential development is located to the North West on the opposite side of the KwaNkuku River. A cemetery and sewage treatment works are located immediately north on the opposite side of the KwaNkuku River.

Site No. 9: The site is located on unimproved grassland. The Clydesdale Mission is located 1.1km south west of the site.

Site No. 11: The site is located on unimproved grassland.

6.8. Physical Infrastructure

The sites are currently bare veld. Access is from the R56 through Clydesdale village. Infrastructure and services will need to be upgraded to a level commensurate with a major landfill site.

6.9. Social and Economic

The new landfill site is likely to have negative impact on the community within its immediate surroundings however these will be identified during the public participation process as well as the Social Impact Assessment. It is however likely to have a positive impact on the Umzimkhulu Municipality in its totality as there will be a safe and conducive place. This project will create temporary and permanent jobs that will allow for employment of unskilled to semi-skilled workers.

6.10. Heritage/ Cultural Environment

During a site visit, a cemetery was observed to be on the opposite side of the KwaNkuku River near the proposed Site No. 8. A Heritage Impact Assessment was conducted to do an assessment of the site to confirm/ establish that the site has no heritage or archaeological importance. The Heritage Impact Report provides more detail, see Appendix 5.

7. Summary of Specialist Studies

7.1. Introduction

The methodologies for the specialist studies undertaken are presented below under the relevant headings. The results of the various studies are presented and the implications considered, along with presentation of the mitigation measures proposed (where required and viable).

The following specialist studies have been included in the EIA Phase;

Heritage Impact assessment by Archaetnos Archaeologists and Heritage Consultants (Appendix 5.1)

Visual Impact Assessment by Axis Landscape Architects (Appendix 5.2)

Wetland delineation by MacKenzie Manson Environmental (Appendix 5.3)

Noise Impact Assessment by Enviro-Acoustic Research (Appendix 5.4)

Fauna Report by GJ McDonald Consulting (Appendix 5.5)

Agricultural Impact Assessment by Mzansi Agriculture (Appendix 5.6)

Air Quality Report by Rayten Engineering Solutions (Appendix 5.7)

Traffic Impact Assessment by (Appendix 5.8)

Geotechnical Report by Terratest (Pty) Ltd (Appendix 6)

Geohydrological Report by Terratest (Pty) Ltd (Appendix 7)

7.2. Heritage Impact assessment

The Heritage Impact study was conducted by Leonie Marais-Botes of Archaetnos Archaeologists and Heritage Consultants (Appendix 5.1).

7.2.1. Method

The objective of the Phase 1 Heritage Impact Assessment (HIA) was to gain an overall understanding of the heritage sensitivities of the area and indicate how they may be impacted on through development activities. The site survey took place on 22 September 2014. In order to establish heritage significance the following method was followed:

- Investigation of primary resources (archival information)
- Investigation of secondary resources (literature and maps)
- Physical evidence (site investigation)
- Determining Heritage Significance.

7.2.2. Findings

The three sites were studied for artefacts and features from the pre-colonial and historical periods and there are no pre-colonial heritage sites evident in the study area. This can be attributed to previous farming and other development activities in the greater study area. Furthermore, there are no structures older than 60 years in the study area. However, there is a possible single grave (S30° 18' 52.0" E29° 57' 00.1") and a cemetery (S30° 18' 13.8" E29° 56 '31.3") near site 11.

Furthermore, the study also weighed findings of heritage value against cultural significance categories in the spiritual, scientific, historical, aesthetic and social and no items with value in any of the aforementioned categories were found.

7.2.3. Recommendations and Mitigation Measures

Site 8 and Site 9 are suitable for development. This report can be regarded as ample mitigation. The possible grave and cemetery near site 11 make this site less favourable for development. Buffer zones of at least 50m as well as the fencing of sites will be applicable. The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Plan.

7.3. Visual Impact Assessment

A Visual Impact Assessment (VIA) was conducted by Mr. Gerhard Griesel of Axis Landscape Architects (Appendix 5.2).

7.3.1. Method

A broad overview of the approach and methodology used in this assessment is provided below:

- The extent of the study area is limited to a radius of 5 km;
- The site is visited to establish a photographic record of the site, views and areas of particular visual quality and or -value;
- The project components and activities are described and assessed as elements that may cause visual and landscape impacts;
- The receiving environment is described in terms of its prevailing landscape- and visual character;
- Landscape- and visual receptors that may be affected by the proposed project are identified and described;

- The sensitivity of the landscape- and visual receptors is assessed;
- The severity of the landscape- and visual impacts is determined;
- The significance of the visual and landscape impacts is assessed;
- Mitigation measures are proposed to reduce or alleviate adverse impacts; and
- Present the findings of the study are documented in a Visual Impact Assessment Report.

7.3.2. Findings

The assessment of the various landscape impacts has indicated that the most significant impacts will occur during the construction phase of the development. This will come about when grassland areas are cleared. The change in surface cover from grassland to exposed soil will diminish the rural grassland character of the area and cause a moderate visual impact.

The three alternative positions for the proposed landfill site were rated according to preference by using a Three-point rating system one (1) being the most preferred, to three (3) being the least preferred. Using this rating system, Site 8 was rated the most preferred, with Site 9 being rated second and Site 11 being the least preferred. The preference rating is informed by the impact assessment discussions and the overall performance of each alternative with regards to the impact on the landscape character and the identified viewers.

7.3.3. Recommendations and Mitigation Measures

The aim of mitigation is to reduce or alleviate the intrusive contrast between the proposed development components and activities, and the receiving landscape to a point where it is acceptable to visual and landscape receptors. Mitigation should be implemented as an iterative process, accompanying the design phase to mitigate predictable impacts before construction commences. This approach generates preventative measures that will influence design decisions instead of relying on cosmetic landscape remediation of a completed project.

- If practically possible, locate construction camps in areas that are already disturbed or where it isn't necessary to remove established vegetation like for example, naturally bare areas;
- Keep the construction sites and camps neat, clean and organised in order to portray a tidy appearance;

- Remove rubble and other building rubbish off site as soon as possible or place it in a container in order to keep the construction site free from additional unsightly elements;
- Locate the construction camps and the material stockpiles outside of the visual field of sensitive visual receptors;
- Rehabilitate or vegetate disturbed areas as soon as practically possible after construction. This should be done to restrict long stages of exposed soil and possible erosion that will result in indirect landscape and visual impacts;
- If construction is necessary during night time, direct light sources away from residential units and roads;
- Dust suppression procedures should be implemented especially on windy days during earth works;
- Maintain the landscape to a high aesthetic standard to retain a high visual quality for visitors and observers;
- All declared weeds and alien vegetation growing in the site reserve must be removed and controlled;
- An ecological approach to rehabilitation measures, as opposed a horticultural approach to landscaping should be adopted wherever possible. For example communities of indigenous, preferable endemic, plants enhance bio-diversity and blend well with existing vegetation. This ecological approach costs significantly less to maintain than conventional landscaping methods and is more sustainable in the long term.

7.4. Wetland delineation

The Wetland Delineation Study was conducted by MacKenzie Manson Environmental, (Appendix 5.3).

7.4.1 Method

Three alternative sites have been identified for the proposed uMzimkhulu landfill site; site 8, site 9 and site 11. All of the proposed sites are within close proximity of one another and were all assessed for the presence of wetlands.

The wetlands were delineated according to Wetland/Riparian Habitats: A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas (Edition 1, September 2005) prepared by the Department of Water Affairs and Forestry.

