

**PROPOSED ESKOM LANDFILL SITE DEVELOPMENT, LEPHALALE,
LIMPOPO PROVINCE**

**ENGINEERING INPUT TO THE SCOPING REPORT OF THE
ENVIRONMENTAL IMPACT ASSESSMENT**

FEBRUARY 2009



PREPARED BY:

P D Naidoo & Associates
25 Scott Street
Waverley

PREPARED FOR:

Envirolution Consulting (Pty) Ltd
4 Peltier Road
SUNNINGHILL
2157

CONTACT PERSON:

Shenaz Moola
Tel No: +27 11 566 8481

CONTACT PERSON:

Nkhensani Khandhela
Tel: 086 144 4499

TABLE OF CONTENTS

Table of Contents.....	2
Abbreviations.....	3
Introduction	4
Site Meeting 1: 17 th and 18 th November 2008	4
Screening report inputs - 20 th November 2008.....	4
Screening workshop – 21 st November 2008.....	4
Alternative disposal options	5
Interim Amendments.....	5
Site Meeting 2 – 17 December 2008	6
Site Geology	8
Site Geo-hydrology	8

ABBREVIATIONS

DWAF	Department of Water Affairs and Forestry, South Africa
EIA	Environmental Impact Assessment
EXS	Enviroxcellence Services
GHT	Geo Hydro Technologies
MR	Minimum Requirements for Waste Disposal by Landfill, DWAF, 1998
PDNA	P D Naidoo & Associates Consulting Engineers

INTRODUCTION

PD Naidoo & Associates (PDNA) was contracted by Envirolution Consulting to provide consulting services as part of an Environmental Impact Assessment (EIA) for Eskom. The scope of this study included a specialist study for engineering design of a general waste site disposal site and hazardous holding facility

SITE MEETING 1: 17TH AND 18TH NOVEMBER 2008

On the 17th and 18th November 2008 all consultants attended a specialist integration meeting in Lephalale and went on site visits to assess proposed sites for the establishment of the general waste disposal site and hazardous waste holding facility. The three sites under consideration included Site 1 (Kromdraai 513 LQ), Site 2 (Grootvallei 515 LQ) and Site 3 (Zwartwater 507 LQ).¹ Each of these sites was further divided into quadrants designated A, B, C and D for ease of reference.²

SCREENING REPORT INPUTS - 20TH NOVEMBER 2008

A post-site visit screening report was prepared to form the basis for further discussion at the screening workshop. The initially reported waste volumes anticipated by Eskom for consideration in the landfill design were 90 000 m³ each of general and hazardous waste (as per the tender Terms of Reference) and all inputs to the screening report were made in the context of this information. For the purpose of the screening phase several elements were considered and submitted for consideration including the size of the site, access to cover material, access to construction material, access to services, topography, transportation costs, access considerations and impacts on surrounding communities.

SCREENING WORKSHOP – 21ST NOVEMBER 2008

On 21st November 2008 a screening workshop was held at Eskom to consider all the specialist inputs, propose a site ranking system, rank criteria in order of importance and attempt to narrow down the available sites to one site which would be the subject of the subsequent Environmental Impact Assessment (EIA) process. The outcome of this workshop was the exclusion of Sites 1 and 3; Site 1 because of future plans by Eskom to extend the footprint of the existing ashdump from Eenzaamheid 512 LQ to the north of Site 1 into Site 1³ and Site 3 because of the presence of a geohydrological constraint i.e. the presence of a

¹ As indicated on the maps provided by Eskom and Envirolution

² *ibid.*

³ Eskom representative, screening workshop

major fault running through Site 3.⁴ By this negative mapping the 4 quadrants of Site 2 (Grootvallei) i.e. Site 2A, Site 2B, Site 2C and Site 2D were identified as the most likely site options though not without their own constraints including the presence of rocky outcrops (2B)⁵ and the presence of a protected bullfrog (2A)⁶ in the area.

ALTERNATIVE DISPOSAL OPTIONS

In terms of the Minimum Requirements (MR) for Waste Disposal by Landfill,⁷ *“certain hazardous wastes may be ‘delisted’ for disposal at an H:h landfill or an appropriately lined general waste site. This would be because the hazardous substance in the waste is of low mobility or concentration, or because the substance has been successfully treated to make it less hazardous. It must, however, be demonstrated to the satisfaction of the Department that the waste does not pose a risk to man or the environment. This would involve additional investigative testing.”*

In consideration of this allowance in the MR it was proposed that Eskom adjust the design brief from that of a general waste landfill to a H:h landfill for disposal of low hazard rating waste and which would additionally accept general waste. This would, if not entirely negate the requirement for a hazardous holding facility, at least require a much smaller hazardous holding facility to be built for temporary storage of high hazard rating waste for onward transport and disposal at an H:H landfill.

