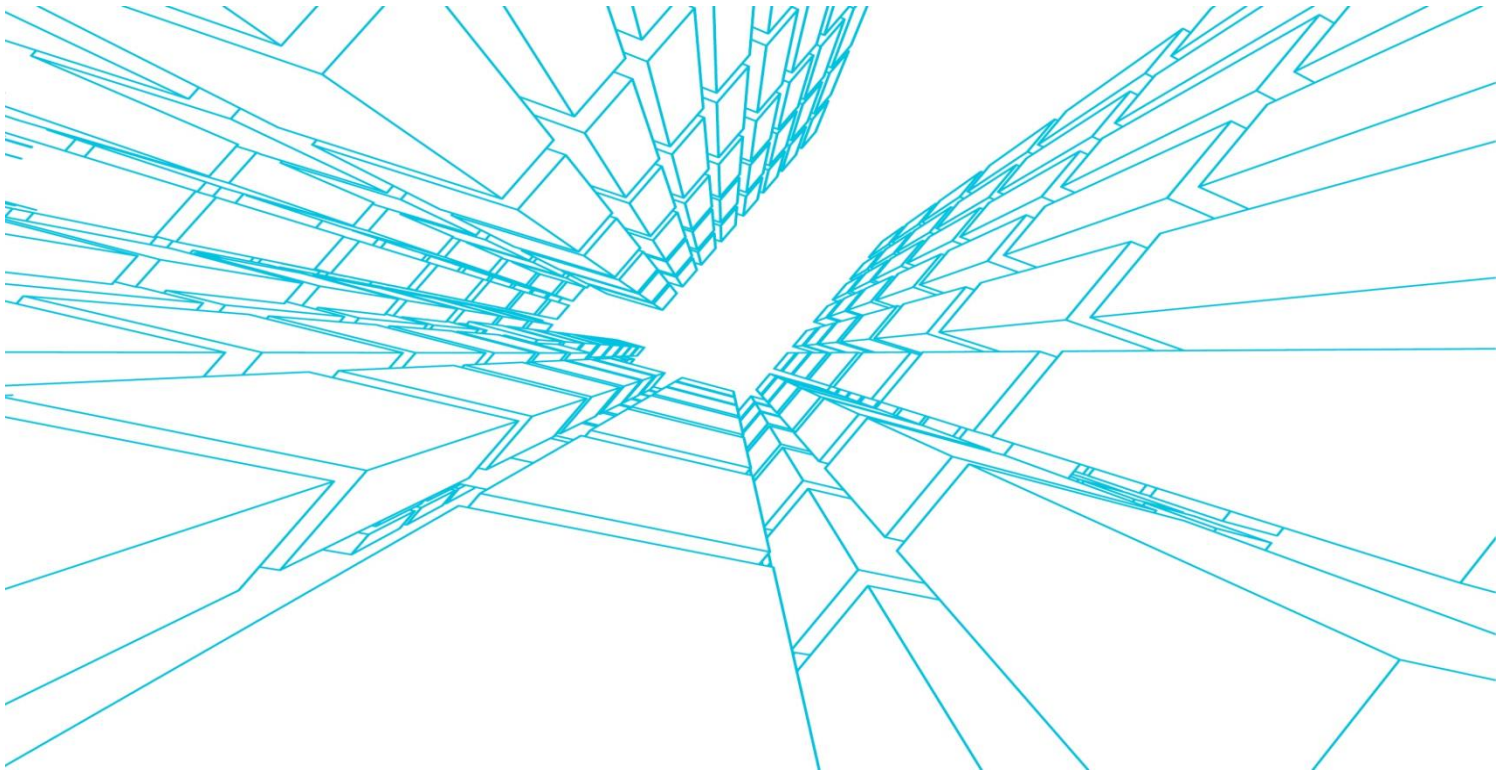


# **Final** Scoping Report for the proposed Multisand Regional Waste Disposal Facility



**DEA Reference No:** 12/9/11/L1422/3

**GDARD Reference No:** GAUT 002/13-14/E0280

**Date:** **June** 2014

**Prepared By:** AECOM SA (Pty) Ltd

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**TITLE** : **Final** Scoping Report for the Multisand Waste Disposal Facility

**Applicant** : Interwaste (Pty) Ltd

**AECOM Project No** : J13020

**Status of Report** : **Final**

**Date of this Issue** : **June** 2014

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**For AECOM SA (Pty) Ltd**

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6 June 2013

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Approved by : N Liversage  
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## **EXECUTIVE SUMMARY**

### **BACKGROUND TO THE PROJECT**

Interwaste (Pty) Ltd (Interwaste) proposes to establish a regional waste disposal facility near Pretoria, within the City of Tshwane Local Municipality, Gauteng. This arose out of an Interwaste internal investigation which suggested that there is a need for additional waste disposal capacity in Gauteng province, and that a regional waste disposal facility located in Tshwane would help meet this need. **Regional landfills are developed to receive waste from various waste generators within a viable transport distance. With the proposed Multisand landfill to be located on the border between Gauteng and the Northwest Province, it can be expected that the new landfill will also draw waste from the Northwest Province. Similar to other commercial regional landfills, the Multisand landfill will not be developed for the exclusive use by any particular municipality; or for private waste generators from a single municipal area.**

The proposed development 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 from the National Department of Environmental Affairs (DEA) in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEMWA). The proposed development also comprises activities listed in the National Environmental Management Act (Act 107 of 1998) (NEMA), for which environmental authorisation from the Gauteng Department of Agriculture and Rural Development (GDARD) is also required. Due to the nature of the proposed development, and the requirement to apply for a Waste Licence and Environmental Authorisation, a full Scoping and Environmental Impact Assessment (EIA) process is required. Authorisation of relevant water uses, as listed in Section 21 of the National Water Act 36 of 1998 (NWA), is required from the Department of Water Affairs (DWA). This EIA is also conducted in support of such a water use license (WUL) application.

AECOM SA (Pty) Ltd (AECOM) was appointed by Interwaste (Pty) Ltd (Interwaste) to conduct the environmental impact assessment. The EIA process is currently in the Scoping Phase and this report documents the outcomes of the Scoping Phase and the Plan of Study for EIA. The draft version of the Scoping Report **was** presented to the public for a 60-day review and comment period, **which lapsed on 30 April 2014.**

### **DETAILS OF THE PROJECT AREA**

The proposed project area is located approximately 24 km northwest of the CBD of the City of Tshwane, 10 km west of Rosslyn and to the south of the R566 Tshwane- Brits road. Ga Rankuwa lies 6 km to the north of the project area, opposite the R566 road.

A gravel road from the Brits/Rosslyn main access road provides access to site. The Eskom power grid services the area, and there are no registered servitudes on the property.

The proposed project is to be located on the following farms, within the City of Tshwane Local Municipality:

- Middelwater 593 JQ;
- Portion 33 of Vissershoeck 435 JQ; and
- Portion 125 of Wildebeesthoek 310 JR, De Wildt.

Land use currently consists of the mining of sand and rock by Multisand (Pty) Ltd, the land owner of the proposed project area.

### **PROJECT DESCRIPTION**

Interwaste proposes to develop a sustainable large regional waste disposal facility to mainly serve waste generators in Gauteng. **Similar to other commercial regional landfills, the Multisand landfill will not be developed for the exclusive use by any particular municipality; or for private waste generators from a single municipal area.** The requirements for the

design and classification of landfills in South Africa as described in the Minimum Requirements for Waste Disposal by Landfill, Second Edition (DWAF, 1998), was superseded on 23 August 2013 by Regulations 634 (Waste Classification and Management Regulations) that define the nature of a waste disposal facility in terms of the liner required for a Class A, Class B, Class C or Class D landfill. Based on a study of its waste disposal needs, Interwaste has decided that a Class B liner Waste Disposal Facility will be developed.

It should be noted that the promulgation of the Department of Environmental Affairs' new Waste Classification and Management Regulations and associated Standards for the Assessment and Disposal of Waste to Landfill removed the linkage between a waste's classification (hazardous versus non-hazardous) and its disposal requirements; except in instances where a waste is hazardous in terms of SANS 10234 on the basis of a contaminant not listed under the Standard for the Assessment of Waste for Disposal to Landfill.

It is conceivable that some of the Type 2, 3 or 4 waste streams that could lawfully be disposed of to the proposed Class B disposal site may be hazardous in terms of SANS 10234, but this does not prohibit their disposal to such a facility – provided that they are assessed to be Type 2, 3 or 4 (with or without treatment) in terms of the aforementioned Standard. It is for this reason that the application for the Waste Management License for the proposed facility has been lodged with the Department of Environmental Affairs, who are the Licensing Authority in respect of applications involving hazardous waste management facilities.

A Class B waste disposal facility typically comprises the following components, which will be investigated during the EIA phase of the process:

- Waste disposal cells;
- Waste treatment facility\*. This would predominantly take the form of a series of concreted, bunded, blending bays under roof in order to blend treatment additives (e.g. lime) into wastes streams requiring treatment to ensure a homogenous end mixture. The treatment of waste destined for disposal to landfill (whether it be hazardous or non-hazardous) is common practice aimed at minimising the impact of the waste on the environment prior to disposal thereof, and 'protecting' the quality of any leachate potentially produced from the landfill;
- Access control facilities including perimeter fencing;
- Waste stream constituents e.g. contaminant concentrations / composition (leach and total), pH, etc.;
- Access roads to the landfill and link roads between the landfill cells;
- Weighbridge with a weighbridge control room;
- Public drop-off area (if required);
- Leachate collection system and leachate ponds to prevent surface and groundwater contamination;
- Pollution control ponds to collect contaminated stormwater runoff and prevent surface and groundwater contamination;
- Stormwater berm around the upstream side of the site to keep clean stormwater off site;
- Leachate treatment facility to treat leachate and contaminated stormwater runoff;
- A plant washing bay with contaminated runoff control.
- A wheel wash for vehicles leaving the landfill during wet conditions, also with contaminated runoff control;
- Weather station;
- Administration buildings;
- Staff dining and ablution facilities;
- Workshops and stores;
- Transport depot for waste vehicles transporting waste to the landfill;
- Fuel storage facilities; and
- Electricity, water and sewage infrastructure and connections.

\* The 'treatment' to be undertaken at the proposed facility is envisaged to entail the mechanical blending of certain waste streams with appropriate treatment agents (e.g. ash, lime, sawdust, etc.) in impermeable bunkers, under roof. The aforementioned structure would be constructed so as to ensure no contact between the waste being treated and the adjacent soil, surface water and ground water environments.

The amount of space available for waste disposal (airspace) and the life of a disposal site depend on the size of the area of land at the preferred site that is suitable for waste disposal, the potential depth to which cells can be excavated, the

height above ground level to which the waste can be disposed of and the expected waste disposal rate in tons / year. In turn, the cell depth is influenced by site's geotechnical, geological and geohydrological conditions, while the potential visual impact to surrounding I&APs and structural stability will determine the height and the shape of the landfill. The above variables will be investigated during the EIA phase to determine available airspace at the preferred site.

In addition to the remaining airspace, the remaining life of any landfill is determined by the average monthly waste disposal rate, which varies depending on the need for waste disposal capacity. With most of the municipal landfills having reached its maximum design capacity, the waste stream to be disposed of on legally compliant waste disposal facilities could at any time increase, should municipal landfills be required to shut down when the design life was reached.

The following additional waste management components that aim at the treatment, re-use and recovery of waste are being considered and will be investigated in the EIA phase in terms of their feasibility, benefit and impact on the surrounding environment:

- Materials recovery facility (MRF), with a conveyor belt, sorters and skips; and
- Facility for the processing of biodegradable waste (composting facility.).

## SITE SELECTION PROCESS

A site selection process was conducted to identify site alternatives for the proposed development and to determine the most feasible location from a technical perspective. The most technically feasible site (the preferred site) has been applied for as the proposed site and will be assessed from an environmental perspective in the EIA process.

Site selection is a minimum requirement for selecting a specific site or sites before more detailed investigations are carried out. In this particular case, and in many other instances, the situation is slightly different in that a specific site is available and desk top studies up to now have not indicated any fatal flaws. In this instance the site selection process has two objectives:

- Show that with the existing landfills being used by the City of Tshwane, there is a need for an additional landfill; and
- Show that by doing a study in the region of the site on which the desk top study has been done that there are no other more suitable sites that should obviously be studied in preference to the site referred to.

The region selected for this study is mainly the City of Tshwane area north of the Magaliesberg Mountain. Two sites just outside the boundary of the former Tshwane area and one just south of the mountain have also been included (Appendix A). However, regional landfills are developed to receive waste from various waste generators within a viable transport distance. With the proposed Multisand landfill to be located on the border between Gauteng and the Northwest Province, it can be expected that the new landfill will also draw waste from the Northwest Province.

From the desktop study of existing landfills, it is clear that very few landfills have a long remaining life. No new landfills in the area are in the process of being permitted. According to the 2004 BKS-Felehetsa study the privately owned licensed Waste Group Bon Accord site and the Enviroserv Rosslyn site are also present in the area. Even though new waste minimisation and disposal technologies are being investigated throughout South Africa, large capacity well operated landfills will always remain an essential part of any waste management system.

A desktop study has been done to identify other potential landfill sites. To minimise the impact on the environment, whilst making use of waste disposal as a means of rehabilitating areas previously scarred by mining activities, Interwaste adopted a strategy of identifying areas of disturbed ground (quarries, mine tailings sites, etc.) rather than greenfields sites during site selection. Quarries are also more suitable for providing increased air space.

The desktop study of 15 potential new sites was interpreted under the following headings:

- Location (Latitude, Longitude);
- Type of feature;
- Description e.g. operating quarry, sandworks etc.;
- Approximate size (and excavation depth);
- Potential fatal flaws; and
- Underlying geology.

The study of existing and potential waste disposal sites shows that:

- The existing landfills have a limited life and there is a demand for a long term well operated waste disposal facility in the Tshwane area; and
- As far as the identification of new landfill sites is concerned, some potential sites may be investigated. The desk study information, does not, however, show any alternative site with more promise than the preferred Multisand site.

It is therefore concluded that the Multisand site is the preferred site at present and should be investigated further as part of the EIA process to determine its suitability for development of a new large regional landfill.

## PROJECT ALTERNATIVES

The identification of alternatives is an important component of the EIA process. The Do-Nothing, Site Alternatives and Site Access Option alternatives have been identified thus far and will be assessed as part of the EIA process and documented in the EIA Report.

Mining operations on the preferred site alternative, the Multisand sand and rock quarries, are still in operation. It is anticipated that mining activities will cease in areas where the first waste disposal cell is due to be developed. Mining operations will however continue on the remainder of the larger site to prevent sterilisation of mineral resources, whilst at the same time creating additional airspace for waste disposal. **It has to be noted that the (i) mining and (ii) waste disposal operations will inter alia comply with the Mine Health and Safety Act (Act 29 of 1996) and the Occupational Health and Safety Act (Act 85 of 1993), respectively.**

## PUBLIC PARTICIPATION

Initial public participation, to notify I&APs of the proposed development and the technically preferred site (Multisand), was conducted to afford them the opportunity to identify issues and concerns that should be addressed during the EIA study. A second round of public participation was conducted during the Scoping Phase to discuss the findings of the **DSR for Public Review. The second round of public participation included Focus Group Meetings (FGMs) with various stakeholder groups as well as a public open day and public meeting, held on 12 April 2014. Subsequent to submitting this Final Scoping Report (FSR) to the DEA and GDARD for authorisation, the FSR will also be submitted for public review, for a period of 30 days.**

## EIA PHASE

All potential significant environmental issues (social, economic and biophysical) associated with the proposed waste disposal facility that were identified in the Scoping Phase will be investigated in detail through specialist studies during the EIA Phase. A Plan of Study for the EIA is included in this report.

## DECISION-MAKING PHASE

Once all issues have been addressed by the EAP and presented in an EIA report, the report will be submitted to GDARD and DEA for their decision whether or not to authorise the proposed landfill development.

**FINAL SCOPING REPORT SUBMISSION**

This Final Scoping Report (FSR) has been updated accordingly from the Draft Scoping Report and will be submitted to the GDARD and DEA.

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## Appendices

Appendix A: Site Selection Report

Appendix B: Public Consultation Documentation

## List of Abbreviations

°C	Degrees Celsius
<b>BID</b>	Background Information Document
DEA	National Department of Environmental Affairs
DFA	Development Facilitation Act
DLA	Department of Land Affairs
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EI&S	Ecological Importance and Sensitivity
EMP	Environmental Management Plan
<b>FSR</b>	<b>Final Scoping Report</b>
GCL	Geosynthetic clay liner
GLB+	General, large landfill with a positive water balance
GN	Government Notice
HIA	Heritage Impact Assessment
I&AP(s)	Interested and Affected Party(ies)
IDP	Integrated Development Plan
IRR	Issues and Responses Report
IWMP	Integrated Waste Management Plan
l/h	Litres per Hour
km <sup>2</sup>	Squared kilometre

<b>m<sup>3</sup></b>	Cubic Metres
<b>MAR</b>	Mean Annual Rainfall
<b>MRF</b>	Materials Recovery Facility
<b>NEMA</b>	National Environmental Management Act (Act 107 of 1998)
<b>NEMWA</b>	National Environmental Management: Waste Act (Act 59 of 2008)
<b>NWA</b>	National Water Act (Act 36 of 1998)
<b>NHRA</b>	National Heritage Resources Act (Act 25 of 1999)
<b>PPP</b>	Public Participation Process
<b>RDL</b>	Red Data Listed
<b>SAHRA</b>	South African Heritage Resource Agency
<b>SIA</b>	Social Impact Assessment
<b>SoER(s)</b>	State of Environment Report(s)
<b>WIS</b>	Waste Information System
<b>WMA</b>	Water Management Area
<b>WUL</b>	Water Use Licence

# 1. Introduction

## 1.1 Background of Study

Interwaste (Pty) Ltd (Interwaste) proposes to establish a regional waste disposal facility near Pretoria, within the City of Tshwane Local Municipality, Gauteng. This arose out of an Interwaste internal investigation which suggested that there is a need for additional waste disposal capacity in Gauteng province and that a regional located waste disposal facility in Tshwane would help meet this need. Regional landfills are developed to receive waste from various waste generators within a viable transport distance. With the proposed Multisand landfill to be located on the border between Gauteng and the Northwest Province, it can be expected that the new landfill will also draw waste from the Northwest Province. Similar to other commercial regional landfills, the Multisand landfill will not be developed for the exclusive use by any particular municipality; or for private waste generators from a single municipal area.

The proposed development 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 from the National Department of Environmental Affairs (DEA) in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEMWA). The proposed development also comprises activities listed in the National Environmental Management Act (Act 107 of 1998) (NEMA), for which environmental authorisation from the Gauteng Department of Agriculture and Rural Development (GDARD) is also required. Due to the nature of the proposed development, and the requirement to apply for a Waste Licence and Environmental Authorisation, a full Scoping and Environmental Impact Assessment (EIA) process is required. Authorisation of relevant water uses, as listed in Section 21 of the National Water Act 36 of 1998 (NWA), is required from the Department of Water Affairs (DWA). This EIA is also conducted in support of such authorisation of water uses according to the NWA.

AECOM SA (Pty) Ltd (AECOM) was appointed by Interwaste (Pty) Ltd (Interwaste) to conduct the environmental impact assessment. The EIA process is currently in the Scoping Phase and this report documents the outcomes of the Scoping Phase and the Plan of Study for EIA. The draft version of the Scoping Report was presented to the public for a 60-day review and comment period, which lapsed on 30 April 2014.

## 1.2 Purpose of Study

This EIA process assists the competent authority (DEA and GDARD) to make an informed decision on whether the proposed development should be authorised or not, and under what conditions an authorisation could be granted. In the EIA process, all potentially significant environmental impacts (social, economic and biophysical) of a proposed development are identified and assessed. An EIA entails the following main phases:

- Scoping Phase
- EIA Phase; and
- Decision-Making Phase.