It is important to bear in mind the definition of a wetland as defined by the National Water Act. The term 'wetland' is associated with a wide range of ecosystems, from estuaries, lakes and rivers to pools, ponds, swamps, marshes, bogs and many more. But in the context of South African Legislation, a wetland is, "land which is transitional between terrestrial and aquatic systems where that water table is usually at or near the surface, or the land that is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

The parameters of this investigation are limited to areas displaying one or more of the following attributes:

- Hydromorphic soils;
- Hydrophytes;
- Anaerobic conditions in the top 50cm of soil.

The aim was to firstly establish whether a wetland exists and then to determine the boundaries between the three distinct wetland zones, namely the zones of permanent wetness, seasonal wetness and temporary wetness.

Accurately delineating the wetlands was based on precise application of the wetland indicators. The initial stages of delineation consisted of surveying the site by foot and locating areas exhibiting typical wetland characteristics, based on terrain and vegetation indicators. If any wetland indicators were noted, transects running perpendicular to the gradient of the land would be drawn and the delineation process continued. Primary samples would be extracted using a 75mm manual clay auger to determine the presence of hydromorphic soils. Once it was confirmed that there was indeed a hydromorphic zone, the full delineation process would be undertaken.

Based on the soil wetness indicator the samples would either be hydromorphic or terrestrial.

Hydromorphic soils would indicate the presence of a wetland and so the delineation process would continue with the extraction and examination of further samples. Sampling would continue along transects until the transition between hydromorphic and terrestrial soils was found.

Soil samples would be extracted to a depth of 50cm and examined for percentage of grey matrix and degree of high chroma mottling. Types of vegetation would also be recorded and relied on to reaffirm wetland boundaries.

The potential permanent, seasonal and temporary wetland boundaries, as well as terrestrial would all be investigated. Sampling points are recorded using a Garmin Geko 201 Global Positioning System.

7.4.2. Findings

Results concluded that there is no permanent, temporary or seasonal wetland on Site 8, Site 9 or Site 11, as none of the typical wetland attributes were found.

Topography and vegetation indicators were not triggered as no hydrophytes were found, no surface water or water sources are present and no depressions leading to the accumulation of water were found; both within the site boundaries and within the surrounding 32m buffer. Visually it was quite obvious from the first viewing of the sites that there are no wetlands present. However three samples were extracted, one from each site, as wetlands do not always exhibit surface water, particularly if they are seasonal or temporary wetlands. Samples were extracted from roughly the centre of each site.

All of the samples yielded dry sandy soils with no grey matrix, no coloured mottles, and no hydrophytes in the vicinity, no obvious organic matter and non-sulphuric conditions.

All findings pointed to the same conclusion that no wetland exists within the study area.

7.4.3. Recommendations and Mitigation Measures

There are no wetlands as defined by the National Water Act on any of the three alternative sites. The developer therefore does not have to take into account the Regional Draft Norms and Standards Relating to Wetlands and Urban/Infrastructure Development (DEDTEA, 2003) or any such related legislation during the planning of the proposed development. Legislation relating to watercourses / rivers / water bodies will however have to be adhered to.

7.5. Noise Impact Assessment

The noise impact study was conducted by Enviro-Acoustics Research in August 2014, (Appendix 5.4)

7.5.1. Method

Ambient (background) noise levels were measured at appropriate times in accordance with the South African National Standard SANS 10103:2008 "***The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication***". The standard specifies the acceptable techniques for sound measurements including:

- type of equipment;
- minimum duration of measurement;
- microphone positions and height above ground level;
- calibration procedures and instrument checks; and
- supplementary weather measurements and observations.

7.5.2. Findings

There is a risk of a noise impact of a low significance during the daytime operations for the site 9 layout. The assessment for site 9 indicated a worst-case scenario whereby the development could increase noise levels to more than 50 dBA at approximately 500 m from the site footprint.

Although the two alternative site footprints (site 8 and 11) were not available for this assessment, their general localities were supplied. By implementing the footprint size of the prefer site 9 to the two alternative sites, the proximity of receptors to the alternative sites can be made. Implementing the 500 m 50 dBA contour to the other two alternative sites indicated the following:

- **Site 11** – The closest receptors of Clydesdale are not within the 500 m 50 dBA contour. If the alternative Site 11 is selected a risk of a noise impact developing during the daytime operational hours is of a low significance; and
- **Site 8** – The closest receptors of Clydesdale are within the 500 m 50 dBA contour. If the alternative site 8 is selected there may be a risk of a noise impact of a moderate significance.

There is always the likelihood that a degree of over-engineering or precautionary principals are adhered to in environmental assessments. However there is a high confidence level in the consecutive calculated Rating Level and assessment.

7.5.3. Recommendations and Mitigation Measures

It is recommended that the developer consider Site 9 or alternative Site 11 as the preferred option in terms of acoustics and legislation (Site 9 preferred). Due to the risk of a low noise impact, no further mitigation or monitoring programmes is recommended for these two sites. If alternative Site 8 is selected, it is highly advisable that the developer consider mitigation options as listed in this document.

It must be noted when industrial projects operated near to potential noise-sensitive receptors, consideration must be given to ensuring a compatible co-existence. The potential sensitive receptors should not be adversely affected and yet, at the same time the industry

needs to reach an optimal scale in terms of layout and production. This does not suggest that the sound from the development should not be inaudible under all circumstances, this is an unrealistic expectation that is not required or expected from any other agricultural, commercial, industrial or transportation related noise source. Rather that the sound due to the development activities should be at a reasonable level in relation to the ambient sound levels as per regulations.

If the location of the development changes significantly (closer than 500 m from potential noise sensitive developments) as used in this report, or the developer intends on implementing night-time (22:00 – 06:00) shifts, this Environmental Noise Impact Assessment should be reviewed with the appropriate information supplied by the developer, including:

- Locality of the noise source (Layout);
- Operational time of the noise source; and
- If possible specifications regarding the noise source.

7.6. Fauna

The Faunal Study was conducted by GJ McDonald Consulting, after site visits on the 6th and 19th July 2014 (Appendix 5.5).

7.6.1. Method

A GIS study was undertaken to generate overlays for the area taking into account the following:

- Soils;
- National vegetation type (Mucina and Rutherford 2006) and KZN vegetation type;
- Wetlands and watersheds; and
- eKZN Wildlife's C-Plan.
- IBA's, CWAC and CAR routes

Also undertaken was a desktop study using Google Earth to determine areas of interest such as wetlands and changes in vegetation.

- Ground study to identify the presence of faunal species and communities in the form of sightings, droppings, spoor, calls, etc. Any additional information on any other feature thought to have ecological significance within the site such as soil type, altitude, erosion, rocky cover, alien and invasive plants as well as species of conservation concern and/or their habitat was also recorded.
- Ground study to determine the likely impact of the proposed development on the fauna of the study area.

- Identification of impacts and mitigations.
- Generation of recommendations.

7.6.2. Findings

From a faunal perspective the sensitivities relating to the proposed development site are:

- the presence of a substantial number of termitaria which may provide shelter for small mammals and herpetofauna. These termitaria will have to be carefully explored and animals relocated as necessary during the construction phase of the project. Present at all three potential sites.
- the presence of rock pavements and rocky outcrops which may provide sunning spots and shelter for reptiles. These areas will have to be carefully explored and animals relocated as necessary during the construction phase. Present mostly at Sites 8 and 9.
- the presence of holes suitable for Blue Swallow nesting. Present at all three potential Sites.
- the presence of overhead utilities (ESKOM powerlines) may pose a risk of collision to larger bodied, less manoeuvrable bird species which may be attracted to feed at the landfill site, either on refuse or on animals attracted to the landfill site, such as rodent species. It may be necessary to fit line markers/flappers if collision by such species occurs. Greatest potential at Site 9.