An alternatively proposed scenario was the establishment of a general waste facility with a co-disposal cell for disposing low hazard rating waste i.e. a G:S:B+⁸ landfill. As before the high hazard rating waste would be disposed of at a licensed H:H facility. The initial indications are that the bulk of the hazardous waste is of low hazard rating though confirmatory testing will be necessary.

INTERIM AMENDMENTS

At the beginning of December Eskom advised that anticipated waste volumes generated from construction activities of the Coal 3 and Coal 4 power stations as well as by the Moropong villages had inadvertently been excluded from the consideration of final waste volumes.⁹ Inclusion of this waste brought the projected waste volume to 230,000 m³.

⁴ A. Schulze-Hulbe, Blue Rock Consulting, input to screening workshop

⁵ As marked on the maps provided by Eskom and Envirolution

⁶ *ibid.*

⁷ Department of Water Affairs and Forestry (DWAf), South Africa, 1998

⁸ G:S:B+: (General, small, potential for leachate generation). B+ is the result of a Climatic Water Balance calculation as required by the DWAf MR

⁹ K. Nair, Eskom, per e-mail, 1.12.08

Clarification was requested from Eskom in terms of the projected increases in the hazardous waste stream volumes. The proposed waste volumes to be considered were again amended by Eskom and are now set at 1,200,000 m³.¹⁰ This includes the contribution of the residents in the construction village which will house approximately 7,000 people.¹¹ Assuming a waste generation rate per capita of 1.5kg/day this sets the value at just under 31,000 kg over the 8 year period the village is expected to be occupied. On the 8th December 2008, the consultants were advised that Eskom would include a fifth site to be considered as a possible waste disposal site and holding facility. The site in question is located within the boundaries of the Matimba Power (designated Grootestryd) and was previously used as a waste disposal site.¹²

SITE MEETING 2 – 17 DECEMBER 2008

On 17th December 2008 the geotechnical, geohydrological and PDNA consultants made a site inspection of this newly proposed site at the Matimba Power Station. Background information and history of the site provided by Eskom was sketchy. Information that could be gleaned from the site visit was that the site had been used as an unpermitted waste disposal site, for an unspecified period of time with no clarity regarding the type of waste disposed. The actual footprint of the disposal area was 4Ha within a 17Ha cordoned off area.

The consultants were supplied with a DWAF communiqué (17 August 2005)¹³ which explained DWAF's rationale for declining to issue a closure permit to Eskom for the existing Matimba waste disposal site. The main reasons were that:

- Disposal of flyash on the site precluded the site from being classified as a waste disposal site in terms of section 20 of the Environment Conservation Act.
- There was concern that the groundwater monitoring boreholes were incorrectly sited to detect groundwater contamination
- The monitoring protocol was not sufficiently clear for DWAF to be able to make an informed assessment of the monitoring data

¹⁰ Based on a spreadsheet submitted by Eskom. There were some errors and discrepancies in the calculation which were corrected and re-submitted to Eskom for endorsement. Eskom have advised that the 1,200,000m³ figure should be considered in the final design to cover any "any unforeseen circumstances" .(personal communication, K Nair, 04.02.2009)

¹¹ Personal communication per e-mail. K Nair. 11.2.2008

¹² Communiqué from Envirolution Consulting

¹³ DWAF Communiqué. 17 August 2005. Addressed to the Manager, Matimba Power Station. 16/2/7/A400/B21/1

- The laboratory used for analysis of the groundwater samples was not accredited and DWAF had experienced problems previously with the quality of data analyses from the lab in question
- The two reports submitted by Eskom in application for a closure permit contradicted each other. The GHT report,¹⁴ which pre-dates the EXS report,¹⁵ concluded that available evidence pointed to groundwater contamination. The GHT report was not made available to EXS.

Additionally, DWAF supplied a document to Eskom which outlined a Generic Process to be followed for the “Remediation of Contaminated Land Areas and Deteriorated Water Resources”.¹⁶ Stage 1 of this process entails “Investigation of Site Status and Determination of Remediation Objectives”. Discussions with Ms Isabella Sekgothe (Safety/Risk Management, Eskom) suggested that remediation activities at the waste disposal site were at Stage 1. A series of questions were formulated and documents requested from Eskom to enable a more informed response in terms of the suitability of the site for siting of the new waste facilities.