The EIA process is currently in the Scoping Phase, and its main purpose is to identify and investigate issues related to the proposed development, including the proposed site and list potentially significant impacts that require further assessment in the EIA phase (Section 6). Issues and impacts are identified by the project team using theoretical knowledge, experience on similar projects, and public participation and consultation with interested and affected parties (I&APs) and other key stakeholders (such as national, regional and local government departments). The Scoping Phase also identifies the most appropriate means by which the potential impacts will be assessed (see Section 8).

## 1.3 Details of the Applicant

Interwaste is a Johannesburg Stock Exchange (JSE) listed company, ISO 14001 accredited and specialising in the field of waste services. Although Interwaste is operating across South and Southern Africa, its primary focus area for waste collection and transport is currently Gauteng, Mpumalanga and the Northwest Province. Interwaste also specialises in development and operation of landfills, with more than 20 years' experience in this field and operating more than 30 waste disposal facilities across Southern Africa.

With waste collection and transport being part of its core business, Interwaste is to a large extent making use of public landfills throughout its area of operation. The inability of municipalities to develop new landfills required to keep up with its growing demand for waste disposal capacity (airspace), creates a concern that the remaining airspace on municipal landfills may in future be reserved for municipal collected waste only. Consequently Interwaste is seeking to develop a private landfill in the City of Tshwane to service its clients.

The details of the applicant are:

Company Name: Interwaste (Pty) Ltd  
Contact Person: Mr Leon Grobbelaar  
Postal Address: P.O Box 382  
Germiston  
1400  
Tel No: 011 792 9330

#### **1.4 Details of the Environmental Assessment Practitioner (EAP)**

AECOM is experienced in environmental management and assessment and is familiar with the EIA, waste and water use license requirements of the NEMA, NEMWA and NWA. The company has a strong track record in undertaking EIA projects with integrity and independence and assisting Interested and Affected Parties (I&APs) to participate in the EIA process.

Johan Hayes of AECOM is the lead Environmental Assessment Practitioner (EAP) for this project. Mr Hayes has eleven years' experience as an environmental scientist and EIA project manager. Neither AECOM, nor Mr Hayes, has any vested interest in the proposed project or Applicant Company.

CVs of the AECOM project team are available on request.

#### **1.5 Details of the Project Area**

The proposed project area is located approximately 24 km northwest of the CBD of the City of Tshwane, 10 km west of Rosslyn and to the south of the R566 Tshwane- Brits road. Ga Rankuwa is lies 6 km to the north of the project area, opposite the R566 road.

A gravel road from the Brits/Rosslyn main access road provides access to site. The Eskom power grid services the area, and there are no registered servitudes on the property.

The proposed project is to be located on the following farms, within the City of Tshwane Local Municipality:

- Middelwater 593 JQ;
- Portion 33 of Vissershoeck 435 JQ; and
- Portion 125 of Wildebeesthoek 310 JR, De Wildt.

Land use currently consists of the mining of sand and rock by Multisand (Pty) Ltd, the land owner of the proposed project area.

#### **1.6 The Environmental Impact Assessment Process**

##### **1.6.1 Study Approach**

An EIA is a planning and decision-making tool that identifies the potential negative and positive impacts of a proposed project and recommends ways to enhance positive impacts and to minimise the negative ones. The environmental studies will thus address the potential impacts associated with the project, recommend mitigating measures and provide an assessment of the project in terms of the biophysical, social and economic environments to inform the DEA's and GDARD's decision regarding authorisation and implementation of the proposed project. The environmental assessment

will be undertaken in compliance with the NEMWA, NEMA and the NWA. Cognisance will also be taken of related guideline documents and other relevant legislation. The overall EIA process will comprise the following three phases:

- Scoping Phase (the draft results are documented here for circulation to and consultation with IAP's) (current);
- Environmental Impact Assessment Phase; and
- Decision-making Phase (by DEA and GDARD).

#### **1.6.1.1 Scoping Phase**

A first round of public participation was conducted with adjacent landowners, to identify additional I&APs, as well as to notify them of the proposed development and technically preferred site (Multisand). I&APs were afforded the opportunity to identify issues and concerns that should be addressed in the study.

Input from I&APs have been considered and integrated into the FSR. The DSR was available for public comment over a period of 60 days (excluding school holidays), from 24 February 2014 to 30 April 2014. During this period, Focus Group Meetings (FGMs) were conducted with various stakeholder groups. In addition, a public open day and public meeting were conducted don 12 April 2014. Subsequent to the submission of this FSR to the DEA and GDARD, the FSR will also be made available for public review, for a period of 30 days.

The objective of the public comment period is for I&APs to raise issues about the information presented in the report and for them to raise any other issues related to the proposed project. It also provides an opportunity for I&APs to see if their issue has been captured correctly.

#### **1.6.1.2 Environmental Impact Assessment**

All potential significant environmental issues (social, economic and biophysical) associated with the proposed waste management facility that were identified in the scoping study will be further investigated through, *inter alia*, specialist studies in the EIA. Included in the EIA process is the identification of mitigation measures and how these will be addressed, which informs the Environmental Management Plan (EMP).

#### **1.6.1.3 Decision-Making Phase**

The decision-making phase will commence once all of the issues have been addressed by the EAP and presented in an EIA report that will be submitted to the DEA and GDARD. The report is reviewed by officials and an environmental authorisation is drafted with conditions that Interwaste must adhere to during design, construction, operation and decommissioning of the landfill.

Once the draft authorisation is approved by the various levels required, the decision (in the form of environmental authorisation) is sent to Interwaste. Should I&APs or Interwaste disagree on the decision taken, they may enter into an appeal process.

### **1.7 Objectives of the Scoping Report**

The purpose of this Scoping Report is to document the outcomes of the Scoping Phase, for submission to the DEA and GDARD for approval as input into the EIA Phase that will follow. In addition, the scoping report provides the following information:

- Description of the property on which the activity is to be undertaken and the location of the property;
- Methodology applied to conduct the scoping investigations;
- Details of the EAP and their expertise to carry out the scoping procedures;
- Key legislation and guidelines that have been considered in the preparation of the Scoping Report;
- Details the current state of the environment;
- Identifies and describes the anticipated environmental and social impacts, including cumulative impacts in respect of the listed activities;
- Need and desirability of the proposed activity, including advantages, disadvantages and alternatives;

- Reasonable land use alternatives, alternative means of carrying out the operations and the consequence of not proceeding with the proposed operation;
- Process of engagement with identified I&APs; and
- The Plan of Study for conducting the EIA including the nature and extent of studies to be included in the EIA.

Subsequent to the submission of the Final Scoping Report to the authorising authorities, I&APs are given an opportunity to review the FSR and comment on the proposed development, the impacts identified and the proposed Plan of Study for the EIA phase. The FSR will be made available for public review for a period of 30 days.



Figure 1-1: Location of the Project Area

## 2. Overview of the Proposed Project

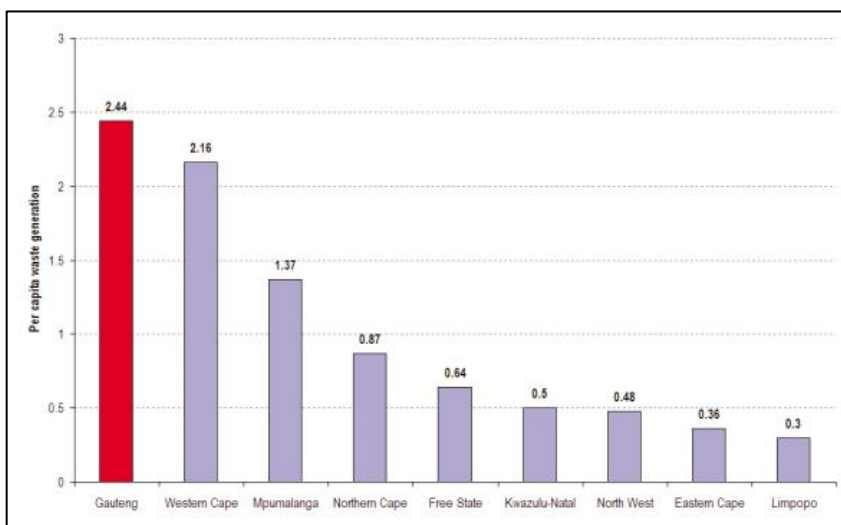
### 2.1 Need and Desirability

#### 2.1.1 Available Landfill Capacity in Gauteng

Poor enforcement of Waste Information System (WIS) Regulations promulgated to date is resulting in limited reliable information being available on waste generation rates and remaining landfill airspace for different Municipalities. Variances were detected in information presented in different reports, with some conflicting information presented. Available data is often outdated.

Due to a shortage of remaining landfill airspace, some municipalities are implementing unsustainable emergency measures to increase the remaining life of its landfills. This includes increasing landfill heights beyond the permitted heights or by steepening side slopes to a degree where it will not be possible to rehabilitate the landfills in accordance with Minimum Requirements for Waste Disposal by Landfill. A lack of enforcement of Minimum Requirements once again seems to be at the core of the problem.

From Figure 2-1 below, it is evident that Gauteng has the highest waste generation rate per capita at 2.44 kg/person-day. The high waste generation rate in Gauteng, brought about by extensive commercial and industrial activities, emphasises the need for increased waste disposal capacity in Gauteng.



**Figure 2-1: Provincial per capita general waste generation rates**

After conducting an extensive literature search to obtain accurate and updated information on waste generation rates and available airspace in Gauteng, data had to be extrapolated to estimate the availability of landfill airspace in Gauteng. Currently there is a general shortage of landfill airspace and the associated difficulty with which new landfills are developed, causes municipalities with airspace available to refuse waste generated in neighbouring municipalities for disposal on its landfills.

With most of the municipal landfills having reached its maximum design capacity, the waste stream to be disposed of on legally compliant waste disposal facilities could at any time increase, should municipal landfills be required to shut down when the design life was reached.

A new landfill licensing process embarked upon at this stage will at best only bear fruit in 2 years' time and it was for that reason important that the availability of landfill airspace in 2015 be used in the following analysis.

#### 2.1.2 General Waste Minimisation Plan for Gauteng (Approved April 2010)

The Waste Minimisation Plan for Gauteng, as approved in April 2010, included information on the remaining life of the landfills in Gauteng. Since the waste generation model used to predict waste tonnages and available airspace was not described in the report, it is difficult to determine the procedures followed when the remaining life of the various landfills were determined. The primary objective of the investigation was however to look at the potential to recover certain waste streams, with determining the remaining life of landfills reportedly being an add-on that was required towards the end of the project.

It was confirmed by the authors of the report that the remaining life of the respective landfills were not determined by comparing surveyed models of the various landfills with approved final landforms. Many of the landfills also did not have operational weighbridges and information was in many instances not consistently reported on the WIS, making it difficult to determine the actual airspace consumption.

The figures from the analysis on remaining landfill lifespan in Gauteng, as recorded in 2007, are presented in Table 2-1 below. The remaining life of the various landfills was then projected to 2015 when it is anticipated that the new Tshwane Regional Waste Disposal Facility will be developed.

Since the landfill life was not presented as remaining airspace versus airspace consumption, it was not possible to calculate a figure for the overall remaining landfill life for each of the Metropolitan Municipalities. From the above, it is however evident that there is a general shortage of landfill airspace in Gauteng, with Tshwane primarily only having airspace available on the Hatherley landfill and Johannesburg being dependent on the Goudkoppies landfill. Such landfills are however some distance from the bulk of the waste generators, which will result in increased transport costs. With all waste generated in the Metropolitan Municipalities having to be disposed of on a small number of landfills, it will also result in faster consumption of available airspace.

Based on the information presented in the General Waste Minimisation Plan for Gauteng, it does however seem like Ekurhuleni may still have sufficient airspace available for at least the next decade.

### 2.1.3 Tshwane Metropolitan Municipality

The latest version of the Integrated Waste Management Plan (IWMP) for the Tshwane Metropolitan Municipality seems to be that of 2004. Although IWMP's are to be reviewed every 5 years, it does not seem like an IWMP was updated for Tshwane in 2009.

Since no new landfills were licensed by the Tshwane Metropolitan Municipality since release of the IWMP in 2004, the information on available landfills is still considered to be relevant, with some reduction in the available landfill airspace that was consumed since 2004.

Table 2-2 provides an overview of the landfill situation in Tshwane for 2004. The information was then extrapolated to 2015, assuming that waste disposal patterns on the landfills remained unchanged. It is however to be recognised that closure of some landfills will inevitable result in increased waste disposal on the remaining landfills, thus resulting in the life of the remaining landfills being reduced even faster.

**Table 2-1: Estimated remaining life for Gauteng Landfills**

LOCAL AUTHORITY	SITE NAME	ESTIMATED LIFESPAN IN YEARS (2007)	ESTIMATED LIFESPAN IN YEARS (2015)
<b>EKURHULENI METROPOLITAN MUNICIPALITY</b>			
<b>Council Landfills:</b>			
Ekurhuleni	Weltevreden	30	22
Ekurhuleni	Rietfontein	40	32
Ekurhuleni	Rooikraal	30	22
Ekurhuleni	Simmer & Jack	20	12
Ekurhuleni	Platkop	60	52

Private Landfills:			
Enviroserv	Chlookop (Dispose-Tech)	5	0
CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY			
Council Landfills:			
Pikitup	Ennerdale	5	0
Pikitup	Goudkoppies	15 to 20	7 to 12
Pikitup	Marie-Louise	Full, but site still used	0
Pikitup	Robinson Deep	5 to 11	Less than 3
Private Landfills:			
Interwaste	FG landfill	10	11
CITY OF TSHWANE METROPOLITAN MUNICIPALITY			
Council Landfills:			
Tshwane	Kwaggasrand	Less than 3	0
Tshwane	Onderstepoort	10	2
Tshwane	Garstkloof	3	0
Tshwane	Hartherley	40	32
Tshwane	Soshanguve	10	2
Tshwane	Derdepoort	5	0
Tshwane	Valhalla	Less than 5	0
Tshwane	Ga-Rankuwa	16	8
Private Landfills:			
Waste Group	Bon Accord (Waste Group)	13	5
Waste Group	Mooiplaats (Waste Group)	11	3
Enviroserv	Rossllyn (Dispose-Tech)	11	3
METSWEDING METROPOLITAN MUNICIPALITY			
Council Landfills:			
Kungwini	Bronkhorstspuit	7 to 10	Less than 2
Private Landfills:			
MEGA	Ekandustria	10	2

\*(Source: General Waste Minimisation Plan for Gauteng)

**Table 2-2: Available landfills, landfill classification and remaining life estimates as projected for 2015 for the City of Tshwane Metropolitan Municipality.**

Landfill Name	Classification	Annual tonnage	Remaining Life (base date 2004)	Remaining Life (base date 2015)
Derdepoort	GMB-	342 540	3 years	0 years
Hatherley	GLB-	120 444	50 years	39 years
Ga-Rankuwa	GMB-	153 816	20-25 years	9 -14 years
Garstkloof	GLB-	421 080	5 years	0 years
Kwaggasrand	GMB-	323 856	5-7 years	0 years
Onderstepoort	GLB-	336 396	20-25 years	9 -14 years
Soshanguve	GLB-	110 400	10-15 years	0 - 4 years
Temba	GSB-	88 356	6-12 months	0 years
Valhalla	GLB-	345 192	2 months	0 years
Eersterust		Closed 1993		
Mamelodi		Closed 1997		
Pretoria North		Closed 1993		
<b>Total</b>		<b>2 242 088</b>		

**As can be seen from**

Table 2-2, the remaining landfills are not well spread throughout Tshwane, thus resulting in increased transport distances and subsequently higher waste collection costs. The bulk of the remaining airspace (on the Hatherly landfill) is situated towards the east of Tshwane.

**2.1.4 The Need and Desirability for a Regional Landfill to Service the Northern Parts of Gauteng**

Based on extensive market research, Interwaste identified potential sources of waste (to be disposed of at a centrally located regional landfill) towards the north of Pretoria. In addition to waste generators in Gauteng, the landfill will also serve some of the waste disposal needs from neighbouring areas like Brits in the Northwest Province.

Although a larger study area is initially considered in the site selection process, it is eventually narrowed down to a smaller area, to be more centrally located for the potential waste sources. It is therefore also important that the proposed landfill has good public road access.

Where possible, development of a waste disposal site should also provide the opportunity for rehabilitation of land previously scarred by other activities such as mining, but without sterilisation of mineral resources still available onsite.

Depending on the waste disposal needs in the area where the landfill is to be located, it is further important that the landfill be made accessible to the local community for disposal of waste generated within that area.

## 2.2 Description of Proposed Development

Interwaste proposes to develop a sustainable regional waste disposal facility to mainly serve waste generators in Gauteng. Regional landfills are developed to receive waste from various waste generators within a viable transport distance. With the proposed Multisand landfill to be located on the border between Gauteng and the Northwest Province, it can be expected that the new landfill will also draw waste from the Northwest Province. Similar to other commercial regional landfills, the Multisand landfill will not be developed for the exclusive use by any particular municipality; or for private waste generators from a single municipal area.

The requirements for the design and classification of landfills in South Africa were previously defined by the Minimum Requirements for Waste Disposal by Landfill, Second Edition (DWAF, 1998). During 2013 DEA however promulgated regulations and standards to regulate various aspects of waste management, including the design and classification of landfills. These regulations and standards are available on (<http://www.sawic.org.za/?menu=302>) and are listed below:

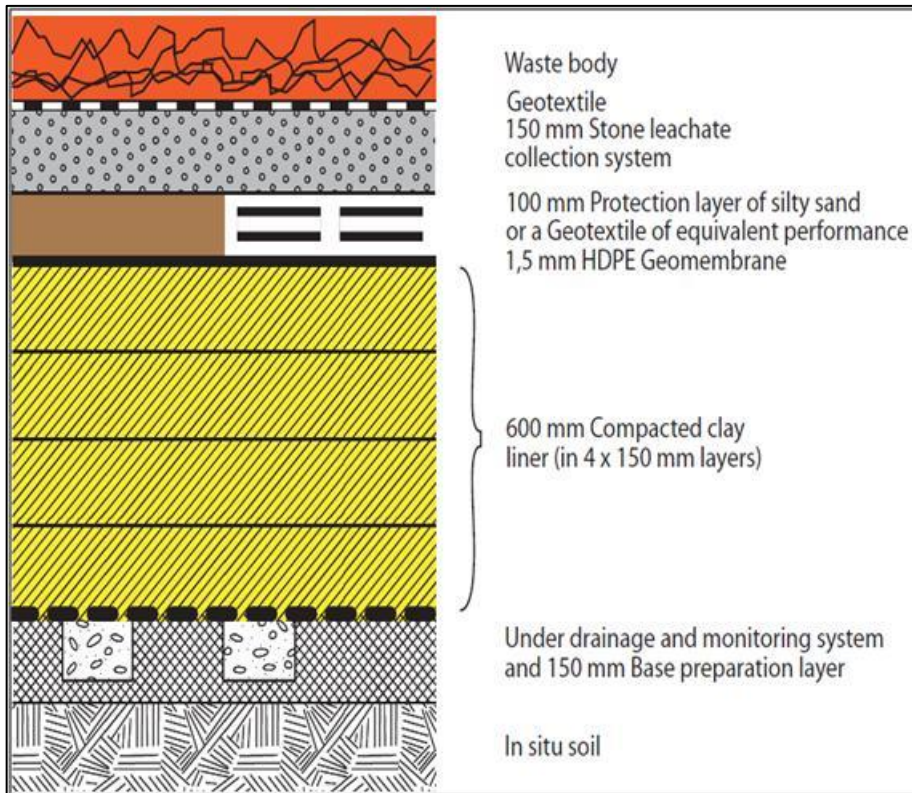
- National Standard for Disposal of Waste to Landfill;
- Standard for Assessment of Waste for Landfill and
- Waste Classification and Management Regulations

The design and classification of the proposed Multisand landfill will therefore be based on the new regulations and standards (Table 2-3).