From a conservation planning perspective the sensitivities are:

- the proximity of Site 8 to a wetland and an area earmarked for inclusion in the Freshwater Conservation Plan.
- the proximity of Site 9 to a wetland and a Critical Biodiversity Area (type 3) habitat.
- the proximity of Site 11 to an Important Bird Area (IBA).

7.6.3. Recommendations and Mitigation Measures

The study reveals that the area is not associated with a high number of endemic or Red Listed species. The avifauna displays the highest number of Red Listed species, but birds are highly mobile and capable of moving away from areas that do not suite them. The size of the proposed development is not extensive, although the impact will be fairly high during the construction and operation phases. The major impacts on fauna can be characterised as habitat destruction, disturbance and the threat of the proliferation of populations of feral/alien species and scavengers. Non-indigenous species will need to be controlled until de-commissioning and rehabilitation are completed.

The proposed development has three potential Sites. None of these Sites is without an environmental issue in terms of some sensitivity. Site 11 would appear to offer the best option for development, followed by Site 9 and then Site 8, although this is not related to the specific fauna of the area, but rather to the conservation planning status or habitat sensitivity in general.

7.7. Agricultural impact assessment

The Agricultural Impact Assessment was conducted by Mr. John Phipson of Mzansi Agriculture (Appendix 5.6).

7.7.1. Method

The Agricultural Impact Study was conducted by means of desktop studies and site verifications. The desktop Studies included the following;

- Soils Data
- Climatic Data
- Vegetative Data
- Land Ownership
- Land Category

The Site Verification included the following;

- Soils Data
- Land Capability Class Determination
- Erodibility
- Climatic Data
- Crop Potential
- Crop Selection Parameters
- Market Outlets
- Livestock

7.7.2. Findings

During the site establishment phase the impact will be considerable as there will be major civil works during this phase. The management of this phase will largely be a civil engineering responsibility rather than an agricultural matter.

The only site condition from an agricultural viewpoint is that stored soil and stored substrates be kept in separate stockpiles in order that the site may be restored to its original rangeland condition once the life of the landfill has expired.

It is recommended that the decorative windbreak planted round the perimeter of the site be conifers such as the *Casuarina cunninghamiae* or a *Pinus* species. The use of trees with needles filters the wind, mitigating its impact. Broadleaf trees form a barrier that creates turbulence, thus aggravating the impact of the wind. Low level branches must not be trimmed.

7.7.3. Recommendations and Mitigation Measures

All three sites from an agricultural perspective are physically suited for use as a landfill. The location gives ready access from residential areas and from the R 56. The latter is the link to the 20 wards making up the Umzimkhulu Local Municipality.

These sites have neither the extent nor the irrigation water required in order to maintain a sustainable agricultural enterprise. The conclusion arrived at by this study is that the sites have been well chosen.

7.8. Air Quality

The Air quality study was undertaken by Rayten Engineering Solutions, (Appendix 5.7)

7.8.1. Method

The methodology followed for this study is as follows;

- An overview of the prevailing meteorological conditions in the area which influence the dilution and dispersion of pollutants in the atmosphere;
- The identification of existing sources of emissions and surrounding environment;
- A review of the current legislative and regulatory requirements;
- A review of emissions from the proposed activities and the associated health effects;
- The identification of sensitive receptors, such as local communities, surrounding the area;
- Provision of recommendations for the mitigation and management of identified potential impacts.

7.8.2. Findings

Potential emissions released from operational activities at the landfill site will include odours, landfill gas and fugitive dust emissions. Landfill gas is produced primarily through bacterial decomposition (aerobic and anaerobic) as well as through volatilization and internal

chemical reactions. Fugitive dust emissions result from vehicle entrainment on unpaved roads, materials handling activities, bulldozing operations and wind erosion of open areas associated with the landfill.

Based on the prevailing wind fields for Clydesdale, emissions from the proposed landfill sites will predominantly be transported towards the north-west, north-north-west, south-east and south-south-east towards Umzimkhulu, Bhoola, Clydesdale and Hopewell residential receptors. Moderate to fast wind speeds will result in effective dispersion and dilution of the pollution from the proposed landfill sites. Diurnal variation in winds could influence the vulnerability of residential receptors differently throughout the day and night. Emissions from the proposed landfill site 8 could affect Hopewell, uMzimkhulu and Bhoola/Clydesdale during the early morning, afternoon and evening periods respectively. Emissions from site 9 may affect Hopewell, Umzimkhulu and Clydesdale during the early morning, afternoon and evening periods respectively. Emissions from site 11 may only have a significant effect on Clydesdale and Bhoola during the afternoon period between 12:00 – 18:00.

Based on the seasonal variation in meteorological conditions for Clydesdale, landfill emissions may be higher during summer and spring due to higher temperatures and precipitation which could accelerate the rate of decomposition of landfill waste resulting in higher landfill gas emissions. Although precipitation increases the moisture content in the landfill waste, precipitation also has a cleansing effect through atmospheric wet deposition of particulates and gases. Higher precipitation observed during spring and summer would also reduce landfill gas concentrations. Winds occur predominantly from the south-east and south-south-east sectors during spring and summer thus landfill gas emissions from the proposed sites could affect Clydesdale, Umzimkhulu and Bhoola significantly during the warmer seasons.

On the other hand, strong inversion layers are most prominent during the winter season. Strong inversion layers are associated with reduced temperature, precipitation and mixing depth within the surface boundary layer. Strong surface inversions limit the dispersion and dilution potential of air pollution allowing for favourable conditions under which landfill gas constituents may accumulate. Little to no rainfall would also result in increased ambient concentrations of pollutants due to reduced wet depositional processes. Winds occur predominantly from the north-north-west and north-west during winter and autumn thus landfill gas emissions from the proposed sites may affect Hopewell significantly during the colder seasons.

7.8.3. Recommendations and Mitigation Measures

In terms of topography, Site 9 is preferred as it is situated at approximately 780-785m above sea level and is surrounded mainly by lower surface ground. Therefore vertical and horizontal dispersion of emissions from the landfill are less likely to be restricted compared to Site 8 and Site 11. Furthermore Site 8 and Site 11 are within very close proximity (< 500m) to the nearest towns of Umzimkhulu and Clydesdale. Landfills are an area source thus emissions from a landfill are likely to affect lower lying areas within close proximity of the landfill. It is in this respect that a buffer zone from the boundary of the landfill site is proposed.

Ambient air quality monitoring of particulates and gaseous substances as well as dust fallout monitoring should be undertaken to determine baseline air quality conditions in the area and thereafter a more informed opinion on the cumulative impact of landfill emissions on ambient air quality can be given. Furthermore it is recommended, once operations commence, that greenhouse gas emissions are measured and reported annually as landfills are identified as a significant source of greenhouse gases.

7.7. Traffic Impact Assessment

The traffic Impact assessment study was conducted by Kantey & Templer Consulting Engineers (Appendix 5.8)

7.7.1. Method

The study considered all three proposed sites, however due to the relatively poor location of sites 8 and 11, they were screened out of the analysis, leaving site 9 as the most favourable site and therefore the focus of the study. The study conducted in order to achieve the following:

- Describe the extent of the proposed development
- Assess the existing traffic operations on the road network in the vicinity of the site
- Predict the extent of the traffic generated by the new development and estimate the distribution of that new traffic
- Assess the effect that this generated traffic is likely to have on the existing road network
- Make recommendations for improvements to the existing road network and intersections affected by the generated traffic.