**Table 2-3: Proposed classification of Multisand landfill**

	Draft new regulations and standards
Landfill classification	Class B
Size	Large (> 500 t/day)
Typical types of waste accepted	<ul style="list-style-type: none"> <li>• Type 2 - Moderate Risk:</li> <li>• Domestic waste;</li> <li>• Post-consumer packaging</li> <li>• Non-hazardous business waste;</li> <li>• Uncontaminated builders rubble and excavated earth material;</li> <li>• Waste tyres;</li> <li>• Garden waste;</li> <li>• Non-infectious animal carcasses;</li> <li>• Type 2, 3 and 4 waste streams for disposal (general and hazardous);</li> <li>• Waste where the leachable concentration of specific contaminants falls within acceptable thresholds, as described in GN 443; and</li> <li>• Waste where the total concentration of a specific contaminant falls below total contamination thresholds, as described in GN 443.</li> </ul>

It is conceivable that some of the Type 2, 3 or 4 waste streams that could lawfully be disposed of to the proposed Class B disposal site may be hazardous in terms of SANS 10234, but this does not prohibit their disposal to such a facility – provided that they are assessed to be Type 2, 3 or 4 (with or without treatment) in terms of the aforementioned Standard. It is for this reason that the application for the Waste Management License for the proposed facility has been lodged with the Department of Environmental Affairs, who are the Licensing Authority in respect of applications involving hazardous waste management facilities.



**Figure 2-2: Indicative liner design in terms of National Standard for Disposal of Waste to landfill**

A Class B waste disposal facility typically comprises the following components, which will be investigated during the EIA phase of the process:

- Waste disposal cells;
- Waste treatment facility. This would predominantly take the form of a series of concreted, bunded, blending bays under roof in order to blend treatment additives (e.g. lime) into wastes streams requiring treatment to ensure a homogenous end mixture. The treatment of waste destined for disposal to landfill (whether it be hazardous or non-hazardous) is common practice aimed at minimising the impact of the waste on the environment prior to disposal thereof, and 'protecting' the quality of any leachate potentially produced from the landfill;
- Access control facilities including perimeter fencing;
- Waste stream constituents e.g. contaminant concentrations / composition (leach and total), pH, etc.;
- Access roads to the landfill and link roads between the landfill cells;
- Weighbridge with a weighbridge control room;
- Public drop-off area (if required);
- Leachate collection system and leachate ponds to prevent surface and groundwater contamination;
- A plant washing bay with contaminated runoff control.
- A wheel wash for vehicles leaving the landfill during wet conditions, also with contaminated runoff control;
- Pollution control ponds to collect contaminated stormwater runoff and prevent surface and groundwater contamination;
- Stormwater berm around the upstream side of the site to keep clean stormwater off site;
- Leachate treatment facility to treat leachate and contaminated stormwater runoff;
- Weather station;
- Administration buildings;
- Staff dining and ablution facilities;
- Workshops and stores;
- Transport depot for waste vehicles transporting waste to the landfill;
- Fuel storage facilities; and
- Electricity, water and sewage infrastructure and connections.

The 'treatment' to be undertaken at the proposed facility is envisaged to entail the mechanical blending of certain waste streams with appropriate treatment agents (e.g. ash, lime, sawdust, etc.) in impermeable bunkers, under roof. The aforementioned structure would be constructed so as to ensure no contact between the waste being treated and the adjacent soil, surface water and ground water environments.

It should be noted that the promulgation of the Department of Environmental Affairs' new Waste Classification and Management Regulations and associated Standards for the Assessment and Disposal of Waste to Landfill removed the linkage between a waste's classification (hazardous versus non-hazardous) and its disposal requirements; except in instances where a waste is hazardous in terms of SANS 10234 on the basis of a contaminant not listed under the Standard for the Assessment of Waste for Disposal to Landfill.

The amount of space available for waste disposal (airspace) and the life of a disposal site depend on the size of the area of land at the preferred site that is suitable for waste disposal, the potential depth to which cells can be excavated, the height above ground level to which the waste can be disposed of and the expected waste disposal rate in tons / year. In turn, the cell depth is influenced by site's geotechnical, geological and geohydrological conditions, while the potential visual impact to surrounding I&APs and structural stability will determine the height and the shape of the landfill. The above variables will be investigated during the EIA phase to determine available airspace at the preferred site. In addition to the remaining airspace, the remaining life of any landfill is determined by the average monthly waste disposal rate, which varies depending on the need for waste disposal capacity.

The following additional waste management components that aim at the treatment, re-use and recovery of waste are being considered and will be investigated in the EIA phase in terms of their feasibility, benefit and impact on the surrounding environment:

- Materials recovery facility (MRF), with a conveyor belt, sorters and skips; and
- Facility for the processing of biodegradable waste (composting facility).

#### 2.2.1 Description of typical disposal cell development

Waste disposal facilities are dynamic structures that need continual monitoring to ensure environmental sustainability. The landfill is typically divided into different cells for disposal so the owners and operators of the landfill can control its day-to-day workings.

A cell is an area (typically about 150 m x 150 m, depending on local conditions) that is excavated and lined to receive waste. The waste disposed of at the waste disposal facility is directed to the active cell and the next cell is prepared by shaping and constructing liners to receive waste once the previous active cell is nearing capacity.

A phased approach to excavating, lining and filling each cell is typically used at waste disposal facilities. The first cell is usually excavated and the excavated material is stockpiled for use when the cells need to be filled and rehabilitated. Once the first cell is ready to accept waste, excavation on the second cell will begin. Waste received on the landfill is deposited in horizontal layers about 2 m thick and is continuously compacted. Excavated material from the second cell is used to cover the waste that is deposited in the first cell in layers of cover material about 150 mm thick; once to twice daily. Once the first cell has reached capacity, it is domed, capped and rehabilitated (vegetated). The second cell would have been lined already and will begin to accept waste, whilst excavations on the third cell begin. This process of excavation, filling and rehabilitation of cells continues, depending on the number of cells proposed. Topsoil from each cell excavated will be stockpiled for use during the capping and rehabilitation of each cell once it has been closed to facilitate the rehabilitation of indigenous vegetation over the cell.

Topsoil and some clay from each cell excavated is stockpiled for use as liners and to progressively cap and rehabilitate each cell once it has been closed to facilitate the rehabilitation of indigenous grass over the cell.

The exact processes for the development of the disposal cells, including the footprint, depth below-ground level, slope and the final height of the cells, as well as the rehabilitation of the cells will be investigated during the preliminary design phase of the proposed development and will be presented in the EIA Report.

#### 2.2.2 Description of typical cell lining, cover and capping

The National Norms & Standards for Disposal of Waste to Landfill (August 2013); provides standards for the lining of disposal cells to prevent soil and groundwater contamination beneath the disposal cells. Cell liners typically comprise layers of geomembranes, geosynthetic clay liners (GCL) and/or compacted clay (Figure 2-3). The final design of the liner system that will be proposed for this facility will be included in the feasibility report as part of the EIA Phase of the project.



Waste that is disposed of in a cell is compacted throughout the day before being covered at least once a day with about 150 mm of soil to prevent windblown litter, prevent the breeding of vectors and rodents and to prevent nuisance odours (malodours) escaping from the waste body.

The daily cover also directs contaminated rain water runoff into the contaminated runoff management system, thus preventing rain water from infiltrating the waste body and generating leachate. Water that did infiltrate the waste body to generate leachate will be extracted from the leachate collection system for containment and onsite treatment.

Waste compaction ensures a stable surface for vehicle movement when the next 2 m layer of waste is to be deposited, and helps extending the life of the disposal facility. Once a cell has reached capacity, it is domed and covered (capped) with layers of clay, GCLs and topsoil before being vegetated, which prevents water from entering the waste body once it has been closed and rehabilitated.

Rain water running off the capped and rehabilitated areas is considered clean and, with that verified through water quality testing, such water may be directed into the receiving environment.



**Figure 2-3: Example of the typical waste cell construction**

### 3. Legislation and Guideline Documents

This section provides information on environmental-related legislation and guideline documents relevant to the proposed development.

#### 3.1 The National Environmental Management Waste Act, Act 59 of 2008

The proposed waste disposal facility includes activities listed in Categories A and B of Government Notice (GN) 37083 of November 2013, published in terms of Section 19(1) of the NEMWA, as waste management activities that may have a detrimental effect on the environment and for which authorisation is required in the form of a Waste Management Licence. The relevant activities in terms of GN 37083 are listed in Table 3-1.

**Table 3-1: Listed Activities in Terms of Category A and B of GN 37083 of November 2013**

Category A Or B	Activity Numbers	Activity Description
A	2	The sorting, shredding, grinding, crushing, screening or bailing of general waste at a facility that has an operational area in excess of 1000 m <sup>2</sup>
A	3	The recycling of general waste at a facility that has an operational area in excess of 500m <sup>2</sup> , excluding recycling that takes place as an integral part of an internal manufacturing process within the same premises
A	4	The recycling of hazardous waste in excess of 500 kg but less than 1 ton per day calculated as a monthly average, excluding recycling that takes place as an integral part of an internal manufacturing process within the same premises
A	6	The treatment of general waste using any form of treatment at a facility that has the capacity to process in excess of 10 tons but less than 100 tons
A	7	The treatment of hazardous waste using any form of treatment at a facility that has the capacity to process in excess of 500 kg but less than 1 ton per day excluding the treatment of effluent, wastewater or sewage
A	9	The disposal of inert waste to land in excess of 25 tons but not exceeding 25 000 tons, excluding the disposal of such waste for the Purpose of levelling and building which has been authorised by or under other legislation
A	12	The construction of a facility for a waste management activity listed in Category A of this schedule (not in isolation to associated waste management activity)
B	3	The recovery of waste including the refining, utilising, or co-processing of the waste at a facility that processes in excess of 100 tons of general waste per day or in excess of 1 ton of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises
B	4	The treatment of hazardous waste in excess of 1 ton per day calculated as a monthly average, using any form of treatment excluding the treatment of effluent, wastewater or sewage
B	6	The treatment of general waste in excess of 100 tons per day calculated as a monthly average, using any form of treatment
B	7	The disposal of any quantity of hazardous waste to land
B	8	The disposal of general waste to land covering an area in excess of 200 m <sup>2</sup> and with a total capacity exceeding 25 000 tons
B	9	The disposal of inert waste top land in excess of 25 000 tone, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation
B	10	The construction of a facility for a waste management activity listed in Category B of this schedule (not in isolation to associated waste management activity)

In terms of GN 37083, the process to be followed in the application for a Waste Licence for activities identified in Categories A and B is a full Scoping and EIA process, as described in the EIA Regulations in GN 543 of June 2010, published in terms of the NEMA.

### 3.2 National Environmental Management Act, Act 107 of 1998

When the application was submitted for the proposed development, the proposed waste disposal facility and associated infrastructure included activities listed in GN 544 and 545 of June 2010, as amended, published in terms of Sections 24 and 24D of the NEMA, as activities that may have a detrimental effect on the environment and for which authorisation is required. The relevant activities in terms of GN 544 and 545 are listed in Table 3-2.

**Table 3-2: NEMA Listed Activities in Terms of GN 544 and 545**

Relevant Notice	Activity No:	Describe each listed activity	Applicability
Regulation R544	9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water –  (i) with an internal diameter of 0,36 metres or more; or  (ii) with a peak throughput of 120 litres per second or more, excluding where:  a) such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or  b) where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	It is still to be determined, as part of the EIA phase and preliminary design, what services infrastructure will be required for the proposed development and what municipal service infrastructure is available in the area of the proposed site. Pipelines may therefore need to be installed to enable connection to municipal services. This will be investigated as part of the EIA phase.
Regulation R544	12	The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 OF 2010.	The construction of a dam for the storage of stormwater may be required to be constructed. The design of such a facility has not been conducted, however, it is anticipated that the capacity would be more than 50000 cubic metres.
Regulation R544	13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.	Facilities will be constructed for the provision and storage of fuel. These facilities will have a combined capacity of less than 500 cubic metres.
Regulation R544	22	The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8 metres.	The site currently has an existing access road. There is an option for an alternative access, which will require a new road to be constructed. The road will have to be wide enough for the safe passage of vehicles entering and exiting the proposed landfill. The length and width of the road will be determined during the Scoping and EIA phases.

Regulation R544	47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre –  where the existing reserve is wider than 13,5 meters; or  where no reserve exists, where the existing road is wider than 8 metres - excluding widening or lengthening occurring inside urban areas.	There is an existing public road that will be used as access and due to the road being narrow, it needs to be upgraded. This will be determined during the Scoping and EIA phases.
Regulation R545	5	The construction of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No.544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).	A Water Use Licence in terms of Section 21 of the National Water Act will be required for the disposal of waste in a manner that may detrimentally affect water resources (NWA).  Air Quality investigations will be conducted to determine if an atmospheric emissions permit will be required in terms of the National Environmental Management: Air Quality Act (NEMAQA).

The process to be followed in an application for environmental authorisation for activities listed in GN 544 and 545 is a full Scoping and EIA process, as described in the EIA Regulations in GN 543 of June 2010, published in terms of the NEMA.

### 3.3 National Heritage Resources Act, Act 25 of 1999

The National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA) stipulates that the South African Heritage Resources Agency (SAHRA) must provide a letter of satisfaction for the following types of development:

- Linear expansion of more than 300 m;
- Structures in excess of 50 m;
- Expansions in excess of 5000 m<sup>2</sup> in area;
- Rezoning, land use changes and township development in terms of regulations or the Development Facilitation Act (DFA) in excess of 10 000 m<sup>2</sup> in area; and
- As deemed appropriate by SAHRA.

A Heritage Impact Assessment (HIA) will be conducted and submitted to SAHRA to provide the required information for the SAHRA to make an informed decision in this regard.

### 3.4 Other Applicable Legislation

Scoping of other relevant legislation was undertaken to identify only the key legal issues related to the proposed project, and is summarised in Table 3-3.

**Table 3-3: Summary of Applicable Legislation**

Legislation	Sections	Relates to
The Constitution of South Africa, 1996 (Act 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
	Section 25	Rights in property
	Section 32	Administrative justice.
	Section 33	Access to information.

Legislation	Sections	Relates to
<b>National Environmental Management Act, 1998 (Act 107 of 1998) as amended</b>	Section 2	Defines the government's strategic environmental management goals, principles and objectives. Applies throughout the country to the actions of all organs of state that may significantly affect the environment.
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	The developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
<b>The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) and regulations</b>	Section 6	Implementation of control measures for alien and invasive plant species, soon to be repealed by the National Environmental Management: Biodiversity Act listing species currently under public review
<b>National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004)</b>	Section 32	Control of dust.
	Section 34	Control of noise.
	Section 35	Control of offensive odours.
<b>Occupational Health and Safety Act, 1993 (Act 85 of 1993) and regulations</b>	Section 8	General duties of employers to their employees.
	Section 9	General duties of employers and self-employed persons to persons other than their employees
<b>National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)</b>	Sections 5 and 39	Strategy for achieving the objectives of the United Nation's Convention on Biological Diversity, to which South Africa is a signatory.
	Sections 65-69	These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species
	Sections 71 and 73	These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species.
<b>Fencing Act, 1963 (Act 31 of 1963)</b>	Section 17	Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.
<b>National Water Act, 1998 (Act 36 of 1998) and regulations</b>	Section 19	Prevention and remedying the effects of pollution.
	Section 20	Control of emergency incidents.
	Chapter 4	Use of water and licensing.
<b>Water Services Act, 1997 (Act 108 of 1997) and regulations</b>	Section 7	Effluent acceptance from Local Authority.
	GN R 2384	Regulation on water works.
<b>National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977)</b>	Section 4	Local Authority approval of plans to erect buildings.
<b>National Road Traffic Act, 1996 (Act 93 of 1996) and GN R225</b>	Chapter 8	Transportation of hazardous substance by road, loading and offloading including related SANS requirements:

Legislation	Sections	Relates to
		<p>10228 The identification and classification of dangerous goods</p> <p>10229 The packaging of dangerous goods for road and rail transportation in SA</p> <p>10233 Intermediate bulk containers for dangerous goods</p> <p>10230 Transportation of dangerous goods - inspection requirements for road vehicles</p> <p>10231 Operational requirements for road vehicles</p> <p>10232-1 Transportation of dangerous goods - Emergency information systems - Road Transportation</p> <p>10232-2 Transportation of dangerous goods - Emergency information systems - Emergency Response Guides</p> <p>11398 Road tank vehicles for petroleum based flammable liquids - design requirements</p> <p>11518 Transportation of dangerous goods - design requirements for tankers</p>
<b>National Veld and Forest Fire, 1998 (Act 101 of 1998)</b>	Section 12	Relates to the duty on owners to prepare and maintain firebreaks.
<b>National Heritage Resources Act, 1999 (Act 25 of 1999)</b>	Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
	Section 38	This section provides for Heritage Impact Assessments (HIA), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
<b>National Environmental Management: Waste Act, 2008 (Act 59 of 2008)</b>	Section(2)	Highlights the objectives and principles of the act for protecting health, wellbeing and the environment by providing reasonable measures.
<b>Development Facilitation</b>	Chapter 5	Land development procedures excluding procedures relating to the development

Legislation	Sections	Relates to
Act (Act 67 of 1995)		of small-scale farming.
Restitution of Land Rights Act (Act 22 of 1994)	Whole	To provide for the restitution of rights in land in respect of which persons or communities were dispossessed under or for the purpose of furthering the objects of any racially based discriminatory law.
Minerals and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA) and regulations	Whole	Provisions for closure objectives and closure plans for a mining area.

## 4. Alternatives Considered

The identification of alternatives is an important component of the EIA process. Should further alternatives (for example process, site layout and operation alternatives) arise during the EIA Phase, it will be assessed as part of the EIA process and documented in the EIA Report. The alternatives listed below have been identified thus far:

- Do nothing option;
- Site access alternative;
- Buffer zone alternatives; and
- Site / location alternatives.

### 4.1 No-go Option

The National Department of Environmental Affairs (DEA) stresses that the no-go option should be considered in cases where the proposed development may have a significant negative impact that cannot be effectively or satisfactorily mitigated. Should the waste disposal facility site not be approved at the Multisand site, the current sand and rock mining activities (current use of the site) will continue. One of the potential site alternatives would then need to be applied for as the proposed site for the development of a landfill and assessed in a new EIA Phase.

The increase in waste from the identified study area requires an effective waste management and disposal solution to prevent illegal dumping and over-capacitating of existing municipal waste disposal facilities, most of which do not comply with the Minimum Requirements for Waste Disposal by Landfill (DWAF, 1998), the National Norms & Standards for Disposal of Waste to Landfill (August 2013), the principles of NEMA, or licence requirements in terms of the NEMWA. With the eminent closure of the existing municipal waste disposal facilities in the study area, the Tshwane Metropolitan Municipality may no longer be able to render the municipal services for which it is mandated by the Constitution.

In addition to the above, it is to be recognised that should a landfill not be developed by Interwaste, the company may not be able to meet its obligations to its clients within the study area for the collection and disposal of waste, and the clients would need to make alternative arrangements. This could also have financial implications, such as the loss of income that is generated from these clients, and thus potentially for staff members at Interwaste (job losses). Alternatively, financial losses to Interwaste could necessitate an increase in fees for its clients outside of the study area, which may ultimately be transferred to the consumer (waste generators).

### 4.2 Site Access Alternatives

Site access alternatives are still under investigation and consideration. Any alternatives that are identified will be assessed as part of the EIA Phase and presented in the EIA Report. A gravel road currently provides access to the Multisand site from the R566 to the north, with a registered servitude to the south. To accommodate waste trucks, either the existing access route will require upgrading or a new access route would have to be constructed.

### 4.3 Buffer Zone Alternatives

These will be investigated during the detailed air quality study that will form part of the EIA and the relevant specialists (in particular the air quality specialist) will recommend buffer zone requirements with alternative mitigating measures, depending on the outcomes of their studies. Buffer zone widths also may vary around the boundary of the proposed landfill, depending on site specific circumstances such as wind strength and direction; neighbouring land use, etc. Hypothetically, upwind buffers may potentially be narrower than downwind buffers. This will however need to be assessed during the EIA phase.

### 4.4 Site location alternatives

A site selection process was conducted to identify feasible site alternatives for the proposed development and to determine the most feasible location from a technical perspective. The most technically feasible site (the preferred site) has been applied for as the proposed site and will be assessed from an environmental perspective in the EIA process.

Site selection is a minimum requirement for selecting a specific site or sites before more detailed investigations are carried out. In this particular case, and in many other instances, the situation is slightly different in that a specific site is available and desk top studies up to now have not indicated any fatal flaws. In this instance the site selection process has two objectives:



- Assess the current status in terms of available landfill capacity and thus the need for additional landfills for the City of Tshwane to dispose of waste; and
- Demonstrate that the desktop study already undertaken is valid and that no other suitable sites are in proximity to the preferred site.

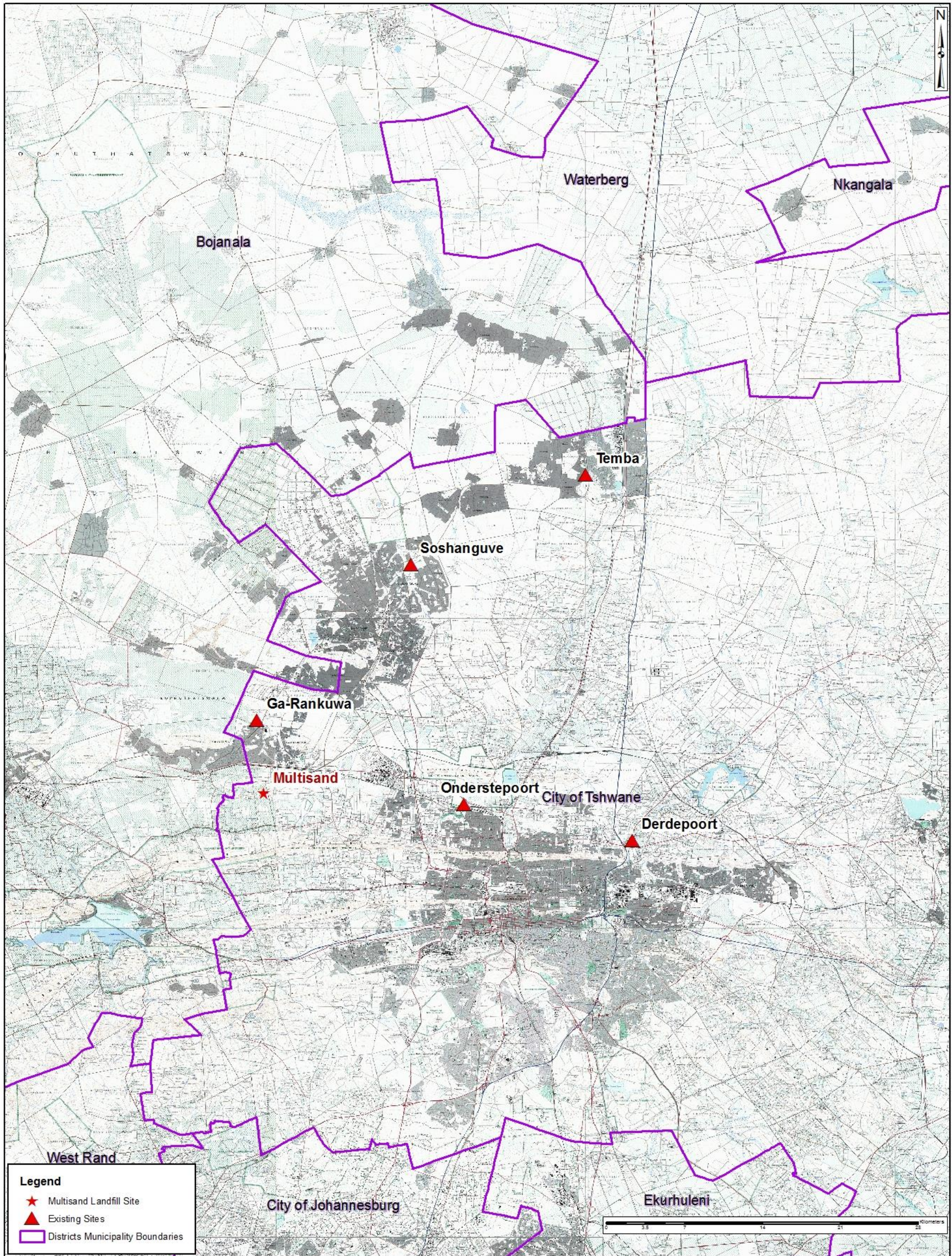
The region selected for this study is mainly the City of Tshwane area north of the Magaliesberg Mountain. Two sites, previously just outside the Tshwane area, and one just south of the mountain have also been included (Appendix A). With the proposed Multisand landfill to be located on the border between Gauteng and the Northwest Province, it can be expected that the new landfill will also draw waste from the Northwest Province. Similar to other commercial regional landfills, the Multisand landfill will not be developed for the exclusive use by any particular municipality; or for private waste generators from a single municipal area.

#### 4.4.1 Existing Landfills

The main source of information on existing landfills in the region is a November 2004 study done for the City of Tshwane by Felehetsa and BKS (2004). More recent studies are not readily available and where available, information presented from different studies is often found to be conflicting. The sites were also studied using recent Google images. The locations of the existing sites are indicated on Figure 4-1 and details provided in Table 4-1 below. According to the 2004 study Waste Group also operates a landfill at Bon Accord and EnviroServ a landfill at Rosslyn. The Waste Group Mooiplaats site is not included in the study area as it is situated far to the south in Centurion.

**Table 4-1: Existing Landfill Sites in the Tshwane Area**

Landfill Site	Classification	Status	Landfill Area (ha)
Derdepoort	G:M:B	To be closed in 3 years from 2004 i.e. 2007. Site is closed.	12.4
Ga-Rankuwa	G:M:B	Estimated to be operational for 20-25 years from 2004. Surrounded by townships to north and south.	41.9
Onderstepoort	G:L:B	Estimated to be operational for 20-25 years from 2004. Site is surrounded by major transport links i.e. N4 route, road R566 and a railway line as well as nature reserves and a spruit. The site seems to be very active because of its central location, but it appears as if almost all the space has been used.	51.8
Soshanguve	Permitted as Class 2 under the very first landfill licensing system used in South Africa	Estimated to be operational for 10-15 years from 2004 i.e 2014 to 2019. Site is situated adjacent to and east of a spruit. Housing is close to the northern and southern boundaries with informal housing encroaching from the southern boundary. Institution type development is present east of Soutpans Road (M35) on the eastern side.	39.2
Temba	G:S:B	To be closed within 6-12 months from 2004. Residential development is present on all sides of the small site. The site seems to be still active but will be closed within months	3.7



Project Title:	<b>PROPOSED INTERWASTE MULTISAND REGIONAL WASTE FACILITY</b>	Scale	1:300 000	<b>FIGURE 4-1</b>
Map Title:	<b>Location of Existing Landfill Sites with the Tshwane Area</b>	Projection:	Geographic - Hartbeeshoek 1994	Sources:
<small>Whilst every care has been taken in compiling the information on this map, AECOM cannot accept responsibility for any inaccuracies.</small>		Drawn by:	LC Gallagher	1:10 000 Topographic Map
© Copyright		GIS QC by:	JM Stone - PGP 0124	(Department of Rural Development & Land Reform)
		Approved by:	J Hayes	
		Date:	2014-01-24	
		Map Ref.:	Location of Existing Landfill Sites.mxd	
		Revision:	00	
		Project Nr.:	J13020	
<small>Y:\7_Projects\J13020 - Multisand_Fig4.1_Location of Existing Landfill Sites_A3L.mxd</small>				

Figure 4-1: Location of Existing Landfill Sites with the Tshwane Area

From the desktop study of existing landfills, it is clear that very few landfills have a long remaining life. **No new landfills in the area are in the process of being licensed.** Even though new waste minimisation and disposal technologies are being investigated throughout South Africa, large capacity well operated disposal landfills will always remain an essential part of any waste management system.

#### 4.4.2 New Potential Sites

A desk top study has been done to identify other potential landfill sites. To minimise the impact on the environment, whilst making use of waste disposal as a means of rehabilitating areas previously scarred by mining activities, Interwaste adopted a strategy of identifying areas of disturbed ground (quarries, mine tailings sites, etc.) rather than greenfields during the site selection investigations. Quarries are also more suitable for providing increased air space.

Recent Google images were mainly used in the study. The 1:50000 published geological maps 2527DB, 2528CA and 2528CB as well as the 1:250000 published Pretoria map (2528) were used to describe the geology. The locations of the sites identified are indicated on Table 4-2 and details provided in Appendix A.

The desktop study information was interpreted under the following headings:

- Location (Latitude Longitude);
- Type of feature;
- Description e.g. operating quarry, sandworks etc;
- Approximate size (and excavation depth);
- Potential fatal flaws; and
- Underlying geology.

**Table 4-2: Alternative Sites Investigated**

Site Alternative	Type of Feature	Description	Approximate Size and Depth	Potential Fatal Flaw	Geology
Preferred Site (Multisand)	Excavations for sand and aggregate	Shallow excavation into sand and deep excavations into rock to mine sand for construction and sand and rock for use in chrome smelters	Two quarries, large areas mined for sand and silting ponds for fines. Disturbed area 150 ha and quarries up to 40 m deep	None	Sand and rock deposits from Smelterskop quartzite inclusions in the Bushveld Igneous Complex
Alternative 2	Very large quarry in Magaliesberg quartzite east of the N1 highway	Deep excavation with benches on northern, western and southern sides. Screened from residential areas but close to residences	1200 x 320 m (38 ha) at surface.  Depth >50 m	May be a possibility in future but still operating. Close to residential development. There may also be other preferred uses	Magaliesberg quartzite
Alternative 3	Operating sand and aggregate works	Large shallow sand works with minor quarry areas. Water (probably stormwater) in some deeper excavations. Some settling ponds also contain water	Roughly 30 ha mainly shallow excavations but minor deeper rock quarries	None clearly evident but works are operational	Probably hillwash from Magaliesberg quartzite and Smelterskop quartzite overlying mainly Smelterskop quartzite
Alternative 4	Probably sandworks area (multitude of works distributed over a large area)	Mainly shallow excavations, probably still operational	About 131 ha (Area surrounded by similar operations in 500 ha area)	Probably still operating. Spruit on western side of works	Sand deposits and hillwash from the quartzite of the Swaershoek Formation, Nylstroom Group, Waterberg

Site Alternative	Type of Feature	Description	Approximate Size and Depth	Potential Fatal Flaw	Geology
					Supergroup.
Alternative 5	Excavation for sand and aggregate	Shallow excavations into sand and deeper quarries into quartzite rock. Aggregate probably supplied to chrome smelters	105 ha	Excavations and quarries still operational.	Sand and rock deposits from Smelterskop quartzite inclusions in the the Bushveld Igneous Complex
Alternative 6	Deep stone quarry	Deep quarry with crushers. Some water on quarry floor	280 x 260 m i.e 7,2 ha on surface, > 20 m deep	Still operating. Cover material. Small size	Underlain by gabbro of the Gabbro Unit, Bushveld Igneous Complex
Alternative 7	Irregularly shaped deep excavation with water on floor	Probably excavation for sand and rock. Possibly material for brickworks just east of excavation	3 ha	Small size, just 250 m north of road and township	Situated on gabbro of Gabbro Unit and harzburgite of the Bushveld Igneous Complex
Alternative 8	Large irregularly shaped backfilled area	Possibly old waste site. Not operational	17 ha	Too close to industrial and residential townships. Closed waste disposal site.	Gabbro of the Gabbro Unit, Bushveld Igneous Complex
Alternative 9	Small deep quarry with water on floor	Deep stone quarry about 330 m east of Bon Accord dam. Not operational	5 ha on surface > 25 m deep	Proximity to Bon Accord dam. Small size	Gabbro of the Gabbro Unit, Bushveld Igneous Complex
Alternative 10	Large disturbed area of unknown origin just west of N1 road	Large area with mainly shallow surface works with large irregular shaped dumps. Some holes waterfilled. Minor deeper rock excavations. Not operational.	76 ha	Extensive work required to develop facility mainly above ground	Gabbro of the Gabbro Unit, Bushveld igneous complex
Alternative 11	Large disturbed area of unknown origin	Irregularly shaped deep excavations with some water. Minor deep quarries in large disturbed area	36,0 ha	450 m south east of "educational" facilities.	Gabbro of the Gabbro Unit, Bushveld Igneous Complex
Alternative 12	Large disturbed area about 600 m east of Soshanguve	Some irregular shaped water filled excavations with some deeper quarries. Possibly sand works or borrow pit. Not operational	11 ha	Spruit running east-west through area	Probably granophyre of the Rashedoop Granophyre Bushveld Igneous Complex
Alternative 13	Stone quarry	Deep stone quarry. No water on floor. Likely to be operational	5,8 ha on surface and >30 m deep	Operational and close to smallholdings. Small size	Gabbro of the Gabbro Unit of the Bushveld Igneous Complex

Site Alternative	Type of Feature	Description	Approximate Size and Depth	Potential Fatal Flaw	Geology
Alternative 14	Large excavated area south of Magaliesberg	Sandworks and old quarries east and quarries west seem to be manufacturing bricks (from sand)	Quarries west about 12 ha with 40 m high northern quarry face. Quarries east about 31 ha with 30 m high irregularly shaped northern faces	Operational. Not close to major development but about 600 m from buildings on smallholdings	Magaliesberg Quartzite and Magaliesberg Shale of the Magaliesberg Group, Transvaal Supergroup
Alternative 15	Large excavated areas with dumps of spoil material. Probably clay quarries	Large irregularly excavated areas, some into rock with shallow water on floor of quarry	57 ha – varying depths (5-10 m)	Probably still operating. 3 km long air strip to the south	Mudrock and sandstone of the Eccca Group, Karoo Supergroup

#### 4.4.3 Conclusion

The study of existing and potential waste disposal sites shows that:

- The existing landfills have a limited life and there is a demand for a long term well operated waste disposal facility in the Tshwane area; and
- As far as the identification of new landfill sites is concerned some potential sites may be investigated. The desk study information does not, however, show any site with more promise than the preferred Multisand site.

It is therefore concluded that the Multisand site is the preferred site at present and should be investigated further as part of the EIA process to determine its suitability for development of a new large regional landfill.

## 5. Description of the Receiving Environment

### 5.1 Physical Environment

#### 5.1.1 Climate and Atmospheric Conditions

The project area is situated within the Highveld climate zone that generally has relatively warm to hot summers and mild winters. The area has summer rainfall, and dry winters. The area receives between 500 and 600-mm of precipitation per annum. Rain falls predominantly during summer in the form of showers and thunderstorms, which generally are of short duration (30 - 60 minutes). However, at times the storms can last between 3 to 4 hours.

Maximum temperature in summer (January) can reach an average of 30°C while the average minimum temperature in winter (June) is -2°C (Mucina and Rutherford, 2006). Frost does occur occasionally.

#### 5.1.1.1 Rainfall and Temperatures

Table 5-1 indicates the monthly average rainfall and temperatures, as obtained from the approved Environmental Management Programme (EMP) for the Multisand quarry in June 2001.

**Table 5-1: Monthly average rainfall and temperature**

Month	Rainfall (in mm)	Temperatures (°C)	
		Maximum	Minimum
January	102.1	26.0	14.2
February	76.1	25.3	14.0
March	66.9	24.2	12.4
April	40.3	21.4	9.0
May	11.8	19.0	5.3
June	4.5	16.4	2.1
July	3.0	16.8	2.3
August	9.8	19.4	4.5
September	16.1	22.9	8.1
October	49.0	24.3	10.8
November	81.5	24.7	12.3
December	82.3	25.6	13.4
<b>TOTAL</b>	<b>593.4</b>		

#### 5.1.1.2 Wind

The mean monthly wind direction and speed are provided in Table 5-2 below. Generally, the predominant wind direction for 7 months of the year is north-easterly with an average wind speed of 2.5 metres per second (m/s), which is considered light. However, during the winter months the predominant wind direction is westerly with an average wind speed of 3.3 m/s.

Table 5-2: Mean Monthly Wind Direction &amp; Speed

Month	North		Northeast		East		Southeast		South		Southwest		West		Northwest	
	N	V	N	V	N	V	N	V	N	V	N	V	N	V	N	V
January	69	2.7	162	2.9	103	3.2	43	3.6	22	3.6	19	3.6	69	3.3	88	2.8
February	51	2.6	140	2.6	131	3.2	51	3.1	15	3.2	26	3.1	57	3.1	73	2.7
March	49	2.5	122	2.4	92	2.8	36	3.3	22	2.9	20	2.7	66	3.1	70	2.6
April	37	2.4	66	2.4	59	2.6	26	2.8	19	3.5	24	3.1	85	3.3	66	2.7
May	24	2.7	39	2.4	52	2.5	34	3.0	22	3.2	31	2.9	76	3.3	60	2.8
June	19	2.6	44	2.6	47	2.8	25	2.8	27	3.3	49	3.3	81	3.3	51	2.8
July	30	2.8	45	2.6	50	2.9	29	2.6	29	3.1	34	3.4	73	3.3	60	3.0
August	49	3.2	94	3.2	60	2.9	22	3.1	25	2.7	34	3.8	93	3.9	97	3.4
September	68	3.6	174	3.3	74	3.4	34	3.7	23	3.1	31	3.7	87	4.5	99	3.6
October	97	3.0	201	3.3	67	3.4	31	4.2	23	3.8	23	3.7	79	3.8	110	3.3
November	95	3.0	196	2.9	73	3.7	29	4.2	21	3.2	29	3.7	95	3.8	114	3.1
December	82	2.8	159	2.8	61	3.2	27	3.7	20	3.8	26	3.4	93	3.5	100	2.9

N: Average direction frequency per thousand

V: Average speed in meters per second

### 5.1.1.3 Evaporation

Relatively high levels of evaporation occur in the Province, as a result of high solar radiation levels experienced. Evaporation is greater in summer than in winter, due to higher air temperatures. On average the evaporation exceeds precipitation by a factor of 2.7, and is expected to be between 1700 and 1800 mm per annum. The area generally has a high A-Pan evaporation rate in the summer months from November to January.

The average evaporation for the year is 1.78 m in the Tshwane area, according to the approved EMP compiled in June 2001.

### 5.1.1.4 Incidence of Extreme Weather Conditions

Extreme weather conditions are generally not common in the area. However, frost does occur during the winter months from June to mid-August with a number of occurrences ranging from 2 to 20 days. Hailstorms occur in the area with hail pellets ranging in size from 3 mm to 30 mm. During hail storms damage to crops and buildings may occur.

Regular droughts results in farmers of the area being dependent on ground water or Rand Water Board/Irrigation Board supply. Dry spells in the area have been recorded since 1932.

### 5.1.2 Air Quality

The proposed project area is located in a predominantly rural area with the general air quality being good. The current land use (mining) will have the following impacts on air quality within the project area:

- Dust is generated during the crushing process;
- Access and haul roads generate dust;
- Dust is generated during blasting; and
- Plant, vehicles and mobile equipment generate emissions.

Other activities taking place in the vicinity such as agriculture (dry land crop production, etc.), residential establishments (Ga-Rankuwa, etc.) and the traffic on surrounding roads contribute to the cumulative impacts of airborne pollutants in the area.

#### 5.1.3 Noise

Noise from current mining activities occurs within the project area mainly due to crushing, blasting and vehicular noise. Noise compliance assessments conducted for the existing Multisand quarry indicates that noise exposure exceed 82 decibels (dB). In addition, adjacent farming activities and traffic along the roads in close proximity to the project area will also contribute to noise being experienced within the area.