7.7.2. Findings

- The Umzimkhulu landfill site will comprise of 80tons per day of landfill material being delivered to site in 20 inbound and 20 outbound 6 ton trucks per day.
- The key intersection experiences a total of 362 and 430 vehicles in the AM and PM peak hours, respectively.
- The traffic generation of the project is less than 10 vehicle trips in the weekday AM peak hour and less than 10 in the weekday PM peak hour. This is an extremely small quantum of traffic and realistically below the threshold for traffic impacts in the context of the Umzimkhulu Landfill site and the R56 road corridor that passes Clydesdale.
- The additional traffic generated by the proposed development is expected to have no significant traffic impact on the key intersection during the peak hours.
- Traffic progression on the R56 and at the key intersection of the R56 / FET Access Road is fairly good and no geometric upgrades to the intersection are required.
- The parking required for the development is approximately 10 bays.

7.7.3. Recommendations and Mitigation Measures

The traffic impact assessment has produced results that endorse the development of the landfill. The specialist are of the professional opinion that the Department of Economic Development, Tourism and Environmental Affairs should approve the development of the landfill by the Umzimkhulu Municipality as the trips generated will have very little impact on the road network. They recommend that directional signage should be provided at the intersection of R56 / FET Access Road in order to direct the site traffic to the planned Umzimkhulu Clydesdale landfill site.

7.8. Geological and Geotechnical Investigation

The Geological and Geotechnical Study was conducted by Terratest (Pty) Ltd (Appendix 6).

7.8.1. Method

Trial Pits

Ten trial pits, numbered were excavated to depths ranging between 0.90m and 2.5m below existing ground level. Excavation refusal was experienced in Site 11 (South Clydesdale) at a depth of 1.3m, in Site 9 (East Clydesdale) at a depth of 2.2, in Site 8 (East Clydesdale) at a depth of 1.0m and in Site 8 (East Clydesdale) at a depth of 0.9m all refusals occurred on weathered shale. No machine refusal occurred in the other trial pits to the depths to which

excavation was terminated. The subsoils were profiled by an Engineering Geologist according to the prescribed terminology of Jennings *et al.*, (1973).

Dynamic Cone Penetration Tests

In-situ Dynamic Cone Penetrometer (DCP) tests, numbered DCP1, to DCP10, were carried out adjacent to the trial pits to complement and augment the information in respect of in-situ subsoil consistency.

Sampling

Representative disturbed soil samples were retrieved from selected elevations in the trial pits and submitted for laboratory soil classification, strength and compaction tests.

Permeability tests

Permeability tests were carried out in the laboratory and field soak aways were undertaken in the trial holes to arrive at an order of magnitude of permeability coefficients.

7.8.2. Findings

Site 8 (East Clydesdale) bedrock depths are shallow and as a result there is insufficient clay material to use as compacted liner for the construction of the proposed landfill. In addition there is insufficient general fill material to be placed over the waste to be used as daily cover.

Site 9 (East Clydesdale) has a generally gentle slope but becomes steeper towards the lower reaches of the valley. From the test pits excavated at Site 9, results show that this site has the suitable qualities for landfill site development, where there will be availability of clay material from the site to use as compacted liner during the proposed landfill construction. The excavated material from the trench excavation can also be stockpiled and used as a daily cover material. The in-situ material has a low permeability which implies that it will form a low risk to leachate percolating through the bedrock and contaminating the potential groundwater sources.

Site 11 (South Clydesdale) has a generally gentle topography but becomes steeper towards the lower reaches of the valley. However other attributes such as shallow bedrock, lack of availability of clay material to use as compacted liner during construction, lack of general fill for capping on a daily period, and higher permeability which makes the site least suitable for development from the two mentioned on above paragraphs (Site 8 and Site9)

7.8.3. Recommendations and Mitigation Measures

The investigation undertaken has concluded that Site 9 (East Clydesdale) is the most suitable of the three sites investigated for the proposed landfill site development, provided that measures are taken to address certain constraints associated with the geotechnical conditions.

The second potential site to be considered for development will be Site 8 (East Clydesdale). Site 11 (South Clydesdale) is least suitable for landfill site development.

- The geology of the site consists of shale of the Pietermaritzburg Formation. Colluvial, and residual soils as well as weathered rock occur on the site.
- Low expansiveness sandy, clayey soils are considered to occur across the site.
- Excavation of service trenches by means of a TLB should be possible over the area proposed for development.
- It is recommended that the landfill layer design be in accordance with the *Draft National Standard for the Disposal of Waste to Landfill* published under Notice 636 of 2013, National Environment Management Act: Waste Act 2008 (Act No. 59 of 2008).

7.9. Geohydrological Assessment

The Geohydrological Assessment was conducted by Terratest (Pty) Ltd (Appendix 15).

7.9.1. Method

The preliminary geohydrological assessment comprised a desktop study, site walkover and hydrocensus mapping exercise for the candidate sites.

A Hydrocensus survey was carried out with a 1km buffer around each site to determine existing groundwater use in the area.

7.9.2. Findings

The sites were ranked using basic geohydrological parameters including geology and structures, topography, surface water bodies, groundwater resources and aquifer characteristics. The ranking was achieved by a scoring system for each parameter, based on the potential to impact of a landfill on groundwater or groundwater users.

Using these rankings and scores, Site 8 East Clydesdale was the least favourable, followed by Site 11 South Clydesdale and Site 9 East Clydesdale as the most favourable.

7.9.3. Recommendations and Mitigation Measures

The East Clydesdale 9 site ranked the highest of the three sites from a geohydrological perspective. A preliminary risk assessment was carried out on the East Clydesdale 9 site, scoring medium and low for aquifer vulnerability and strategic value respectively. Once the candidate site has been selected, additional detailed geohydrological assessment can be proposed and carried out to meet the DWAS requirements for landfill development.

8. Description & Comparative Assessment of Alternatives

8.1. Overview

“Alternatives are different means of meeting the general purpose and need of a proposed activity. The identification, description, evaluation and comparison of alternatives are important for ensuring the objectivity of the assessment process. In cases where there is no objective and thorough assessment of alternatives, the EIA process usually only confirms a chosen activity and the value of the assessment as an input to a decision-making may be compromised” (DEAT Guideline 4, 2006).

Various alternatives have been determined, considered and screened based on specialist planning, environmental, social, engineering and economical inputs during the Scoping Phase.

8.2. “No Go” Alternative

The National DEA stresses that the “No Go” option should be considered in cases where the proposed activity will have a significant negative impact that cannot be effectively or satisfactorily mitigated. In addition, if the proposed site does not meet the DWA’s Minimum Requirements for Landfill, such a site would then be deemed not to be suitable for a landfill.

The “no go” approach entails that the proposed waste disposal facility is not developed in the area, i.e. that no development as per the proposal is undertaken. The prevention of the proposed landfill will entail that waste management in the Umzimkhulu Municipality is compromised due to the absence of a licenced landfill site.

The advantages for the proposed new landfill include the following:

a) The proposed landfill will extend the waste management capacity of the municipality,

- b) Presently vacant and available land is effectively used and is expected to provide waste disposal capacity for the foreseeable future.
- c) Waste disposal creates a cost effective means for waste management and provides an environmentally sound use for areas unsuitable for other development.
- d) Limited employment opportunities are created during the construction and operational phases.

The “Do-Nothing” scenario will be the basis against which the acceptability of the identified environmental issues, and, technically and economically feasible alternatives, are assessed.