#### 5.1.4 Geology

According to the published geological maps of the area, the project area is underlain by igneous rocks of the Bushveld Complex that intruded into the older sedimentary sequences of the Pretoria Group. The southern part of the project area is underlain by Lower Zone norite rocks of the Bushveld Complex, while the area between the two sets of prominent hills further north is underlain by gabbro-norite of the Main Zone of the Bushveld Complex. The quartzitic rocks forming the prominent hills in the central and northern part of the project area where quartzite is currently mined, forms part of the Rayton Formation which is the most upper or youngest sedimentary sequence of the Pretoria Group. Quartzite and sand is currently mined from the southern range of these hills. A prominent outcrop of norite and acidic, migmatized hybrid rock is present between the southern outcrops of the Rayton quartzite formation and the norite of the Lower Zone. Stratigraphically this layer is correlated with the Marginal Zone of the Bushveld Complex, and could represent a chill zone of the larger magma intrusion that resulted in the Bushveld Complex.

The various outcrops of the Bushveld Complex and the quartzite being mined has a general east-west strike direction with a northerly dip of around 30°. Weathering of two prominent outcrops of the Rayton quartzite formation resulted in the formation of thick deposits of silty sand between the quartzite ridges. The weathering of basic rocks of the Bushveld Complex again resulted in large areas within the project area to be covered by clayey soils. No structural features such as faults or dyke intrusion are indicated on published available geological maps or have been intersected during the quartzite mining operations, but further investigations will be required.

The Marikana Thornveld (SVcb 6), one of the vegetation units found on site, occurs mainly in areas underlain by mafic intrusive rocks of the Rustenburg Layered Suite of the Bushveld Complex.

The Gold Reef Mountain Bushveld (SVcb 9), another of the on-site vegetation types, occurs in areas underlain by quartzite of the Rayton Formation.

#### 5.1.5 Topography

The project area is located at the northern foothills of the Magaliesberg mountain range. This results in an undulating countryside with a maximum of over 80 m in difference of elevation from the general existing mining area to the valley below. The general area has a morphology ranging from hills and lowlands to gently undulating plains. According to the ENPAT maps of the Gauteng Province, the area consists of lowlands with parallel hills.

Large sections of the surrounding area have been irreversibly transformed, primarily from sand mining and agricultural activities. Fallow agricultural lands dominate the southern section of the project area. The northern and eastern boundary areas still retain the original savanna habitat of the area and remain in relatively pristine condition.

#### 5.1.6 Soils

The soils of the project area fall within the Ae21d classification (Figure 5-2). Three distinct soil types are found at the Multisand project area. The soil mined is of the Mispah Form – Ms. This soil type comprises of an Orthic A-horizon, which directly overlies hard rock.

The soils of the Marikana Thornveld (SVcb 6), one of the vegetation units found on-site, consists mainly of vertic or melanic clays with some dystrophic or mesotrophic plintic catenas and some freely drained, deep soils (Mucina & Rutherford, 2006).



The soils on which the Gold Reef Mountain Bushveld (SVcb 9) vegetation type is present are shallow, gravel lithosols of the Mispah and Glenrosa forms, and originate from areas underlain predominantly of quartzites of the Rayton Formation (Mucina & Rutherford, 2006).

Figure 5-1: Map showing the surface geology around the Project Area

Figure 5-2: Map indicating the different soil Types around the Project Area

### 5.1.7 Existing Land Capability

Large sections of the existing project area have been irreversibly transformed, primarily by current and historical sand mining activities. Fallow agricultural lands dominate the southern section of the project area. The northern and eastern borders, however, still retain the original savanna habitat of the area and remain in relatively pristine condition.

The pre-mining land capability of the disturbed areas is presumed to have been predominantly livestock grazing, as it is generally rocky with limited soils being present. The Wildebeesthoek portion of the mining area, although mainly utilized for grazing could also potentially produce crops.

### 5.1.8 Land Use

Land use in the greater area, varies and this is depicted in Figure 5-3 below reflecting the general land usage of the area:

- Built-up urban areas, e.g. Ga-Rankuwa located approximately 6 km to the north and Rosslyn located 10 km to the east;
- Agricultural uses e.g. small-scale crop production and predominantly livestock grazing, on the farms in the immediate vicinity; and
- Protected natural areas such as the Magaliesberg Protected Natural Environment located some 5 km to the south of the mining area.

Most of the project area consists of grazing land with large areas being irreversibly altered by mining activities. The mining area also has a small section that has been previously used for crop production, but is now laying overgrown and unused.

There is no actual evidence of overgrazing present onsite and the only disturbed areas are those areas currently being mined, or used for mine infrastructure and tailings from sand washing. The majority of the structures and infrastructure has been in existence for some time and are located on the farm Wildebeesthoek. This area is rocky and it is presumed that it had been used for grazing purposes previously.

### 5.1.9 Surface Water

#### **5.1.9.1 *Surface Water Catchment Areas***

The project area falls within the primary catchment area of the Limpopo River Basin (Figure 5-3). According to statistics and background information for the Limpopo River Basin the following must be noted:

- The Limpopo River catchment covers an area of approximately 413,000 km<sup>2</sup>;
- Runoff is generally calculated at 13 mm per annum;
- Water is transferred into the Limpopo River basin from 6 separate transfer schemes;
- Presently 244,000 ha are irrigated within the Limpopo River catchment with an additional potential of 122,000 ha available in selected sub-catchments. However, approximately 70,000 ha is currently over developed in certain sub-catchments, thus, areas where demand exceeds availability;
- Other land uses within the Limpopo River basin are dry land crops at 234,000 ha; pastures at 1,780,000 ha and forestry at 455,000 ha;
- The population in the Limpopo River basin is estimated at 14 million people with a poverty rate estimated at 75% over the whole area; and
- It is estimated by Limpopo River Basin Water and Food Scheme that within 4 years 10% of the population will have abandoned their homes and migrated southwards and that up to 10% of those remaining will have died from AIDS-related illnesses.

The project area falls within the Crocodile (West) Marico Water Management Area (WMA 3), one of 6 water management areas that make up the Limpopo River Basin Catchment Area.

According to the River Health Programme (2005), State-of-Rivers Report: Monitoring and Managing the Ecological State of Rivers in the Crocodile (West) Marico Water Management Area compiled for the Department of Environmental Affairs and Tourism in Pretoria, the Crocodile (West) Marico Water Management Area (WMA) lies primarily within the North West Province with parts of it in the northern region of Gauteng and the southwestern corner of the Limpopo Province. Along the northwestern side, the WMA borders on Botswana.

The Crocodile and Marico rivers are the two main rivers in this WMA, which at their confluence forms the Limpopo River that flows eastwards to the Indian Ocean. The Limpopo River is an international river that is shared by Botswana, Zimbabwe and Mozambique. The headwaters of the west flowing Molopo River, a tributary of the Orange River, also forms part of the WMA.

Important features in this WMA include the Bafokeng Tribal Area, the Pilanesberg Nature Reserve, the Cradle of Humankind Heritage site, the dolomitic wetland or "eye" system found at the source of the Marico and Molopo rivers and large dams such as Hartbeespoort, Rooikopjes, Vaalkop, Roodeplaat, Klipvoor and Molatedi.

The natural mean annual runoff (MAR) of the Crocodile (West) Marico WMA is 855 million cubic meters per annum. Approximately 75 % of the total surface runoff from the WMA flows down the Crocodile River, while the Marico catchment contributes 20 % and the Upper Molopo catchment 5 %.

More than half of the total water use in the WMA comprises urban, industrial and mining use, approximately a third is used by irrigation and the remainder of the water requirements is for rural water supplies and power generation. These water requirements are far more than what can be provided by the current water resources. In order to meet the current demand, much of the water in the WMA is being imported mainly from the Vaal River system for domestic and industrial use purposes. Rand Water, which is the largest water board in South Africa, together with Magalies Water and Botshelo Water (the North West Water Supply Authority), are the three water boards that supply water in this WMA.

The Crocodile (West) Marico WMA is divided into six sub-areas by the Department of Water Affairs (DWA) for water resources planning purposes. The delineation was largely based on practical considerations such as size and location of sub-catchments, homogeneity of natural characteristics, location of dams, and economic development.

The project area falls within the Upper Crocodile sub-management area and this area corresponds to the catchment of the Crocodile River upstream of the confluence of the Elands River, which includes the major tributaries of the Sterkstroom, Magalies, Bloubankspruit, Jukskei, and Hennops rivers.

The Crocodile River has its source in the Witwatersrand mountain range at a height of 1 700 metres above sea level (masl). The northern suburbs of Johannesburg, as well as parts of adjacent cities such as Kempton Park and Krugersdorp are situated in this sub-catchment. There are two large dams in this sub-catchment, namely Hartbeespoort and Roodekopjes dams. The upper reaches of the catchment are densely settled.

The project area is situated in two tertiary catchment areas, dividing the property as follows:

- The A21J region (the farms Middelwater 593 JQ and Visserhoek 435 JQ) that flows directly into the Crocodile River, with a tertiary catchment area of 1 151 km<sup>2</sup>; and
- The farm Wildebeesthoek 310 JR lies within the A23K drainage region and flows into the Crocodile River, which has a tertiary catchment area of 1 131 km<sup>2</sup>.

Figure 5-3: Water Management Area of the Project Area

### 5.1.9.2 Surface Water Quantity

All the water that runs off the existing mine property is in the form of sheet water that runs in an easterly direction towards the drainage channel located east of the property. The affected catchment area, according to the approved June 2001 EMPR, is approximately 0,398 km<sup>2</sup>. Mean Annual Runoff calculations predict 2 354 210 m<sup>3</sup> of runoff using an average rainfall of 593 mm per annum. This includes drainage calculated at approximately 8% and evaporation at 5%.

Evaporation takes place at 306 047 m<sup>3</sup>, which results in 2 048 162 m<sup>3</sup> of runoff remaining, according to the approved Multisand EMPR. The property is divided into two quaternary catchment areas, namely A21J and A23K, having a drainage area of 1151 and 1 131 km<sup>2</sup> respectively, according to the drainage region's base map.

The mean annual runoff from the current mining area of approximately 100 ha, which is 100 x 100 x 0.593 m of rain, equals 593 000 m<sup>3</sup> of runoff from the disturbed areas to the watercourse located to the east of the property, less 13% for drainage and evaporation. This result in 515 910 m<sup>3</sup>, thus, there is no significant change expected in the flow of water emanating from the mine.

### 5.1.9.3 Surface Water Quality (APP 4)

The project area is located within the Crocodile Western Bankenveld ecological unit.

Generally, the overall Eco-Status for this study unit is considered poor, according to the River Health Report of 2005, and comprises the following indices (see the River Health Programme (2005), State-of-Rivers Report: Monitoring and Managing the Ecological State of Rivers in the Crocodile (West) Marico Water Management Area compiled for the Department of Environmental Affairs and Tourism in Pretoria):

- Instream Habitat Integrity is poor - this can be attributed to the severe modifications to the channel morphology and flow patterns. Patterns have changed because of development, an increase in return flows resulting in higher peak flows, water being imported into the system and sewer discharges into the river. Solid waste in the form of general litter is problematic in the riparian zone and in-stream;
- The Riparian Zone Habitat Integrity is poor - the modifications of channel morphology and flow has had a serious impact on the riparian habitats; bank erosion and inundation of the riparian zone have all contributed to low scores;
- Riparian Vegetation Integrity is poor with alien vegetation encroachment and vegetation clearing both impacting on riparian vegetation integrity. At Ben Albert's Nature reserve, however, there are relatively fewer alien species, greater cover and recruitment of indigenous riparian species and the riparian zone is well covered with vegetation;
- The Fish Assemblage Integrity is poor – there is a complete loss of sensitive species *Amphilius sp.* (Stargazer mountain catfish) and *Opsaridium sp.* (barred minnow)). Even hardy species are under stress with lowered frequencies of occurrence;
- Macro-invertebrate Integrity is poor – reduced water quality and flow modifications due to urban and industrial runoff have a severe impact on invertebrates;
- Water Quality is poor - flows have high levels of nutrients and water quality problems but are free from significant organic pollution. This is primarily the result of urban runoff and industrial discharges; and
- Ecological Importance and Sensitivity (EI&S) is considered marginal / low, although there is some diversity of habitat due to the influence of the Bankenveld eco-region. Overall however species and habitat diversity is low with little natural area left for protection or conservation.

### 5.1.10 Groundwater

#### 5.1.10.1 Ground Water

Groundwater occurrence in the Rustenburg Layered Suite of the Bushveld Complex is mainly associated with weathered, low permeability mafic rocks. The deeper solid and poorly fractured norite and gabbro rocks are seldom considered as prominent aquifers. This is also reflected in the high percentage (>80%) of boreholes on record with a sustainable yield potential of less than 2 l/s and as a result the groundwater yield potential is classified as poor (Barnard, 2000). According to the same author the groundwater level can vary between 5 and 40m below ground surface. The average water quality in this aquifer exhibits also an electrical conductivity of >100 mS/m which is somewhat above the South African drinking water quality standards.

In the Rayton Formation the groundwater is usually associated with fracturing of the quartzite and on the contact zone between quartzite and diabase intruded as sills. Barnard (2000) reports that borehole yields are generally in the range of 0.1 to 2.5 l/s, with occasionally higher yields being experienced. The depth to the static groundwater level can be up to

20m below surface. In general the ground water quality associated with quartzite is good, but elevated concentrations of nitrate and fluoride have been reported for groundwater from the Rayton Formation.

#### **5.1.10.2 Ground Water Levels**

As reported above, the depth to the static groundwater level varies for different geological conditions and can be expected to be as deep as 40m below surface. In this regard it is important to note that the existing quarries from which quartzite is mined, do not experience any seepage into the quarries, nor is groundwater intercepted at the base of the quarries.

#### **5.1.10.3 Boreholes**

There are 3 boreholes within the project area which are mostly used for domestic purposes, but during droughts these are used to supplement the sand washing water system:

- Borehole 1 – Services the office and workshop as well as other domestic requirements and the plant area;
- Borehole 2 – This borehole is located just north of the west excavation and serves as standby for the plant area and is also a cattle drinking point; and
- Borehole 3 – Supplements the water reticulation system when necessary at the far southeast sand washing and screening plant.

The boreholes all yield in excess of 1 500 litres per hour (l/h). This reported yield agrees with the yield potential reported by Barnard (2000). The water use is registered with the DWA (registration certificate no. 26009836).

#### **5.1.10.4 Ground Water Use**

The groundwater used on-site is mostly for domestic purposes (approximately 2 m<sup>3</sup> per day) and to supplement any shortfall in the recycling system as indicated above. A hydrocensus of all boreholes in the project area will be conducted during the specialist studies.

#### **5.1.11 Visual Aspects**

The project area is located approximately 4 km south of the Brits/Rosslyn road (R566), approximately 10 km west of the residential area of Rosslyn, 6 km south of the residential area of Ga-Rankuwa and 24 km north west of Tshwane (Pretoria).

The project area is not in close proximity to any protected area and/or nature reserve. It is not located along any major tourist routes. The existing mine is also not visible from any main road or scenic route. Except for the small hill mentioned below, the mine is only visible from the mine access road.

The hill that is being mined is visible to the neighbours located to the west of the mining area. The property located to the east of the mining area is used solely for livestock grazing purposes.

## **5.2 Biological Environment**

### **5.2.1 Flora**

A total of 347 plant species were identified in the surveyed area (Götze, 2008) which in spite of large transformed areas indicates high species diversity. It might be argued that the degree of transformation and disturbance in the area contributes towards the diversity of plant species in the study area, but even when the total number of exotic species (54) is subtracted from the total of 347, the total of indigenous species is still a high 293.

During the study five main vegetation units were identified:

- Vegetation Unit 1: The *Acacia caffra* – *Acacia karroo* Vegetation Unit;
- Vegetation Unit 2: The *Acacia caffra* – *Englerophytum magalismontanum* Vegetation Unit;
- Vegetation Unit 3: The *Phragmites australis* – *Imperata cylindrica* Vegetation Unit;
- Vegetation Unit 4: The *Burkea africana* – *Ochna pulchra* Vegetation Unit; and
- Vegetation Unit 5: The *Cynodon dactylon* – *Eragrostis curvula* Old Lands Vegetation Unit.



### 5.2.1.1 *The Acacia caffra – Acacia karroo Vegetation Unit*

This vegetation unit is dominated by trees and shrubs and has a well-developed herbaceous layer. It is situated on the southern side of the study area and was spared from transformation into cultivated lands due to the rocky nature of the soil. The natural vegetation of this unit has been subjected to light to moderately heavy grazing in the past. No evidence of overgrazing (bare patches, compaction of the soil surface, etc.) was visible in this unit and the natural vegetation seems to be in a good condition. This vegetation unit lies in the Marikana Thornveld (SVcb 6) (Mucina & Rutherford, 2006) on well-drained soils and culminates in a low ridge in the extreme south of the study area where the soil is very rocky and large rocks cover large portions of the soil surface. The dominant plant species of the Acacia caffra – Acacia karroo Vegetation Unit (1) are the woody species *Acacia caffra*, *A. karroo*, *Euclea crispa*, *Pappea capensis*, *Dombeya rotundifolia*, *Rhus leptodictya* and *Ehretia rigida subsp. nervifolia*.

Dominant herbaceous species include the grasses *Heteropogon contortus*, *Eragrostis curvula*, *E. chloromelas*, *Themeda triandra* and *Setaria sphacelata var. torta* and the forbs *Hermannia depressa*, *Nidorella hottentotica*, *Lippia rehmannii*, *Asparagus suaveolens*, *Aloe greatheadii var. davyana*, *Rhynchosia totta* and *Vernonia oligocephala*.

Some diagnostic plant species to this vegetation unit are the woody *Scolopia zeyheri*, *Celtis africana*, *Erythrina zeyheri* and *Grewia bicolor var. bicolor*, the grasses *Panicum coloratum var. coloratum*, *Eragrostis superba* and *Cymbopogon poppischilii*, as well as the forbs *Aptosimum procumbens*, *Corchorus asplenifolius* and *Osteospermum muricatum subsp. muricatum*.

### 5.2.1.2 *The Acacia caffra – Englerophytum magalimontanum Vegetation Unit*

This vegetation unit is associated with shallow rocky soils and the midslopes and crests of the west-east trending hills and ridges of the Gold Reef Mountain Bushveld (SVcb 9) (Mucina & Rutherford, 2006) on the northern, eastern and western extremities of the study area. The largest portion of the slopes occurring in the study area is south facing with few eastern, western and northern facing slopes. The difference between the south and north facing slopes on the study area are clearly noticeable through differences in vegetation density and to a degree floristic composition.

The natural veld condition of this vegetation unit is in a fair to good state. In some areas, which are less accessible to cattle, little degradation through heavy grazing is noticeable, but the largest portion of the southern slope of the ridge to the north of the study area is heavily grazed to an extent where signs of overgrazing has started to appear. The most visible negative sign of overgrazing in this vegetation unit is the degree of bush encroachment, especially on the lower foot- and midslopes.

The dominant plant species in this vegetation unit are the woody species *Acacia caffra*, *Dombeya rotundifolia*, *Combretum molle*, *Mundulea sericea*, *Lannea discolor*, *Rhus leptodictya* and *Strychnos pungens*.

The herbaceous layer is dominated by the grasses *Tristachya leucothrix*, *Eragrostis curvula*, *Melinis nerviglumis*, *Brachiaria serrata*, *Urelytrum agropyroides* and *Aristida canescens subsp. canescens* and the forbs *Senecio venosus*, *Parinari capensis subsp. capensis*, *Tephrosia longipes subsp. longipes*, *Triumfetta sonderi*, *Ruellia cordata*, *Gerbera viridifolia* and the sedge *Bulbostylis hispidula subsp. pyriformis*.

Some of the significant diagnostic species to this vegetation unit include the woody *Englerophytum magalimontanum*, *Euphorbia ingens*, *Protea caffra subsp. caffra*, *Berchemia zeyheri*, *Ancylobotrys capensis*, *Vangueria parvifolia* and *Elephantorrhiza burkei*, the grasses *Tristachya leucothrix*, *Digitaria monodactyla*, *Cymbopogon nardus*, as well as the forbs *Ruellia cordata*, *Xerophyta retinervis*, *Dicoma zeyheri*, *Euphorbia schinzii*, *Psiadia punctulata* and *Hermannia glanduligera*.

### 5.2.1.3 *The Phragmites australis – Imperata cylindrica Vegetation Unit*

The *Phragmites australis* – *Imperata cylindrica* Vegetation Unit is situated in natural drainage lines in the study area and man-made settling dams mostly cover these areas. The wetlands occurring to the downstream side of these settling dams were most probably formed as a result of the settling dams and not as a result of natural springs. Soils are deep sandy to clayey with many man-made soils in between. Degradation is as a result of a large anthropogenic interaction and the largest portion of this vegetation unit is transformed into the mentioned settling dams and disused or rehabilitated versions thereof.

The vegetation of this vegetation unit is complex due to a combination of number of different anthropogenic activities and remnants of the natural vegetation that once occurred there. The dominant indigenous woody plants in this

vegetation unit are *Acacia karroo*, *Rhus lancea*, *R. pyroides* and *Dodonaea angustifolia* and also the exotic *Populus wislizenii*, *Salix babylonica*, *Tecoma stans*, *Robinia pseudoacacia* and *Ricinus communis*.

The largest part of the *Phragmites australis* – *Imperata cylindrica* Vegetation Unit is dominated by wetland vegetation with the reed *Phragmites australis* and the grass *Leersia hexandra* as the dominant diagnostic plant species. The bulrush *Typha capensis*, the sedges *Cyperus denudatus*, *C. sexangularis*, *Eleocharis dregeana*, *Juncus effusus*, *J. lomatophyllus*, *Mariscus congestus* and *Schoenoplectus brachyceras* as well as the hydrophyte *Lagarosiphon muscoides* and the exotic reed *Arundo donax* and herbs *Persicaria lapathifolia*, *Rumex crispus* and *Aster squamatus* are dominant in the wetland part of this vegetation unit.

Smaller parts of this unit consist of rehabilitated or disused settling dams as well as the severely disturbed areas on the fringes of the settling dams. These areas are vegetated by a mixture of plants associated with wet conditions as well as plants that are generally considered to be associated with drier terrestrial conditions.

Plant species occurring in these parts are the woody species mentioned in the second paragraph of this description of the *Phragmites australis* – *Imperata cylindrica* Vegetation Unit as well as the graminoids (grass like plants) *Phragmites australis*, *Imperata cylindrica*, *Cynodon dactylon*, *Melinis repens*, *Eragrostis curvula*, *E. heteromera*, *Cortaderia selloana*, *Arundo donax*, *Pennisetum clandestinum* and *Paspalum dilatatum*.

Dominant herbs in this part of the unit include the indigenous *Seriphium plumosum*, *Pelargonium dolomiticum*, *Pentarrhinum insipidum*, *Gomphocarpus fruticosus* and *Aloe greatheadii* as well as the exotic *Tagetes minuta*, *Bidens bipinnata*, *Cardiospermum grandiflorum*, *Conyza bonariensis*, *Datura spp*, *Xanthium strumarium*, *Verbena bonariensis*, *Acanthospermum hispidum* and *Tithonia rotundifolia*.

The smallest part of the *Phragmites australis* – *Imperata cylindrica* Vegetation Unit is dominated by plant species generally associated with moist soil conditions and occurs in an area that has been rehabilitated some years ago. Some of the remnants of the once natural vegetation in this area still occur in the form of isolated islands in this part of Veg Unit 3.

Dominant tree species are the indigenous *Acacia karroo*, *Rhus lancea* and *R. pyroides*. One specimen of moderate size of the protected tree species *Combretum imberbe* (DWAF, 2007) was also recorded.

The dominant grasses are *Imperata cylindrica*, *Eragrostis curvula*, *E. heteromera*, *Sporobolus africanus*, *S. fimbriatus*, *Cynodon transvaalensis*, *Paspalum dilatatum*, *Cortaderia selloana*, *Sorghum bicolor* and *Agrostis lachnantha*.

The herbs that dominate this small section of Vegetation unit 3 are the indigenous *Ranunculus multifidus*, *Plantago lanceolata*, *Sonchus wilmsii*, *Vernonia poskeana*, *Senecio coronatus*, *Rumex sagittatus*, *Asparagus laricinus* and the sedge *Mariscus congestus*.

A number of exotic herbs are also high in abundance and include *Cirsium vulgare*, *Conyza bonariensis*, *Oenothera rosea*, *Persicaria lapathifolia*, *Rumex crispus*, *Sonchus oleraceus*, *Tagetes minuta*, *Verbena bonariensis*, *V. officinalis* and *Xanthium strumarium*.

#### **5.2.1.4 The *Burkea africana* – *Ochna pulchra* Vegetation Unit**

This vegetation unit is situated on the western side of the study area and is the most disturbed natural vegetation unit on the property. It occurs on deep sandy loam soils.

Degradation in this vegetation unit is strongly related to the mining activities in the area and numerous roads, prospecting holes and old farming infrastructure is scattered through this vegetation unit. The vegetation of the *Burkea africana* – *Ochna pulchra* Vegetation Unit is associated with that of the Marikana Thornveld vegetation type (SVcb 6) (Mucina & Rutherford, 2006).

The dominant tree species occurring in this vegetation unit are *Burkea africana*, *Ochna pulchra*, *Sclerocarya birrea* (a protected tree species according to DWAF, 2007), *Rhus lancea* and *Terminalia sericea*. Other less dominant woody species are *Ficus burkei*, *Dichrostachys cinerea*, *Carissa bispinosa*, *Erythrina lysistemon*, *Mundulea sericea*, *Peltophorum africanum* and the exotic *Melia azedarach*.

Dominant grass species include *Digitaria eriantha*, *Themeda triandra*, *Eragrostis curvula*, *E. chloromelas*, *E. superba*, *Hyparrhenia hirta*, *Perotis patens*, *Pogonarthria squarrosa* and *Setaria sphacelata* var. *torta*. The dominant herbs are *Dichapetalum cymosum*, *Gnidia capitata*, *Indigofera oxytropis*, *Tagetes minuta*, *Ipomoea obscura*, *Ledebouria ovatifolia*, *Commelina africana*, *Monsonia burkeana* and *Pelargonium dolomiticum*. Less dominant are *Solanum panduriforme*, *Pollichia campestris*, *Hermannia depressa*, *Momordica balsamina*, *Lippia rehmannii* and *Asparagus suaveolens*.

#### 5.2.1.5 The *Cynodon dactylon* – *Eragrostis curvula* Old Lands Vegetation Unit

This vegetation unit was transformed from the Marikana Thornveld vegetation type (SVcb 6) (Mucina & Rutherford, 2006) to its current state and is distributed over the largest part of the study area and is situated on old lands once cultivated for various dry land crops.

The vegetation occurring on the old lands is in a pioneer state of succession with small differences as soil structure varies. The old lands to the north of the current mine activities is mostly on sandy soils and the old lands to the lower laying south start out as a vertisol, which becomes less clayey and even sandy towards the south. Since cultivation on these lands has ceased, cattle have grazed them. Many annual weeds and invasive alien plants are to be found in this vegetation unit. The vegetation of the *Cynodon dactylon* – *Eragrostis curvula* Old Lands Vegetation Unit is dominated by the herbaceous layer and more specifically by pioneer and some sub-climax grasses. Of these *Cynodon dactylon*, *Aristida congesta*, *A. bipartita*, *Eragrostis curvula*, *Melinis repens*, *Hyparrhenia hirta*, *Hyperthelia dissolute* and *Chloris virgata* are the most abundant.

On the clayey northern part of the large old land on the southern side of the mine activities, the grasses *Dichanthium annulatum*, *Eleusine coracana*, *Bothriochloa insculpta*, *Brachiaria eruciformis* and *Setaria verticillata* are significant. On the sandier parts of the old lands the grass species *Aristida adscensionis*, *Enneapogon cenchroides*, *E. scoparius*, *Heteropogon contortus* and *Pogonarthria squarrosa* are of importance.

The rest of the herbaceous layer of this unit is dominated by the herbs *Gomphocarpus fruticosus*, *Sida cordifolia*, *Conyza podocephala*, *Pseudognaphalium undulatum*, *Felicia muricata* and the exotic species *Tagetes minuta*, *Schkuhria pinnata*, *Datura stramonium*, *Conyza bonariensis*, *Sesbania bispinosa*, *Xanthium strumarium* and *Malvastrum coromandelianum*. The poorly developed woody layer is dominated by *Acacia karroo*, mainly in the form of shrubs as well as specimens of *Dichrostachys cinerea*, *Rhus lancea*, *Ziziphus mucronata* and the exotic *Ricinus communis*.

#### 5.2.1.6 Conservation Status

The conservation status of the Marikana Thornveld (SVcb 6) is considered endangered. Less than 1% is statutorily conserved in, for example the Magaliesberg Nature Area, and small portions in other reserves such as De Onderstepoort Nature Reserve. Approximately 48% of this vegetation type has been transformed, mainly by using it for cultivated lands and by urban areas (Mucina & Rutherford, 2006).

The Gold Reef Mountain Bushveld (SVcb 9), on the other hand, is described by Mucina & Rutherford (2006) as least threatened, as some 22% is statutorily conserved, mainly in the Magaliesberg Nature Area and some smaller portions in the Rustenburg, Wonderboom and Suikerbosrand Nature Reserves. At least an additional 1% is conserved in other reserves. About 15% is transformed due to cultivation and urban and other built-up areas (Mucina & Rutherford, 2006).

#### 5.2.1.7 Conservation Areas

The proposed project area is situated within the Peglerae Cross-border Conservancy, constituted on 1 March 2006 (Figure 5-4). The conservancy was registered with the then Gauteng Department of Agriculture, Conservation and Environment (GDACE) and affiliated to Gauteng Conservancy Association and National Association of Conservancies as well as a direct affiliation to The De Wildt, Helpmekaar association (Company Registration 2000\004862\08). The conservancy covers an area of approximately 36 km<sup>2</sup>.

The main objectives of the conservancy are:

- To generate interest and active participation by landowners in the conservation of indigenous fauna and flora and the protection of the environment in the area;
- The protection, regulation and improvement of the environment by enforcing and seeing that members abide by National and Provincial Environmental Laws, regulations and frameworks;
- To promote better general security;
- Conservation of natural and man-made resources within development frameworks;

- The monitoring of proposed physical development in the area and, if necessary, the objection of the Conservancy thereto;
- To pro-actively prepare for inputs into the plans and policies of Provincial and Local Government by preparing guidelines and frameworks for the physical development of the area in close co-operation with relevant authorities;
- To actively promote the conservation of our water resources, especially underground water and monitor and act on any possible sources of pollution thereof;
- Monitor and act on any sources of air and noise pollution; and
- Introduce programs to reintroduce species that once occurred in the region as well as programs to rehabilitate some of our Flagship species such as *Aloe peglerae* (Protect, Rehabilitate, Propagate, Repopulate).

#### 5.2.1.8 Endangered, Rare and Protected Species

Thirteen specimens of the protected tree species *Sclerocarya birrea subsp. Caffra* (Marula) and one of *Combretum imberbe* (Leadwood) were recorded and mapped. According to the Department of Water Affairs and Forestry (DWAF) these tree species are protected by law and may not be disturbed without the necessary permits (DWAF 2004 & 2007). Neither plant species which are listed as red data species by SANBI (2007), nor species that are included in the red and orange plant species list of Department of Agriculture, Conservation, Environment and Land Affairs (2006) were recorded in the study area during the time of the study.

#### 5.2.1.9 Exotic Species

Of the 54 exotic plant species that were observed in the study area 18 are woody species, six are grasses and 30 are herbaceous shrubs and forbs. Of the 54 exotic plant species 33 are listed by Henderson (2001) as declared weeds or invaders (16 trees, five grasses or reeds and 12 herbaceous shrubs or forbs).

The total number of different exotic plant species occurring in the study area is of some concern. The total number of exotic plant species is moderately high with a significant percentage of declared weeds and invaders (Henderson, 2001).

### 5.2.2 Fauna

#### 5.2.2.1 Mammals

No sensitive or endangered fauna were recorded during previous surveys. The majority of species have disappeared or relocated to suitable habitats away from the study area, due to existing mining activities as well as habitat alteration and degradation. Smaller mammal species are extremely vulnerable to snares and poaching activities as well as feral cat (*Felis catus*) and dog populations.

According to the "South African Red Data Book of Terrestrial Mammals" (Smithers 1986; Skinner & Smithers 1990), the study area falls within the distribution ranges of twelve known species that are placed into one of the threatened species categories (Endangered, Vulnerable and Rare). Due to the high level of human activity within the study area, however, it is unlikely that the study area comprises significant habitat for any species of threatened larger mammals. On the basis of the habitat descriptions provided for the twelve threatened species by Smithers (1986) and Skinner & Smithers (1991), and the high level of human activity within the study area, it is deemed highly unlikely that the study area still provides suitable habitat for more than four of the twelve threatened species.

Mammal species of conservation importance (Smithers, 1986) that could possibly occur within the project area and adjacent areas are indicated below.

**Table 5-3: Possible red data fauna species**

Common name	Scientific name	Conservation status
White-tailed Mouse	<i>Mystromys albicaudatus</i>	Rare
South African Hedgehog	<i>Atelerix frontalis</i>	Rare
African (Striped) Weasel	<i>Poecilogale albinucha</i>	Vulnerable
Rough-haired Golden Mole	<i>Chrysospalax villosus</i>	Vulnerable

**Figure 5-4: Location of the project area within the Peglerae Conservancy**

### 5.2.2.2 Avifauna

The greater part of the site is irreversibly transformed, primarily from sand mining activities. Fallow agricultural lands dominate the southern section of the area. The northern and eastern borders, however, still retain the original savanna habitat of the area and remain in relatively pristine condition with regards the vegetation still present within these zones. Settling dams dominate the central region of the site where this area has been transformed to an aquatic habitat with a number of small ponds and a wetland area.

Birds positively identified in the survey totalled 74 species. Of these, no endemic, vulnerable or threatened species were encountered. Following a desktop study, a further 75 species have a high likelihood to very well occur within the site and an additional 80 species have a low likelihood of occurrence. None of these are considered vulnerable or threatened in any way. Thus, a total of 229 species of birds have a likely chance to be encountered on this site. The majority of these were specific to the original habitat type within this biome, i.e. 128 species specific to the savanna ecotone. The artificial wetland system created by the settling dams have the ability to attract at least an additional 47 species of waterfowl.

The number of bird species recorded is high, but not unnatural for the bushveld region. The remnant savannah retains a large proportion and the wetlands have attracted additional species not normally present. A few species occur that exploit the quarry areas themselves, such as the Bee-Eater species, were observed.

### 5.2.3 Wetlands

A watercourse appears to enter the site in the south-eastern portion of the site and then flow through the southern portion of the site to the east. This wetland appears to have been an unchannelled valley bottom wetland or seepage wetland in the past.

Currently, it is understood that the wetland was formed as a result of the settling dams and not due to natural causes. However, this will be confirmed during the wetland assessment to be conducted. The largest portion of this wetland area is transformed into the mentioned settling dams and disused or rehabilitated versions thereof. The settling dams and surroundings form a man-made wetland that attracts many different life forms that include plants, birds, mammals, frogs and reptiles.

Several holding dams are present on the site and some of the dam walls are located on the wetland on site. The vegetation in the holding dams is mostly dominated by *Phragmites australis* and the areas below the dam walls mostly receive seepage from the dams and are dominated by sedges and wetland grasses. The holding dams mostly receive water from the mining activities although it may possibly also receive some overland flow. The water used for the mining activities are mostly pumped from the existing quarry close to the holding dams or is extracted from boreholes on site.

A historical quarry is present in the wetland to the east of the holding dams. This quarry is now mostly well vegetated with wetland species, but a few alien species are also present. An artificial channel was constructed in the eastern portion of the wetland to divert water away from the road and into the quarry.

Several impacts are however present leading to the wetland boundaries being unclear.

## 5.3 Social Environment

The City of Tshwane is the administrative capital of the Republic of South Africa and is located in the northwestern parts of the Gauteng province. The municipal area of 2 199 km<sup>2</sup> represents 12,8% of the total area of the province. It consists of Pretoria, Centurion, Akasia, Winterveld, Ga-Rankuwa, Temba, Hammanskraal, Mabopane, Atteridgeville and Mamelodi. Tshwane is the only metropolitan area in Gauteng with rural areas as well as cross border areas of the North West Province included in its jurisdictional area.

Tshwane Metropolitan Council is made up out of 9 ward zones and the mining area is located within Zone D in Ward 4. The following information was obtained from the Tshwane Integrated Development Plan (IDP) published in 2005 (Figure 5-6).

Figure 5-5: Location of wetland areas within the project area

Figure 5-6: Demarcation of Ward 4 of Zone D of the Tshwane Metropolitan Council



### 5.3.1 Population

According to the 2011 Census data, the City of Tshwane is home to approximately 2,9 million people. Tshwane's population is predominantly black Africans representing 2,2 million people, followed by a White population of approximately 600 000 people, 59 166 Coloured individuals and 51 547 Asian individuals. About 37% of the population is classified as youth, making Tshwane one of the youngest cities in South Africa. The overall number of men and women in Tshwane are equivalent.

### 5.3.2 Languages

Tshwane is home to different languages such as Afrikaans, English, Northern Sotho, Tsonga and Tswana. From an education perspective, as per the 2011 Census estimates, 25 % of Tshwane's population are matriculants; whilst 3,7 % of the population has no education.

### 5.3.3 Living Conditions

The City boasts a growing and diverse population living in an environment that is increasingly developing to meet the basic needs of its people. With approximately 24,3 % of the population having been classified as living in poverty, down from 25,8 % in 2010 and only 1,1 % of the population living on less than R 20-00 per day, the City is implementing plans in bridging the poverty gap. In addition, the number of people living in poverty has dropped from just over 10 000 in 2003 to below 4000 in 2011.

### 5.3.4 Basic Services

The City has experienced an urbanisation rate of 1,6 % over the past 3 years with 89,3 % of the population living in urban areas. Furthermore, more than 75 % of the population resides in formal housing, with 77,9 % of households having access to hygienic sanitation and over 87 % having access to piped water at or above the RDP level. With 72,2% of the households having electricity connections and 84,6% benefitting from formal refuse removal, it is increasingly evident that the living conditions in the City are well on their way to being the best in the country.

With almost 49 % of households having access to piped water inside their dwelling and 72 % having access to electricity, the City continues to make advances in affording all households access to basic services. Almost all households in the City (99 %) have access to sanitation facilities with 76 % having access to flush toilets.

### 5.3.5 Employment

According to Census 2011 data, nearly 15 % of households have no source of income and approximately 46 % of households in the City earn an annual income of less than R 76 401. The average annual household income in the City is around R 60 642 with only 0,65 % of households in the City earning more than R 457 600 per annum. Individual monthly incomes vary greatly amongst population groups and over 44 % of individuals in the City have no source of income whilst another 9,6 % of the population earns less than R 401 per month and almost 21 % of the population earns between R 401 and R 1 600 per month. However, men have more job opportunities than women.

### 5.3.6 Economy

The City has a diverse and growing economy which contributed 27 % to Gauteng's GDP and 9 % to the national GDP in 2011. Its economy is highly service-based with community services and government, financial services and manufacturing as the most significant sectors. The City's GDP (GVA) was recorded at R 272 billion (in current prices) in 2011, growing by 21 % since the 2009 slump. Furthermore, the City of Tshwane has been the fastest growing municipality in South Africa, on average, between 1997 and 2011. Gross Domestic Product per capita was R 93 158 (in current prices) in 2011 increasing by 13 % from its 2009 figure.

The City has a well-established manufacturing sector with the automotive industry being a key player in this sector. The City has the highest concentration of automotive Original Equipment Manufacturers (OEMs) in the country. Furthermore, the City's economy is characterised by a rapidly growing trade performance with exports in 2011 comprising 61,7 % as a percentage of GDP. The City has contributed 22,2 % to the nation's total exports and 15,9 % to its total trade in 2011.