8.3. Location Alternatives

A detailed investigation on location alternatives was undertaken by Terratest (Pty) Ltd Pty Ltd where a total of 12 candidate sites were identified, assessed and ranked using three broad criteria, i.e. environmental, economic and public acceptance. The three sites discussed in this report were ranked as the three most favourable. Considering the outcome of the extensive site selection process undertaken, it can be concluded that the remaining areas discussed in this report, are likely to be areas best suited for development of a new landfill in the region. Refer to Appendix 8 for a summary report on the site selection study.

9. Impact Assessment Methodology

9.1. Overview

In order to determine the significance of an impact, the following criteria would be used: extent, duration, intensity and probability. The extent and probability criteria have five parameters, with a scaling of 1 to 5. Intensity also has five parameters, but with a weighted scaling.

The assessment of the intensity of the impact is a relative evaluation within the context of all the activities and other impacts within the framework of the project. The intensity rating is weighted as 2 since this is the critical issue in terms of the overall risk and impact assessment (thus the scaling of 2 to 10, with intervals of 2). The intensity is thus measured as the degree to which the project affects or changes the environment.

9.2. Impact Assessment Criteria

The criteria used for the assessment of the potential impacts of the proposed Umzimkhulu Landfill Site are described in the table below. Cumulative impacts will be included as part of the impact assessment process.

Criteria	Description
Nature	Includes a description of what causes the effect, what will be affected and how it will be affected.
Extent	The physical and spatial scale of the impact.
Duration	The lifetime of the impact is measured in relation to the lifetime of the proposed development.
Intensity	Examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself.
Probability	This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the lifecycle of the activity, and not at any given time.
Status	Description of the impact as positive, negative or neutral.
Significance	A synthesis of the characteristics described above and assessed as low, medium or high. A distinction will be made for the significance rating without the implementation of mitigation measures and with the implementation of mitigation measures.
Confidence	This is the level of knowledge/information that the environmental impact practitioner or a specialist had in his/her judgement.

Table 9.1. Impact Assessment Criteria

9.2.1. Nature and Status

The nature of the impact is the consideration of what the impact will be and how it will be affected. This description is qualitative and gives an overview of what is specifically being considered. That is, the nature considers 'what is the cause, what is affected, and how is it affected?' The status is thus given as being positive, negative or neutral, and is deemed to be either direct or indirect in impact.

9.2.2. Extent

The physical and spatial scale of the impact is classified in the table below.

Description	Explanation	Scoring
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Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.	1
Site	The impact could affect the whole, or a significant portion of the site.	2
Local	Impact could affect the adjacent landowners.	3
Regional	Impact could affect the wider area around the site, that is, from a few kilometres, up to the wider Council region	4
National	Impact could have an effect that expands throughout a significant portion of South Africa – that is, as a minimum has an impact across Provincial borders.	5

Table 9.2. Extent

9.2.3. Duration

The lifetime of the impact is measured in relation to the lifetime of the proposed project, as Per table below.

Description	Explanation	Scoring
Short Term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than any of the development phases (i.e. less than 2 years).	1
Short to medium	The impact will be relevant through to the end of the construction phase (i.e. less than 5 years).	2
Medium Term	Impact will last up to the end of the development phases, where after it will be entirely negated (i.e. related to each phase development thus less than 10 years).	3
Long term	The impact will continue or last for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter (i.e. during decommissioning) (i.e. more than 10 years, or a maximum of 60 years).	4
Permanent	This is the only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient (i.e. will remain once the site is closed).	5

Table 9.3. Duration

9.2.4. Intensity

This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project, as per the table below.

Description	Explanation	Scoring
Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.	2
Low- Medium	The impact alters the affected environment in such a way that the natural processes or functions are slightly affected.	4
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.	6
Medium- High	The affected environment is altered, and the functions and processes are modified immensely.	8
High	Function or process of the affected environment is disturbed to the extent where the function or process temporarily or permanently ceases.	10

Table 9.4. Intensity

9.2.5. Probability

This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the lifecycle of the activity, and not at any given time. The probability classes are rated in the table below.

Description	Explanation	Scoring
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience (less than 40% chance of occurring).	1
Probable	The possibility of the impact occurring is very low, either due to the circumstances, design or experience (40-70%).	2
Highly probable	There is a possibility that the impact will occur to the extent that provisions must therefore be made (70 – 90%).	3
Definite	It is most likely that the impacts will occur at some stage of the Development. Plans must be drawn up before carrying out the activity (> 90%).	4

Table 9.5. Probability

9.2.6. Confidence

The level of knowledge the EAP or a specialist had in their judgement and is rated in the table below.

Description	Explanation
Low	The judgement is based on intuition and not on knowledge or information.
Medium	The judgement is based on common sense and general knowledge.
High	The judgement is based on scientific and/or proven information.

Table 9.6. Confidence

9.2.7. Significance

The level of significance is expressed as the sum of the area exposed to the risk (extent), the length of time that exposure may occur over in total (duration), the severity of the exposure (intensity) and the likelihood of the event occurring (probability). This leads to a range of significance values running from 'no impact' to 'extreme'.

The significance of the impacts have been determined as the consequence of the impact occurring (reflection of chance of occurring, what will be affected (extent), how long will it be affected, and how intense is the impact) as affected by the probability of it occurring, this translates to the following formula: Significance value = (Extent + Duration + Intensity) x Probability.

Each impact is considered in turn and assigned a rating calculated using the results of this formula, and presented as a final rating classification according to Table 9.7. A distinction will be made for the significance rating of (a) without the implementation of mitigation measures, and, (b) with the implementation of mitigation measures.

Description	Explanation	Scoring
No Impact	No impacts	0-9
Low Impact	The impacts are less important, but some mitigation is required to reduce the negative impacts.	10-24
Medium	The impacts are important and require attention; mitigation is required to reduce the negative impacts.	25-49
Medium to High	The impacts are of medium to high importance; mitigation is necessary to reduce negative impacts.	50-74
High	The impacts are of high importance and mitigation is	75-89

	essential to reduce the negative impacts	
Extreme	The impacts present a fatal flaw, and alternatives must be considered.	90-100

Table 9.7. Level of Significance

9.3. Identification of Mitigation Measures

The purpose of mitigation measures is to reduce the significance level of the anticipated impact. Therefore, the reduction in the significance level after mitigation is directly related to the scores used in the impact assessment criteria. The effect of potential mitigation measures to reduce the overall significance level is also to be considered in each issues table (i.e. values with or without mitigation are presented).

9.4. Cumulative Impacts

A cumulative impact, in relation to an activity, is the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts arising from similar or other activities in the area. The possible cumulative impacts of this project were considered.

Cumulative impacts are those which have incremental impacts of the activity as a whole, and, others that past, present and future activities will have an impact on a common resource.

10. Assessment of Impact

10.1. Overview

The aim of the Scoping Phase was to identify, record and describe the issues that have been identified and/or raised by stakeholders, I&APs and specialists with regard to the proposed landfill site. This enabled the specialist studies to be clearly focused on aspects of significant concern. It also provided a framework for the assessment of the impacts that the proposed Umzimkhulu landfill site will have on the environment, and of the impacts the environment will have on the proposed Umzimkhulu Landfill Site.

The description of all environmental issues that were identified during the Scoping Phase of the EIA process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures have been considered in this section of the document and the associated draft Site Specific EMPr. The cumulative impacts anticipated for the proposed development are considered at the end of this section.

The following environmental impacts were identified. Mitigation measures proposed have been included in the assessment and draft EMPr.

Identified Potential Impacts	
Socio-economic Impacts	Social impacts
	Impact on traffic
	Impact on heritage resources
	Impact on visual integrity
	Impact on waste management
Bio-physical Impacts	Impact on ecology
	Impact on water resources
	Impact on soils
	Impact on air quality
	Geological impacts
	Structural impacts

Table 10.1. Identified Potential Impacts

The specialist information was considered in terms of a formal quantification of the impact as per facets of the specific field highlighted by the specialist. In each case the specialist's recommendations were converted into potential mitigation measures and linked in the EMPr (Appendix 3). The mitigation measures are summarised in the impact tables.

10.2. Heritage Resources Impacts

As per the summary of the heritage impact assessment presented in the summary of specialists studies the key points noted were:

- No sites, features or objects of cultural significance dating to the Stone Age, Iron Age or dating to the historic period were identified in the study area.

- Most of the study area has been subjected to previous infra-structure development and farming activities which would have destroyed potential sites, features or objects that might have occurred there previously.
- As no sites, features or objects of cultural heritage significance were identified in the region, there would be no impact as a result of the proposed development.

From a heritage point of view the proposed development is recommended to continue, on condition of acceptance of the following: If archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

The focal point with respect to heritage relates to the possible loss of heritage artefacts, including archaeological and paleontological artefacts.

Theme	Heritage		
Impact Focal Point	Loss of Heritage resources		
Phase	Construction	Operational	No Go
Nature and Status	Loss of / damage to artefacts due to initial infrastructure development and associated activities; Negative	Loss of / damage to artefacts due to initial infrastructure development and associated activities; Negative	No change in present status.
Extent	Site (2)	Site (2)	None
Duration	Permanent (5)	Permanent (5)	
Intensity	Medium – High (8)	Medium – High (8)	
Probability	Possible (2)	Possible (2)	
Confidence	High	High	High
Calculation	$(2+5+8) * 2 = 30$	$(2+5+8) * 2 = 30$	0
Level of Significance	Medium	Medium	None
Mitigation Measures	Should a find of heritage importance be found, construction activities will stop immediately at the site of discovery. The area will be fenced off with a radius of at least 20m around the unearthed item, demarcated as a no-go area and access will be prohibited.		If the landfill site is not developed, there will be no impact on any heritage resources that may exist on

	<p>Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on site.</p> <p>The Contractor and workers, during construction, shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the NHRA.</p> <p>If archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made</p>	the site.
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Table 10.2 Heritage Impact Assessment.

Given the specialist’s input and professional consideration, and contextualised within the impact assessment as presented in **Table 10.2**, the potential loss of heritage artefacts are considered to be low, especially with appropriate mitigation measures being implemented.

10.3. Visual Impact Assessment

As per the summary of the visual impact assessment study the two landscape types that occur in the study area are the uMzimkhulu Rural Settlements and the uMzimkhulu Grassland.

Both the landscape types have very similar topographical characteristics but are distinguished due to the difference in land use. In short the visual qualities of the two landscape types give the area a Moderately low to Moderate visual quality.

Theme	Visual		
Impact Focal Point	Reducing the visual quality of the landscape		
Phase	Construction	Operational	No Go
Nature and Status	Change in visual landscape due to development of landfill cells and associated activities- Negative	Change in visual landscape due to waste disposal activities - Negative	Maintenance of the status quo
Extent	(Footprint) 1	(Local) 3	None

Duration	(Permanent) 5	(Permanent) 5	
Intensity	(Medium- High) 8	Medium- High) 8	
Probability	(highly Probable) 3	(Definite) 4	
Confidence	High	High	High
Calculation	$(1+5+8)*3 = 42$	$(3+5+8)*4 = 64$	0
Level of Significance	Medium	Medium to high	No Impact
Mitigation Measures	<p>Planting of indigenous trees at an early stage of the landfill development process.</p> <p>The placement of a screening berm between the landfill and community, consisting of materials to be used in the final rehabilitation process.</p> <p>As soon as feasible after decommissioning, the Landfill Operator will undertake the landscaping of the outer face in preparation of the construction of the final capping, all of which will be in accordance with the Minimum Requirements for Waste Disposal by Landfill.</p> <p>Disturbed areas that are no longer in use will be rehabilitated. Rehabilitation will be conducted in a progressive manner (i.e. once phased activity in an area has been completed the area will be rehabilitated). The rehabilitation of the area with indigenous vegetation must coincide with the rainfall events and all alien invasive vegetation shall be removed.</p> <p>After construction, the site needs to be inspected by the ECO to ensure that the rehabilitation activities have been successful and to monitor alien vegetation re-growth. The ECO will report the condition of rehabilitation to the Applicant. All aspects of the Landfill will be maintained in order to ensure its smooth and efficient operation and to prevent undue deterioration of any item.</p>		<p>If the landfill site is not developed, there will be no impact on any the present state of visual landscape.</p>

Table 10.3. Visual Impact Assessment

10.4. Air Quality Assessment

The air quality impacts considered in this section of the report are based on the findings of the Air Quality Assessment summarised in the specialist study section. As indicated in this section's overview, the specialist's recommendations were converted into mitigation measures, as proposed, and linked in the EMPr.

The considerations of the health impacts are considered in terms of the media through which the health impact could be delivered, that is, air quality and water contamination impacts.

To summarise, the findings of the Air Quality Assessment for the proposed Umzimkhulu landfill found that:

- Potential emissions released from operational activities at the landfill site will include odours, landfill gas and fugitive dust emissions.
- Landfill gas is produced primarily through bacterial decomposition (aerobic and anaerobic) as well as through volatilization and internal chemical reactions.
- Fugitive dust emissions result from vehicle entrainment on unpaved roads, materials handling activities, bulldozing operations and wind erosion of open areas associated with the landfill.

Theme	Air Quality		
Impact Focal Point	Impact on air quality of study area – Development of landfill cells		
Phase	Construction	Operational	No Go
Nature and Status	Construction of infrastructure (landfill cells and associated infrastructure) (dust); Negative	Gaseous emissions from active landfill cells (odour, health impacting substances); Negative	
Extent	(Local) 3	(Local) 3	None
Duration	(Short term) 1	(Long term) 4	
Intensity	4	6	
Probability	4	4	
Confidence	High	High	High
Calculation	$(3+1+4)*4=32$	$(3+4+6)*4=52$	0
Level of Significance	Medium	Medium to High	None
Mitigation Measures	Wind breaks in the form of trees or similar porous structure should be constructed and maintained. All dust-generating surfaces to be routinely sprayed with water, a dust suppressing agent or similar substance to prevent dust generation. Potable and contaminated water will not be used as a dust-suppressing agent and only recycled		None

	<p>and/or rain water is to be used, when available. Contaminated runoff may however be used within the lined footprint of the waste disposal cells.</p> <p>Rehabilitated landfill slopes and long term soil storage stockpiles are to be grassed.</p> <p>A weather station should be situated on site to assess prevailing wind fields so that complaints can be addressed based on empirical data.</p> <p>Dust monitoring shall be undertaken as per the prevailing regulatory requirements.</p> <p>A complaints register should be maintained with dust related complaints assessed and adjustments made to management measures as needed to mitigate impacts on surrounding receptors.</p> <p>Development of appropriate buffer zones around the site as informed by the Air Quality study and the Conceptual design – as part of the final detailed design process.</p>	
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Table 10.4. Air Quality Assessment

It can thus be concluded from the information presented that, with mitigation in the form of dust control / minimisation mechanisms, that the expected impact can be mitigated to a low impact.

10.5. Groundwater Impact Assessment

Groundwater samples were collected from designated resources to characterise the groundwater quality status quo in the project area and to determine the strategic value for the risk assessment. Samples were collected from the discharge of the borehole pumps and sent to Talbot Laboratory for analysis of the SANS241 shortened suite of compounds.