## 5.4 **Cultural Resources**

Three farm workers' cemeteries were identified on site that are important and should be protected:

- Vissershoek 40+ graves of farm workers at S25° 38' 45.9" and E27° 58' 52.3";
- Middelwater 60+ graves of farm workers at S25° 38' 27.2" and E27° 59' 10.1"; and

- Wildebeesthoek 8 graves of farm workers at S25° 38' 26.4" and E27° 59' 39.5"

No other important Cultural Heritage Resources were found to be present on the farms. It is recommended that the three identified cemeteries be properly cleaned and fenced in, or an application for re-location may be submitted.

## 6. Potential Identified Impacts

### 6.1 General

The purpose of this section is to provide a description of the environmental issues and anticipated impacts as required by Section 28(1)(g) of the EIA Regulations (2010). This enables the EIA Report to be clearly focused. It also provides a framework for the impact assessment that the proposed new regional landfill facility will have on the environment, and of the impacts the environment will have on the proposed new landfill facility.

From the various abovementioned sources, the following environmental (biophysical, social and cultural) issues have been identified and will be investigated during the EIA phase of the process. Specialist studies will address some additional issues for completeness.

#### 6.1.1 Construction-Related Impacts

During the construction phase, overall activity within the study area will be increased. Activities during construction, such as driving on gravel roads, the clearing of vegetation, construction of access roads and the excavations will generate windblown dust. Other activities involving heavy machinery could cause a noise disturbance.

#### 6.1.2 Operations-Related Impacts

Potential impacts associated with the operation of landfill relates to air quality, including dust and odours, as well as water quality. Wind-blown litter, vectors, rodents and odour are amongst some of the potential operational impacts of landfill sites. Separation and management of clean rain water, contaminated runoff and leachate are also important considerations.

### 6.2 Traffic Impacts

Increased traffic on the existing roads leading to the proposed project area may have a negative impact on the mostly farming-related lifestyle currently experienced within the area. Higher traffic volumes could increase the risk of accidents occurring in addition to the degradation of existing road conditions. Traffic noise is also of further concern and could be disruptive to those living nearby the landfill site.

Upgrading of the local gravel roads to be used might also be required to limit dust pollution and will thus be further investigated.

Not only would the local traffic be of concern, but also the transfer routes to be used as the landfill site would serve the Tshwane Metropolitan Municipality area, as a minimum. Roads used as transportation routes could thus also be possibly negatively affected. The majority of roads within the Tshwane Metropolitan Municipality are in a satisfactory condition, but continuous upgrading could become more urgent should there be a severe increase in heavy vehicles on specific roads due to the proposed facility.

Stray litter from trucks transporting waste could further have a regional impact which would worsen the existing problem experienced by illegal dumping and littering throughout the district.

All of the above will be investigated as part of the Traffic Impact study, after which appropriate mitigating measures will be proposed.

### 6.3 Air Quality

The proposed development is considered to have the potential to result in the following adverse effects on air quality:

- Health and nuisance impacts at sensitive receptors (e.g. residential properties, chicken farms etc.) as a result of dust and PM emissions during construction;
- Nuisance impacts at sensitive receptors as a result of the emission of odorous compounds during the operation of the landfill; and
- Health impacts at sensitive receptors as a result of emissions of organic compounds (e.g. benzene) during the operation of the landfill.

A detailed air quality study will be undertaken, with appropriate mitigating measures like specific buffer zones recommended in specific directions recommended for implementation.

## 6.4 Geohydrological Impacts

As the adjacent farming areas mainly obtain their water from groundwater resources, the potential impacts of the proposed new landfill site on groundwater are to be investigated, more specifically:

- The quality of groundwater as well as surface water may be impacted on by contaminated runoff and leachate emanating from the site;
- Impact of the construction and operation of the proposed landfill on groundwater and surface water quantity; and
- Impact of future seizure of mining activities on manmade wetlands.

The geohydrological investigations will be conducted according to the guidelines presented in the DWA Minimum Requirements for Waste Disposal by Landfill.

## 6.5 Soil and Agriculture Impacts

A potential impact is the loss of soils available for rehabilitation due to construction works and erosion by wind and water at the construction areas, operational cells and soil stockpiles. A further potential impact is contamination of soils (e.g. from the waste management operations).

## 6.6 Ecological Impacts

Based on the proposed landfill operations, major impacts associated with the construction, operational and decommissioning phases may include:

- Long-term loss and displacement of fauna (in particular threatened and near-threatened bird taxa) caused by landfill operations. It has to be noted that the area is currently used for mining operations which in itself may have an impact;
- Indirect, long-term impacts associated with the pollution of soils and surface water (e.g. the drainage line), thereby affecting the reproduction and mortality of aquatic species, as well as accidental spillage of effluent into nearby wetland drainage lines;
- Impacts on the ecology, especially on the existing and migrant bird life, associated with the existing wetland areas, although artificial, due to possible pollution or destruction, and
- Possible skewed bird/invertebrate/mammal compositions due to the creation of artificial habitat (e.g. increase in aggressive or superior competitors such as Pied Crows *Corvus albus*, Grey-headed Gull *Larus cirrocephalus* and feral dogs).

In addition, the landfill operations may also contribute to the following impacts that are potentially harmful (both directly and indirectly) to the local faunal community:

- Increased human influx and subsequent exploitation of natural resources (e.g. hunting);
- Increased incidence of alien and exotic mammal and invertebrate taxa that are vectors of diseases (e.g. House mouse *Mus musculus*, Brown Rat *Rattus rattus* and various taxa pertaining to the Dipteran (flies) order); and
- The establishment of a landfill in the area may attract migrating birds like the sacred ibis (*Threskiornis aethiopicus*). These birds are already present in the area due a potential food source at the adjacent chicken farm, as well as potential breeding grounds in the wetland area within the project area. Therefore, the spread of avian diseases by these migrating birds have been identified to be a potential impact.

## 6.7 Potential Social Impacts

The following potential socio-economic impacts may be expected to come about during the establishment of the proposed new landfill project. These preliminary anticipated social impacts would be further assessed during the detailed studies.

### 6.7.1 Inflow of Workers

An inflow of workers to the area during the construction and operational phase of the landfill site would have an impact on the local social environment. The intensity would depend on the number of workers involved with each stage as well as the length of the construction activities. The influx of workers (and possible job seekers) could impact on the residents' sense of security, and their existing rural lifestyle due to an increase in people movement, noise, an increase in vehicular movement and possible increase in criminal activities.

Unless well controlled, there could also be an influx in informal reclaimers (or scavengers) that may in addition to possible establishment of informal residences in the neighbouring area, also result in increased occurrence of crime.

#### 6.7.2 Employment Opportunities

At this stage no final figures are available with regards to the employment opportunities that would be created during the construction of the landfill. However, permanent and temporary employment will be created during the construction and operation of the proposed landfill.

#### 6.7.3 Socio-Economic Impact

The proposed new regional landfill site is anticipated to assist in increasing the service delivery within the Tshwane Metropolitan Municipality, by providing environmentally sound and sustainable waste disposal facilities.

#### 6.7.4 Impacts on Social Life

Residential areas in close proximity to landfill sites could be negatively affected by:

- Possible bad odors from the landfill site;
- Possible rodents, flies and other insects attracted to the waste, as well as stray dogs, birds and other animals;
- Possible air and noise pollution created by the landfill site activities;
- Possible windblown litter on route and from the landfill;
- Possible contaminated runoff from the landfill;
- The movement of workers and job seekers to and from the site;
- The impact of increased traffic transporting waste to the landfill site; and
- The possible impact on residents' perception and feeling of security within the area.

The above possible impacts could have a detrimental impact on the affected residents' quality of life and subsequently on the property values within the area surrounding such a landfill. The decrease in value could even be attributed to the perception of the impact on the social life within the area, as well as the perception with regards to the possible health impacts associated with landfills.

It is however a known fact that poor landfill operations by certain municipalities in Gauteng is contributing towards negative perceptions around landfill operations. Interwaste is therefore committed to change perceptions by illustrating its ability to operate sanitary landfills in an environmentally sound manner through IAP's visits to its existing landfills.

### 6.8 **Community Health**

Concerns about the possible impact on community health due to the landfill site are highly likely to be raised as most communities regard landfill emissions as nuisances and a potential health hazard. Although various differences of opinions are prevalent in the environmental field with regards to the actual impact, these concerns should be sensitively and thoroughly dealt with during the execution of scientifically based air quality studies.

### 6.9 **Odour and Noise**

Impacts with regards to odour and noise are likely to be reported by the surrounding and/or adjacent communities. During the EIA Phase of the project, it would thus be important to clearly explain to the local community members how these types of impacts could be addressed through proper management of the landfill site and through the implementation of mitigation measures. Weather stations are also found to be a reliable means of confirming the source of possible bad odours.

### 6.10 **Visual and Aesthetic Appearance**

There are various infrastructure disturbances within the viewshed from area surrounding the project area. However, it is anticipated that the landfill site would have an impact on the direct local aesthetic appearance of the area.

Should security lights be erected within the project area, it would have a negative visual impact on the surrounding landowners, currently living in a semi-rural environment.

The impacts on the aesthetic appearance or "sense of place" do not readily lend itself to mitigation. Since the sense of place is non-economic and non-transferable, it cannot be mitigated through reimbursement or relocation of individuals.

### 6.11 Potential 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 will be considered. Potential cumulative impacts identified thus far for further investigation in the EIA include:

- Air Quality;
- Surface and ground water pollution;
- Traffic impacts;
- Noise impacts;
- Potential decrease in property values due to the presence and potential direct impacts of a landfill facility; and
- Positive impact on regional waste management and development of infrastructure.

## 7. Public Participation

Public participation provides I&APs with an opportunity to participate in the proposed project on an informed basis, and ensures that their needs, issues and requirements are considered. In so doing, ownership of the proposed project is vested in both the project proponent and the affected community. A PPP should:

- Provide a vehicle for public input and the facilitation of negotiated outcomes;
- Create trust and partnerships;
- Minimise negative impacts and maximise positive impacts; and
- Provide an up-front indication of issues that may impact on the EIA process.

### 7.1.1 Approach

The PPP is an integral part of the EIA process. Some of the PPP principles listed by the Department of Environmental Affairs (DEA) (1998) are:

- Meaningful and timely participation of I&APs;
- Focus on important issues;
- Accountability for information used for decision making;
- Encouragement of co-regulation, shared responsibility and a sense of ownership;
- Application of due process, particularly with regard to public participation in environmental governance as provided for in the Constitution; and
- The needs, interests and values of I&APs must be considered in the decision-making process.

The approach to any PPP depends on the details of the proposed project. Each project has a particular geographic and technical nature and the PPP should thus be structured accordingly. Where possible, and within the required statutory frameworks, the process should be structured to address the process needs of I&APs.

### 7.1.2 Methodology for Initial PP Process

The following methods were used during the process. All relevant PPP documentation, such as notification letters, copies of adverts and photographs of site notices, has been provided in Appendix A.

#### 7.1.2.1 Identification and Registration of I&APs

Through networking and advertising, there are currently 119 I&APs on the public participation database for the proposed project. AECOM ensured that individuals / organisations from an institutional and a geographic point of view were identified.

Geographically, AECOM focused on nearby / adjacent landowners, communities and the structures that represents them. Institutionally, the focus is on organisations or individuals that may influence policies and decisions or make a contribution to the project. Not all of these organisations are necessarily in the project's direct sphere of impact.

Refer to Appendix B for the I&AP Register.

#### 7.1.2.2 Creating Awareness during the Scoping Process

A variety of mechanisms were used to create awareness of the proposed project among those that may be directly or indirectly affected by the proposed project. These inter alia include the following:

#### 7.1.2.3 Newspaper Advertisements

The newspaper advertisements, notifying the public about the proposed project, appeared in the:

- Die Beeld on the 18 February 2014; and
- Brits Pos on 20 February 2014.

Refer to Appendix A for copies of the newspaper adverts.

#### 7.1.2.4 On-site Notices

Four (4) A2-sized site notices were erected in the project area on 18 February 2014 at the following places.

- At the entrance of the Multisand offices;
- At the Rabboni Centre Ministries;
- At the main entrance to the Multisand property; and
- At the Freeway Supermarket R513.

Refer to Appendix B for photographs of the site notices.

#### 7.1.2.5 Background Information Document

A Background Information Document (BID) provides background information on the proposed project, the processes to be followed and the appropriate contact information. Information was disseminated to registered I&APs primarily by means of a BID. Issues raised and comments received from I&APs will be fed into the EIA process.

Refer to Appendix B for a copy of the BID.

#### 7.1.2.6 Public Review of the DSR

All registered I&APs were notified of the availability of the DSR for public review via e-mail (Appendix B). The DSR for the proposed project was made available for public review from 24 February 2014 to 30 April 2014. Copies of the DSR were placed at the following venues:

Venue	Address
Die Bek se Pad Stal	R513, 012 Vissershoek
Tshwane Community Library	Sammy Marks Square Cnr Church and Prinsloo Street, Pretoria Central
City of Tshwane Municipal Office: Akasia	12 Dale Street, Karen Park, Pretoria

I&APs that requested electronic copies of the DSR was sent a CD containing the DSR.

#### 7.1.2.7 Focus Group Meetings

The following focus group meetings were held during the public review period of the DSR. The main purpose of these meetings was to present the findings of the DSR and to obtain comments regarding the DSR and the proposed projects. Attendance registers and minutes of these focus group meetings are contained in Appendix B.

Date	Focus Group Meeting	Venue
11 March 2014	City of Tshwane: Environmental Management Department	11 Francis Baard Mercedes Benz Building Schoeman Street Pretoria
12 March 2014	City of Tshwane: Council Office Akasia	12 Dale Street Karen Park Pretoria
12 March 2014	De Wildt Helpmekeer Maatskappy	Off Ramp 75, R513, De Wildt, Skietfontein Cafe Building
12 March 2014	Rabboni Centre Ministires	Plot 27, Uitval Grond, Rosslyn
12 March 2014	Kroon Chickens	Plot 84 Wildebeesthoek, De Wildt

#### 7.1.2.8 Public Open Day

A public open day was held at Laerskool Vissershoek, DeWildt, on 12 April 2014. IAPs were invited to this public open day via e-mail and 45 people attended the public day.

At the open day, attendees indicated that they want the open day to take on the form of a public meeting. Subsequently, I&APs a public meeting was held during which I&APs indicated their comments and concerns relating to the proposed project. Minutes of the public meeting is contained in Appendix B.



### 7.1.2.9 Public Review of the FSR

Subsequent to the submission of the FSR to GDARD and DEA for approval, the FSR will be made available, for a period of 30 days, at the following venues:

Venue	Address
De Wildt Helpmekaar Maatskaapy	Off Ramp 75, R513, De Wildt, Skietfontein Cafe Building
Tshwane Community Library	Sammy Marks Square Cnr Church and Prinsloo Street, Pretoria Central
City of Tshwane Municipal Office: Akasia	12 Dale Street, Karen Park, Pretoria

On written request, AECOM will make electronic copies of the FSR available to IAP's.

### 7.1.2.10 Ongoing Communication

AECOM's contact details were provided on all written communication.

### 7.1.3 Issues Raised

All written / minuted issues and concerns indicated by I&APs were noted and collated into an Issues and Responses Register (IRR), which provides a list of issues raised with regard to the EIA process and the proposed project. This indicates the form and scope of the issues to be addressed in the EIA phase.

Refer to Appendix B for the issues and response register and copies of the comment sheets and correspondence sent to EAP.

### 7.1.4 Conclusion

Based on the inputs received during the PPP conducted so far, the following conclusions can be made:

- The PPP process complies with the regulatory requirements;
- Issues and concerns were identified in order to be addressed in the EIA process; and
- Communication with I&APs, especially the communities surrounding the site, should continue to ensure informed decision making and a transparent process throughout.

## 8. Plan of Study for EIA

Subsequent to the Scoping Phase and approval of the Scoping Report, the following activities will be conducted during the EIA phase:

### 8.1 Specialist Studies

The following specialist studies will be undertaken at the Multisand site during the EIA Phase and the results of these studies will be included in the EIA Report. I&APs will have the opportunity to comment on the methodology and findings of these reports during the public review of the EIA Report.

- Geotechnical investigation;
- Geological investigation;
- Geohydrological (including quality) investigation;
- Visual impact assessment;
- Air quality and odor study;
- Traffic impact assessment;
- Social impact assessment;
- Ecological assessment;
- Heritage and Archaeological Assessment;
- Wetland impact assessment and water quality investigation;
- Soil and agricultural assessment; and
- **Decrease in property values.**

The methodologies for the specialist studies still to be undertaken are presented below for I&APs to comment on and raise any additional issues. The DEA and GDARD will review the methodology and, if it approves of the methodology, it will grant permission to continue with the studies. The DEA and GDARD may include additional aspects that it would like assessed in order for it to take an informed decision on issuing a Waste Management Licence for the proposed development.

#### 8.1.1 Geological and Geotechnical Investigations

The geological and geotechnical investigations will include:

- Search of available information as part of a desktop study: Collection of geological reports and maps of the site and surrounding areas, and use of aerial photos to assist in the mapping and evaluation of the area.
- Geophysical surveys: Geophysical surveys, such as magnetic and electromagnetic surveys, will be conducted to determine whether there are anomalies indicating features such as faults, intrusions or shallow rock.
- Mapping of existing quarry: The existing quarry will be mapped to assist in determining the geology of the site and to obtain information on materials that may be available for different uses during the development and operation of a waste disposal site.
- Mapping of the larger area: The larger area will be mapped using a succession of methods, e.g.:
  - Geological mapping of the surface on evenly spaced lines to determine and identify the locality and nature of outcrops such as quartzite layers;
  - Shallow test pitting to determine the thickness and nature of the near-surface horizons (e.g. topsoil, ferruginised materials and the residual soils. Shallow trenches may also be used to determine the extent and thickness of quartzite layers.
- Investigation of deeper materials: Percussion drilling will be used to ascertain the deeper geology of the site. To obtain large representative samples of materials which can be tested, a large excavator will be used to excavate to depths of about 5 m.
- Testing of materials: Materials suitable for lining layers, daily cover material and rehabilitation must conform to specifications. Materials will be sampled in the quarry and excavations and submitted for tests such as foundation indicator tests, compaction tests and permeability tests. Double-ring infiltrometer tests may be done on the floor of the quarry.
- Other geological information: Other geological information that may be required for the application include information on seismicity, neo-tectonics and structural geology of the area.
- Prepare a report for the area to be used as part of the permit application documentation and for the EIA.

#### 8.1.2 Geohydrological Investigation

The Geohydrological investigation will include the following components:

- Literature search for published geological and geohydrological information on the general area (e.g. reports from the DWA, reports conducted for the Multisand quarry, published technical papers describing aspects of the area and other consultants reports on the area).
- Review geological and geohydrological information obtained during the literature search for the site.
- Design the geophysical survey plan. According to Minimum Requirements for Waste Disposal by Landfill, Second Edition (DWA, 1998), geophysical surveys are required for the selection of new exploration and monitoring boreholes to be drilled on the site. It is proposed that the geophysical surveys will at least include the use of ground magnetic and electromagnetic surveys to locate geological structures and areas where there may be deeper weathering of the formations. Geophysical surveys will, however, also be beneficial to the geotechnical investigation, especially for informing decisions on the selection and properties of cover material resources, the determination of the excavation potential of selected areas, and the presence of near-surface shallow quartzite sub-outcrops. In this respect, the use of shallow resistivity tomography and electromagnetic surveys will be considered to determine the geological conditions at shallow depth, excavation potential and cover material properties.
- Select positions for new exploration / monitoring boreholes across the site based on geological, geohydrological and geophysical information, and taking the proposed design and layout of the landfill into account.
- A hydrocensus with a radius of approximately 1 km around the proposed site. During this census, information on existing boreholes and wells such as depth, water level, construction detail, drill date, geological formations encountered, depths at which groundwater was intersected, borehole yield, and water use will be recorded. Groundwater samples will also be collected from selected boreholes for chemical analyses. Where groundwater is used for domestic and drinking water purposes, microbiological analyses will also be done on water samples from specific boreholes.
- Close cooperation will be maintained with the geotechnical investigators and information will be exchanged between the two groups.
- Drill new exploration / monitoring boreholes and equip them for monitoring purposes. During drilling, records will be kept of penetration rate, water strike depths and yield and total blow yield, and geological profiles will be constructed from these data. Depending on what drilling method is used, water samples may also be collected during blow yield tests for chemical analyses.
- Depending on the blow yield established during the drilling of each borehole, a decision will be taken which boreholes will be subjected to test pumping to obtain the hydraulic parameters of the formations intersected. Should pumping tests be required, and depending on the blow yield recorded, slug tests, step tests, constant yield tests and recovery tests will be considered. If pump tests are conducted on the deep boreholes, the shallow borehole will also be used as a monitoring borehole and vice versa.
- It may be necessary to develop a preliminary (uncalibrated) numerical groundwater flow model depending on the requirements of the regulating authorities.
- Prepare a geohydrological report for the area to be used as part of the permit application documentation and for the EIA.