The results of analysis indicate that groundwater in the area is typically suitable for human consumption except for marginally elevated levels of iron and manganese. Based on these results groundwater in the area has strategic value in terms of domestic use.

Theme	Ground and Surface water Contamination		
Impact Focal Point	Impact on ground and surface water – establishment and operation of new landfill		
Phase	Construction	Operational	No Go
Nature and Status	Fuel, vehicle-specific substances	Water resource contamination from	No ground and surface water

	(e.g. hydraulic, brake fluids, oil, grease) for construction specific vehicles – stored and leaking from vehicles; Negative	leakage of leachate; Negative	contamination associated with this alternative.
Extent	(Site) 2	(Local) 3	None
Duration	(Short Term) 1	(Permanent) 5	
Intensity	(Medium) 6	(High) 10	
Probability	(Highly Probable) 4	(Highly Probable) 4	
Confidence	High	High	High
Calculation	$(2+1+6)*4 = 36$	$(3+5+10)*4 = 72$	0
Level of Significance	Medium	Medium to High	None
Mitigation Measures	<p>Throughout the operation of the landfill, the primary objective will be to reduce the generation of contaminated runoff and leachate, with the secondary objective being to treat and dispose of contaminated runoff and leachate formed in an environmentally sound manner without unnecessary exposure to the atmosphere.</p> <p>Uncontaminated storm water runoff must be prevented from coming into contact with waste or contaminants on the site.</p> <p>Contaminated runoff from the waste body and leachate generated will be collected separately for appropriate treatment or disposal to sewer (where approved). Discharge of effluents or polluted water into the water resources / surrounding area shall not be allowed.</p> <p>Storm-water drains and canals will be lined to prevent soil and ground water pollution / provided with erosion protection as required.</p> <p>The Construction Contractor shall prevent the discharge of any pollutants, such as cements, concrete, lime, chemicals and fuels into any water resource.</p>		

	<p>Undue contact between waste and storm water will be prevented, so as to minimise the volume of contaminated runoff and leachate generated on the Landfill.</p> <p>Three drainage systems should be operated on Site; one for clean storm water and uncontaminated run-off from rehabilitated parts of the Landfill, the second for contaminated runoff from the operational part of the waste body that is to be directed into a contaminated water containment pond, and the third for leachate extracted from the leachate collection system forming part of the landfill liner.</p>	
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Table 10.5. Groundwater Impact Assessment.

10.6. Biodiversity Impact Assessment

As per the summary of the biodiversity (Flora and Fauna) assessment study presented, the key points noted were:

- the site for the proposed areas earmarked for the Umzimkhulu landfill have previously been highly impacted on by agriculture and very little of the original vegetation, remains on the site.
- No red data species were observed at all three and due to the degree disturbance sensitive species are not expected.
- No natural wetlands and associated aquifers were identified on the proposed development site.
- No sensitivities were identified in terms of biodiversity and wetlands on the proposed development site. However, the proximity of the sites to the Umzimkhulu River would make them a possible migratory corridor.

Theme	Biodiversity		
Impact Focal Point	Impact on ecosystem(s) – site establishment, infrastructure and landfill development – removal of vegetation, reduction in ecosystem connectivity		
Phase	Construction	Operational	No Go
Nature and Status	Clearing of land for	Erosion and/or siltation	No Change in

	establishment of landfill and associated infrastructure Negative	of and - due to excavation and water contamination from leakage of leachate thereby changing the nature of the ecosystem function, and loss of ecosystem connectivity removal of vegetation; Negative	status
Extent	(Footprint) 1	(Site) 2	
Duration	(Long-term) 4	(Long-term) 4	
Intensity	(Low-Medium) 4	(Low- Medium) 4	
Probability	(Definite) 4	(Definite) 4	
Confidence	High	High	High
Calculation	$(1+4+4)*4= 36$	$(2+4+4)*4= 40$	0
Level of Significance	Medium	Medium	None
Mitigation Measures	<p>The study reveals that the area is not associated with a high number of endemic or Red Listed species.</p> <p>The avifauna displays the highest number of Red Listed species, but birds are highly mobile and capable of moving away from areas that do not suite them. The size of the proposed development is not extensive, although the impact will be fairly high during the construction and operation phases. The major impacts on fauna can be characterised as habitat destruction, disturbance and the threat of the proliferation of populations of feral/alien species and scavengers. Non-indigenous species will need to be controlled until de-commissioning and rehabilitation are completed.</p> <p>The proposed development has three potential Sites. None of these Sites is without an environmental issue in terms of some sensitivity. Site 11 would appear to offer the</p>		None

	best option for development, followed by Site 9 and then Site 8, although this is not related to the specific fauna of the area, but rather to the conservation planning status or habitat sensitivity in general.	
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Table 10.6. Biodiversity Impact Assessment

10.7. Traffic Impact Assessment

The focal point with respect to traffic implications relates simply to potential increases in traffic within the area, with resultant potential congestion, road damage, noise, etc. issues.

Theme	Traffic		
Impact Focal Point	Increased traffic in greater area		
Phase	Construction	Operational	No Go
Nature and Status	Increased traffic on local roads; Negative	Increased traffic on local roads; Negative	No change in Status
Extent	(Local) 3	(Local) 3	
Duration	(Long Term) 4	(Long Term) 4	
Intensity	(Low) 2	(Low) 2	
Probability	(Improbable) 1	(Improbable) 1	
Confidence	High	High	
Calculation	$(3+4+2)*1=9$	$(3+4+2)*1=9$	
Level of Significance	Low	Low	None
Mitigation Measures	<p>The Contractor during construction shall provide safe points for pedestrian and vehicular crossing at designated points. These points will be “stop-and-go” systems manned by flag persons.</p> <p>Orange safety fencing / netting must be utilised by the Contractor to keep pedestrians away from the construction work area. Danger tape must not be used, as this breaks easily and could litter the surrounding environment.</p> <p>Appropriate notification signs shall be erected by the Contractor at entrances to the construction site to warn visitors and pedestrians about the hazards around the construction site and the presence of heavy vehicles, where appropriate.</p>		None

	<p>Construction vehicles are to keep to the speed limits (25km/h on the construction site).</p> <p>Proactive warning signs shall be erected in the case of traffic disruption or diversion and along access roads.</p>	
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Table 10.7. Traffic Impact Assessment

10.8. Summary of Impacts

The consideration of the impacts and their change pre- and post-mitigation is summarised below.

Phase	Construction Phase	Operational Phase	No Go Alternative
Biodiversity			
Impact on ecosystem(s) – site establishment, infrastructure and landfill development – removal of vegetation, reduction in ecosystem connectivity			
Level of significance without mitigation	Medium	Medium	None
Level of significance with mitigation	Low	Low	None
Visual			
Reducing the visual quality of the landscape			
Level of significance without mitigation	Medium	Medium- High	None
Level of significance with mitigation	Low	Low	None
Heritage			
Loss of Heritage resources			
Level of significance without mitigation	Medium	Medium	None
Level of significance with mitigation	Low	Low	None
Ground and Surface Water			
Impact on ground and surface water – establishment and operation of new landfill			
Level of significance without mitigation	Medium	Medium to High	None
Level of significance with mitigation	Low	Low	None
Traffic			
Increased traffic in greater area			
Level of significance without mitigation	Low	Low	None
Level of significance with mitigation	Low	Low	None
Air Quality			

Impact on air quality of study area – Development & Operation of landfill			
Level of significance without mitigation	Medium	Medium to High	None
Level of significance with mitigation	Low	Medium	None
Social			
General Noise Nuisance – site and surrounding areas			
Level of significance without mitigation	Medium	Medium- High	None
Level of significance with mitigation	Low	Medium	None
Employment Opportunities and Skills Inequities – Site, surrounding areas and region			
Level of significance without mitigation	Low	Low	None
Level of significance with mitigation	Low (positive)	Low (positive)	None
Safety and security – Site, surrounding areas			
Level of significance without mitigation	Medium	Medium	None
Level of significance with mitigation	Low	Low	None
Infrastructure and Services – Study, surrounding areas and municipal area			
Level of significance without mitigation	Medium	Medium	None
Level of significance with mitigation	Low	Low	None

Table 10.8: Summary of Impacts

The overall impact for the landfill site after mitigation (and assuming best practice operations) are determined to be “low” with mitigation measures being implemented. In comparison, the impact on the current land use activities can be considered as “low” – “medium”.

11. Environmental Management Programme

A draft site-specific Environmental Management Programme (EMPr) has been included as part of the EIA Report (Appendix 3).

The EMPr outlines the impacts and mitigation measures for the planning and design, construction, operational phases and rehabilitation of the landfill site. The EMPr comprises of the following:

a) Summary of Impacts: The identified negative environmental impacts for which mitigation is required are summarised. Positive impacts requiring enhancement have been listed.

- b) Description of mitigation measures: The EMPr identifies feasible and cost effective mitigation measures to reduce significant negative environmental impacts to acceptable and legal levels. Mitigation measures are described in detail and accompanied by designs, equipment descriptions, and operating procedures, where appropriate. The technical aspects of implementing the mitigation measures are also described.
- c) Description of a monitoring programme: Environmental performance monitoring is designed to ensure that mitigation measures are implemented. The monitoring programme clearly indicates the linkages between impacts, indicators to be measured, measurement methods and definition of thresholds that will signal the need for corrective actions.
- d) The institutional arrangements depict and define the responsibilities for mitigation and monitoring actions.
- e) Legal enforceability: The key legal considerations with respect to the EMPr are:
- i. Legal framework for environmental protection.
 - ii. Legal basis for mitigation.
- f) The implementation schedule and reporting procedures that specify the timing, frequency, and duration of the mitigation measures.
- g) A description of requirements for record keeping, reporting, review, auditing and updating of the EMPr have been provided.

Environmental Impact Statement

The proposed Umzimkhulu Landfill Sites were selected due to the already physically degraded nature, i.e. the proposed sites are currently vacant, undeveloped and dominated by Grassland. The sites are already bare and this means development costs will be slightly decreased as there is not much land clearance.

Negative impacts associated with the proposed Umzimkhulu landfill were determined and assessed and it was found that, with implementation of specialist recommended mitigation measures, all potential impacts can be reduced to a “low” or “medium” negative and/or positive significance (as per summary presented in.

The establishment of a licensed landfill development, such as the one proposed at Umzimkhulu, will provide an opportunity to manage waste in an environmentally sound manner while contributing to waste minimisation to a greater degree.

No sensitivities were identified in terms of biodiversity and wetlands on the proposed development site. The vegetation on the site is considered to be of limited ecological value (i.e. degraded, low indigenous vegetation level). The area where vegetation will be removed is minimal. However, the site currently connects other open spaces and river networks and therefore acts as a migratory corridor.

In terms of visual impacts, the receptors that will be mostly affected are the residents within a 2 km distance from the site. The visual impact will be moderately high during the construction of the developments when unsightly views of the construction activity will be visible. The residents will experience a high level of visual exposure due to their proximity and the exposed soil, construction equipment and material stockpiles will cause severe visual intrusion. Mitigation measures such as planting of indigenous trees at an early stage of the landfill development process are to be undertaken.

No sites, features or objects of cultural significance dating to the Stone Age, Iron Age or dating to the historic period were identified. This is due to the majority of the site having been previously subjected to some activities, which would have destroyed potential sites, features or objects that might have occurred there previously. A control measure has been included in the EMPr in that if heritage artefacts or graves are exposed during construction work, it will be immediately reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. In general the monitoring boreholes around the waste disposal site are not expected to show ground water contamination that is of any major concern.

Potential health impacts (relating to particulate matter) that are associated with the proposed landfill site were assessed as part of the air quality impact assessment. This assessment indicated that the proposed Umzimkhulu Landfill Site will not negatively affect the human health of receptors in the area should the buffer zones and height restriction be implemented. Similarly, dust and odours were shown to be of low significance, particularly if mitigation measures such as daily covering of waste and appropriate dust suppression on gravel roads are implemented. Additional use of rock cladding instead of grassing on the landfill sites will result in a further reduction in impacts. Mitigation measures have been included in the EMPr (Appendix 3). Noise will be generated during construction and operation of the landfill site. Noise during construction is likely to be higher than during operation, but will, however, vary in loudness and timing and will thus not be a constant nuisance to receptors who may be able to hear it. In addition to this, if loud activities are limited to daylight hours and residents are consulted when particularly loud activities are

planned, the impact of construction noise can be reduced. The construction phase is temporary in nature, further reducing the significance of this impact. The nearest residences are also some distance from the proposed landfill site, and operation will be limited to daylight hours, and thus the impact should be minimal. Due to the fact that the landfill will only generate noise during day time hours, the impact of noise on these receptors is not envisaged to be significant.

Impacts will be reduced with the implementation of the mitigation measures that have been included in the EMPr (Appendix 3).

Conclusion and Recommendations

Based on the findings documented in this report, the EAP is of the opinion that the proposed Umzimkhulu Landfill Site in will assist in meeting current and future demands for environmentally sound waste management in the Umzimkhulu Local Municipality and surrounding areas.

The preliminary design of the landfill will be done in terms of the *Minimum Requirements for Waste Disposal by Landfill* (2nd Edition, DWAF 2009), and is within the constraints of the regulations making use of latest technologies and best practice for landfill development. An EMPr has been drafted to ensure the site is operated in an environmentally sound manner across its entire life cycle. It is noted that this programme will be updated as required by the competent authority so as to ensure that the site remains operating at best practice level.

The assessment of the issues identified in the Scoping Report or as raised by I&APs, and considered in greater detail in the EIA Report with its related specialists studies, indicated that the significance of potential impacts associated with the proposed development can all be reduced to a low"/"medium", if the recommended mitigation measures are implemented.

The EAP is of the opinion that the proposed Umzimkhulu, to be located in Clydesdale area of Umzimkhulu, KwaZulu Natal Province, should be authorised.

Conditions of the environmental authorisation should include the implementation of mitigation measures in the draft Site-Specific EMPr and the appointment of an independent Environmental Control Officer to monitor compliance with the draft Site-Specific EMPr.

Appendices

EIA process related:

Appendix 1: Authority Correspondence

Appendix 2: Public Participation Details

Management control mechanisms & Design Information:

Appendix 3: Site-Specific Environmental Management Programme

Appendix 4 Emergency Preparedness and Response Plan

Specialist Studies

Appendix 5.1: Heritage Impact Assessment

Appendix 5.2: Visual Impact Assessment

Appendix 5.3: Wetland Delineation Study

Appendix 5.4: Noise Impact Assessment

Appendix 5.5: Fauna Assessment

Appendix 5.6: Agricultural Impact Assessment

Appendix 5.7: Air Quality Assessment

Appendix 5.8: Traffic Impact Assessment

Appendix 6: Geological and Geotechnical Report

Appendix 7: Geohydrological Report

Appendix 8: Site Selection Report