### 8.1.3 Visual Assessment

A visual impact assessment is an evolving practice that develops continuously to take account of new issues and assessment techniques, which include the continued importance of landscape character assessment and a greater emphasis on process and public participation, the development of systems for assessing environmental and 'quality of life' capital, and increased use of the EIA.

Visual impact assessments are an essential component of the EIA process. Landscape and visual assessments are different to most specialist studies required in the EIA process as it is not possible to quantify all aspects. The assessment of potential impacts on a landscape resource and on visual quality is determined through a combination of quantitative and qualitative assessments and evaluations.

In the EIA process a broad assessment of the potential of significant impacts at the scoping stage must be done based upon the nature, size, location of the proposed activity, and the scale of its likely environmental effects. For this initial stage, it can be assumed that formally designated landscapes (such as protected areas and scenic landscapes such as ridges) are deemed to be more sensitive to change than are many other areas. Similarly, certain development and activity types are considered more likely to give rise to significant impacts, such as particular processes or operations, or particularly large in nature (physical extent or continuous nature of the activity, such as roads).

Within the EIA process the specific impacts of development activities on landscape considers each situation that is likely to impact on the landscape elements, characteristics and character are assessed and its significance is evaluated on the basis of the nature and magnitude of impact and the sensitivity (including value or importance) of those elements,

characteristics and character. The use of tools such as view shed analysis and line-of-sight profiles are used to determine the spatial context.

The initial step in the visual impact assessment is to review the existing visual resource and visual condition. This forms the basis from which the occurrence, estimation of magnitude and significance of visual effects of the development may be identified and assessed.

Part of this task would be to record and analyse the existing landscape features, characteristics, the way the landscape is experienced and the value or importance of the landscape and visual resources in the vicinity of the proposed development. This requires the following analyses:

- Research / survey: both desk and field studies to assemble basic information;
- Classification: Categorising the landscape into units or groups of distinct and recognisable type and character; and
- Analysis: Detailed analysis of the parts of the landscape and visual resource to gain an understanding of composition and experiential quality. Assess the importance of the various aspects of the landscape and visual resource.

The majority of the baseline assimilation for visual amenity assessment for the proposed project will be conducted as a field assessment, and the results will be presented as a desktop composite. The visual impact assessment describes the likely nature and scale of changes to individual landscape elements and characteristics, and the effect on the landscape character resulting from the proposed activity.

Mitigation for minimising the potential negative effects of the visual influence on both landscape and visual amenity will be provided. Where applicable, the positive visual influences of the proposed development will also be emphasised. Short- and long-term mitigation measures that will reduce the negative visual impact or enhance the positive impacts will be determined.

#### 8.1.4 Air Quality Study

##### **8.1.4.1 Baseline Assessment**

A baseline assessment will be undertaken to:

- Provide an overview of the prevailing meteorological conditions in the area. Where available, surface meteorological data will be obtained from the South African Weather Services (SAWS) to evaluate the prevailing meteorological conditions in the study area that will influence the dilution and dispersion of pollutants that may be released within the area;
- Review applicable legislation and policies such as the National Environmental Management: Air Quality Act 39 of 2004 will be undertaken;
- A review of potential health effects associated with emissions from the proposed landfill;
- Identify existing sources of emission and surrounding sensitive receptors such as local communities; and
- Assessment of the baseline air quality situation based on available air quality monitoring data will also be undertaken to determine the current air quality situation in the area.

##### **8.1.4.2 Air Quality Impact Assessment**

To assess cumulative impacts, the impacts associated with the landfill need to be quantified. This will involve the compilation of an emissions inventory for the proposed landfill.

Emissions from the proposed landfill will be estimated using the Gassim model. The model uses information on waste composition and quantity, landfill engineering, and landfill gas management techniques to estimate emissions.

Dispersion modelling simulations will be undertaken using AERMOD to determine the potential air quality impacts of the proposed landfill on the surrounding area.

A comparison of the modelled results will be made with the national ambient air quality standards and international guidelines / standards (where applicable) to determine compliance.

Recommendations will be made for the implementation of appropriate mitigation measures and a monitoring programme (if required).

A comprehensive Air Quality Impact Assessment Report will be compiled.

#### 8.1.5 Traffic Impact Assessment

The traffic impact specialist study will assess the impact of the proposed project on the N4, R566 and proposed access roads. Any mitigation measures required will be defined for inclusion in the EMP. It is proposed that the following methodology be used to conduct the required investigation:

- Discuss the planned development with the client and obtain clarity on the exact extent and composition of the planned development;
- Conduct a site visit to ensure familiarity with the site and surrounding road network. Identify possible access alternatives and evaluate the extent of the required traffic surveys;
- Discuss the planned development with the relevant representatives of the Tshwane Metropolitan Municipality and Provincial Authorities and ensure that all issues are identified. Also, ensure that already-approved new developments in the immediate surrounding area are identified and included in the traffic study;
- Conduct traffic surveys during a weekday morning to determine the status quo of traffic in the area, including existing operating conditions at the critical intersections;
- Undertake additional capacity analyses to determine future operating conditions without the implementation of the proposed development. Identify the road improvements needed to cater for the expected future traffic volumes;
- Evaluate the alternative access arrangements and the operational functioning at the controlled entrance / exits and the traffic impact on the surrounding road network; and
- Provide practical and feasible recommendations with regard to road upgrading required to serve the growth in background traffic volumes, as well as the trips that will be generated by the proposed development, given the expected impact of the development on the surrounding road network.

#### 8.1.6 Social Impact Assessment

The purpose of a social impact assessment (SIA) is to provide a systematic analysis in advance of the likely impacts that a development event (or project) will have on the day-to-day lives of people and communities. It identifies potential social impacts and variables that should be considered.

In broad terms, the process for the implementation of a SIA proceeds according to the following steps:

- Determine the Scope of the Assessment;
- Data collection and integration;
- Profiling:
  - Profiling serves as a starting point for estimating potential positive and negative effects of change. It builds on information generated during scoping and involves a description of the social characteristics and history of the area being assessed; and
  - The process is a combination of secondary and primary research, site visits and interviews, and includes information such as historical background, social characteristics, culture, attitudes, values, socio-psychological conditions, community and institutional structures and community resources;
- Undertake Assessment / Projection of the potential impacts for the proposed development on the surrounding communities.

#### 8.1.7 Ecological Survey and Wetland Assessment

The scope of the study will include the following:

- Impact assessment:
  - A brief assessment of the ecology;
  - Sensitivities of wetlands within 5 km of the site; and
  - Potential impact of the landfill on wetlands, surface water and groundwater.
- Baseline assessment
  - A status quo assessment of the wetlands within 5 km of the proposed landfill, including occurrence, extent, functioning and sensitivity; and
  - A status quo assessment on surface water and groundwater quality.

##### **8.1.7.1 Desktop study**

A desktop study will be undertaken by studying maps and literature. Information will be acquired on the following aspects of the study site:

- Red Data Listed (RDL) species that have been recorded;
- Veld types according to Mucina and Rutherford (2006);
- Presence of conservation areas in the surrounding environment;
- A map survey to determine the occurrence and potential extent of wet areas;
- The geology of the site (which will be obtained from the geological specialist study); and
- The hydrology of the site.

#### **8.1.7.2 Field survey**

An onsite field survey will be undertaken to establish the presence of species or habitats of environmental importance. The field study will determine the occurrence and extent of wetlands within 5 km of the proposed site.

The delineation of wetlands will be conducted according to the DWA guidelines (A practical field procedure for identification and delineation of wetlands and riparian areas, DWAF 2005) as well as the National Water Act (1998). The following indicators will be used to determine the extent of the wetlands:

- Terrain unit indicator;
- Soil wetness indicators ;
- Soil form indicator; and
- Vegetation indicator.

A reconnaissance walk-about will be undertaken to identify and map all environmentally important species, ecosystems and wetlands. This information will be included in the baseline report and will be used in a site-specific EMP.

#### **8.1.7.3 Functioning of the wetlands**

The functioning of the wetlands that are likely to be affected will be determined using Wet-EcoServices, a rapid assessment technique (Kotze *et al.*, 2005).

#### **8.1.7.4 Ecological condition of the wetlands**

An assessment of the ecological condition of the wetlands will be based on observations made during the field survey as well as current and previous land uses.

#### **8.1.7.5 Sensitivity of the wetlands**

The sensitivity of the wetlands will be based on the ecological functioning and condition of each wetland.

#### **8.1.7.6 Water quality of the surface and groundwater**

Existing information on water quality in the area will be collected. Should more data be required, water samples will be taken and analysed.

#### **8.1.8 Heritage and Archaeology Assessment**

The objectives for the cultural and archaeological study will be:

- To obtain a good understanding of the overall archaeological and cultural heritage conditions of the area through a brief desktop study;
- To locate, identify, record, photograph and describe sites of archaeological and cultural importance;
- Should any sites be identified to propose a study method forward;
- Ensure that all requirements of the local South African Heritage Resources Agency (SAHRA) are met; and
- Report on the results of the archaeological and cultural heritage survey adhering to minimum standards as prescribed by the SAHRA and approved by the Association for Southern African Professional Archaeologist (ASAPA).

In order to achieve the successful completion of the project the following methodology is proposed:

##### **8.1.8.1 Background Study:**

The first phase will comprise a desktop study, gathering data to compile a background history of the area. The desktop study will utilise data for information gathering from various sources to extract data and information on the study area focussing on archaeological sites, historical sites and known graves of the area. This will help to contextualise the study area.

### 8.1.8.2 Physical Surveying

The field visit will aim to locate and identify sites of significance, in addition to the 3 cemeteries already found to occur. These sites will then be recorded, photographed and described. GPS points of significant sites will be documented using the WGS 84 datum point.

### 8.1.8.3 Reporting and Impact Assessment

Should any sites be identified during the field visit a study method for the way forward will be proposed. This will include determining the levels of heritage significance of recorded heritage resources and the impact of the proposed development on these resources. Mitigation measures and management actions will be recommended should any significant sites be impacted upon.

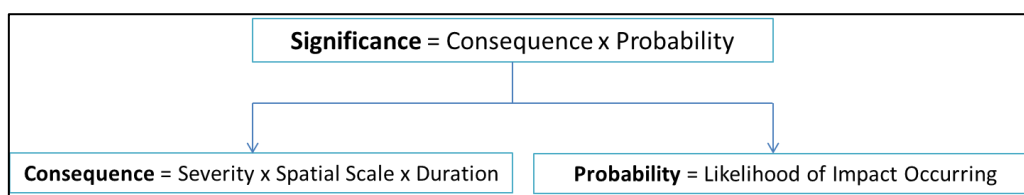
## 8.2 Environmental Impact Report

Once the specialist investigations have been completed and the findings and recommendations integrated by the team, an Environmental Impact Assessment Report (EIAR) will be prepared in compliance with the NEMA and will include:

- A description of the EAP that prepared the report;
- A detailed description of the proposed activity;
- A description of the need and desirability of the project and details of the alternatives that were investigated;
- A description of the environment that may be affected;
- A description of the PPP that was undertaken;
- Findings, recommendations and copies of specialist studies;
- An indication of the method used to identify significance;
- An assessment of specific information required by the competent authority;
- A comparative assessment of all alternatives;
- An assessment of each potentially significant impact;
- A description of any assumptions, uncertainties and gaps in knowledge;
- An opinion on whether the activity should be authorised or not and, if it should be authorised, under what conditions;
- An Environmental Impact Statement; and
- A draft Environmental Management Plan for the full lifecycle of the proposed landfill site.

## 8.3 IMPACT ASSESSMENT METHODOLOGY

The impact assessment methodology, during the following ESIA phase, for the proposed project, will consist of two phases, namely (i) impact identification; and (ii) impact significance rating. Impacts and risks will be identified based on a description of the existing and proposed future activities to be undertaken as part of the proposed project. The impact associated with each of these proposed activities will be assessed and a significance rating will be determined for each of them using the flowing formula and matrix below. The mitigation measures and impact management controls for all identified impacts and risks will be incorporated into an EMP. The significance rating process for impacts follows the established impact/risk assessment formula:



Significance	Consequence (severity + scale + duration)									
	1	3	5	7	9	11	15	18	21	
Probability / Likelihood	1	3	5	7	9	11	15	18	21	
	2	6	10	14	18	22	30	36	42	
	3	9	15	21	27	33	45	54	63	
	4	12	20	28	36	44	60	72	84	
	5	15	25	35	45	55	75	90	105	
	6	18	30	42	54	66	90	108	126	
	7	21	35	49	63	77	105	126	147	

Significance		
High	108- 147	
Medium-High	73 - 107	
Medium-Low	36 - 72	
Low	0 - 35	

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
High	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	<u>International</u> The effect will occur across international borders	<u>Permanent: No Mitigation</u> No mitigation measures of natural process will reduce the impact after implementation.	<u>Certain/ Definite.</u> The impact will occur regardless of the implementation of any preventative or corrective actions.
Medium-High	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate	Very serious widespread social impacts. Irreparable damage to highly valued items	<u>Province/ Region</u> Will affect the entire province or region	<u>Project Life</u> The impact will cease after the operational life span of the project.	<u>Likely</u> The impact may occur.
Medium-Low	Serious medium term environmental effects. Environmental damage can be reversed in less than a year	On-going serious social issues. Significant damage to structures / items of cultural significance	<u>Municipal Area</u> Will affect the whole municipal area	<u>Long term</u> 6-15 years	<u>Probable</u> Has occurred here or elsewhere and could therefore occur.
Low	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	<u>Limited</u> Limited to the site and its immediate surroundings	<u>Short term</u> Less than 1 year	<u>Rare/ improbable</u> Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation



Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
					measures

8.3.1 Cumulative Impacts

Cumulative impacts are changes to the environment that are caused by an action in combination with other past, present and future actions. Each impact identified will be assessed on its own and considered as a combined or cumulative impact.

Potential cumulative impacts identified thus far for further investigation in the EIA include:

- Air Quality;
- Surface and ground water pollution;
- Traffic impacts;
- Noise impacts;
- Potential decrease in property values due to the presence and potential direct impacts of a landfill facility; and
- Positive impact on regional waste management and development of infrastructure.

8.3.2 Mitigation

Mitigation for significant issues will be incorporated into the EMP for planning, construction, operation and decommissioning.

8.3.3 Environmental Management Plan

A draft EMP will be included as part of the draft EIA Report which will be made available for public review; after which, it will be finalised and submitted as part of the final EIA Report to the DEA. The EMP outlines the impacts and mitigation measures for the construction, operation and maintenance and decommissioning phases of the project. The EMP will comprise:

- Summary of Impacts: The predicted negative environmental impacts for which mitigation is required , and positive impacts requiring enhancement;
- Description of mitigation measures: The EMP 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 will be accompanied by designs, equipment descriptions, and operating procedures, where appropriate, as well as descriptions of technical aspects of implementing the mitigation measures;
- Description of a monitoring programme: The monitoring programme indicates the linkages between impacts, indicators to be measured, measurement methods and definition of thresholds that will signal the need for corrective actions;
- Emergency Action Plan: The identification of possible accidents during the construction and operation phase of the project, with measures on how they will be prevented and/or managed;
- Institutional arrangements depict and define the responsibilities for mitigation and monitoring actions;
- Responsibilities of the Environmental Officer, Environmental Control Officer (ECO) and the Environmental Manager;
- Legal enforceability: The key legal considerations with respect to the EMP are:
  - Legal framework for environmental protection; and
  - Legal basis for mitigation.
- The implementation schedule and reporting procedures that specify the timing, frequency and duration of the mitigation measures; and
- A description of requirements for record keeping, reporting, review, auditing and updating of the EMP.

8.3.4 Public Participation in the EIA Phase

**8.3.4.1 Making the Draft and Final EIA reports Available for Public Comment**

The draft EIA report and EMP will be made available to the public for comment. All registered I&APs will be notified of the availability of the reports. A 60-day review period (as per NEMWA requirements) is recommended for each of the reports. On completion of the review period, the EIA team will update the report to incorporate and/or address comments received.

The final report will be presented to the authorities. If there are any further comments, the public will provide these directly to the authorities. This fulfils the requirement that the decision-makers and the public work from the same information set.

The draft and final reports will be made available at suitable venues such as public libraries, community centres, website, etc. Copies on CD-Rom will be provided to core stakeholders and otherwise on request.

#### **8.3.4.2 EIA Public Meetings**

Once the Draft EIA and EMP have been prepared, a public meeting will be held during the public review period of the draft EIA and EMP reports to explain the process followed, discuss the findings of the environmental impact study and obtain inputs and comments (bio-physical and social) regarding the findings and recommendations. All registered I&APs will be directly invited to the public meeting.

Minutes of the public meeting will be compiled and distributed to I&APs and will form part of the final EIA report. Agendas, attendance registers, comment sheets, sound recording and display equipment will be made available. Minutes will be compiled and distributed to the attendees of the public meeting.

#### **8.3.4.3 Finalisation of Public Participation Reports**

The Public Participation Report will be completed and finalised after the public meeting and the end of the public review period. The report will comprise:

- A description of the public participation process followed;
- A list of issues, comments and concerns raised during the public participation process;
- Conclusions and recommendations;
- A list of the registered I&APs; and
- Minutes of meetings and written comments received during the public participation process.

#### **8.3.4.4 Notification of Environmental Authorisation**

Once the environmental authorisations have been issued by the authorities, the I&APs on the database will be notified of the decision within 10 calendar days. The full environmental authorisations will be made available on request. The public will also be informed of its right to appeal and the process to follow.

## 9. Conclusion

A number of potentially significant impacts have been highlighted for further investigation. Of particular importance will be the geological and geohydrological investigations to determine areas on the site that are suitable for development as a waste disposal facility.

The impacts identified will be assessed to determine their significance and to determine the need for the implementation of mitigation measures for the overall project to be environmentally sustainable.

It is, therefore, recommended that more comprehensive studies be conducted for the proposed landfill site in the EIA Phase.

The potential impacts that have been identified during the Scoping Phase will be investigated during the EIA Phase of the project with appropriate mitigation measures included in the EMP. These impacts can be summarised as:

- Potential decrease in property values due to the presence and potential direct impacts of a landfill facility; and
- Positive impact on regional waste management and development of infrastructure.
- Potential visual impacts;
- Potential noise impacts;
- Potential vectors and rodents;
- Potential windblown litter;
- Potential soil impacts;
- Potential social impacts, including health and impact on surrounding farm activities (e.g. maize and chicken farming);
- Concerns regarding job losses at the Multisand quarry and related potential issues;
- Potential impacts on the N4 and R566 traffic routes;
- Potential impacts on air quality (including dust and mal-odours)
- Geotechnical and geological conditions
- Potential issues around surface and groundwater quantity and quality;
- Potential impact on wetland areas and associated bird life; and
- Potential spread of diseases due to the proposed project attracting migrating birds.

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# **Appendix A**

## **Site Selection Report**

# Appendix B

## Public Participation Documentation