Subsequent to the site visit, Eskom advised that they will consider the option of co-disposal of waste (without discarding the hazardous waste storage facility).¹⁷

From the available information, the conclusions arrived at after the site visit was that the general area i.e., within the cordoned off 17Ha area (Grootestryd), was suitable for siting of a waste disposal site as it was already “disturbed” by previous disposal activities. Continued disposal activity atop the old waste disposal site, as proposed by Eskom, was precluded as an option because of:

- uncertainty regarding the nature and extent of existing contamination and future polluting potential of the site
- concerns that lack of records regarding nature and volumes of waste disposed of, frequency of disposal and degree of compaction made stability and settlement at the site difficult to predict

¹⁴ Site characteristics in the vicinity of an unregistered waste disposal facility, Matimba Power Station (Geo Hydro Technologies; 2001)

¹⁵ Final scoping report on close of the waste site (Enviroxcellence Services; 2003)

¹⁶ As supplied to the consultants at Site Meeting 2 at the Matimba Power Station.

¹⁷ E-mail communiqué from Envirovolution Consulting 27.01.2008

- The site is subject to a closure licensing process which is still underway, and needs to be finalised before any other activities can be considered in respect to it

SITE GEOLOGY

Grootestryd is very close to access roads and services including water and electricity. Eskom will consider the installation of a septic tank for sewage handling. From an engineering point of view, the site could be designed to be well screened from the public. On the basis of the information provided we propose that the landfill be sited in the area north of the old landfill site. Road access is good to this portion of the site. The updated geo-hydrological report¹⁸ makes the point that at the 4 sites on the farm Grootvallei (i.e., 2A, 2B, 2C and 2D) hard, unweathered and tight rocks are overlain by transported and residual soils which are sandy and thin and rarely more than 3m in thickness.¹⁹ At the farm Grootestryd the sequence of sandstone and mudstone and shale rocks is overlain by dark brown sandy transported soils that extend to depths of 4m to 5m below the surface level. Furthermore, highly to completely weathered soft rock sandstone underlies the soils and extends to depths varying between 13m and 15m.²⁰ This means that the potential for securing cover material is greater at this site and excavation operations are likely to be easier here.

SITE GEO-HYDROLOGY

The DWAF report,²¹ citing two geo-hydrological reports supplied by Eskom, indicates that the groundwater has been polluted by deposited liquids and emitted leachates from the disposal site which has resulted in the groundwater being polluted. This while noting, that DWAF considers the monitoring boreholes wholly inadequate to derive conclusive evidence of the possible impacts of the waste site on the groundwater. Furthermore the laboratory appointed to carry out some of the testing is not accredited and the accuracy of reported values is therefore questionable.

These reports also suggest that the groundwater underlying the area to the north of the existing waste dump is unpolluted.²² Although the existing groundwater monitoring system indicates a regional groundwater flow in a southerly direction, the reliability of this data is not certain. DWAF suggests that no true picture of the extent of groundwater

¹⁸ Supplied per e-mail, 02.02.2009

¹⁹ Updated geo-hydrological report, Blue Rock Consulting, 03.02.2009.

²⁰ *Ibid.*

²¹ As supplied to the consultants at Site Meeting 2 at the Matimba Power Station.

²² Updated geo-hydrological report, Blue Rock Consulting, 03.02.2009

contamination can be obtained without extending monitoring to the south and east of the existing disposal site.

Blue Rock Consulting (BRC) additionally raise the possibility of polluting potential of the existing coal storage site on the groundwater in the area to the south and east of the existing waste dump.²³ BRC recommend that:

- geophysical surveys be carried out in the areas surrounding the proposed site to the north of the existing waste site and also in the areas surrounding the existing waste site to identify faults and fracture zones and hence potential aquifers in the bedrock.
- rotary percussion boreholes be drilled at strategic locations where fracture zones and zones of deep weathering that may represent potential aquifers have been identified. These should be located at positions indicative of groundwater flow. These boreholes can also be used to establish the extended groundwater monitoring system for the new waste site.
- Monitoring boreholes should be drilled to monitor water flow in the area envisaged for general and for hazardous waste on the new site.
- Soil profiles exposed in test pits excavated for the geotechnical investigation at the site should be investigated to determine the composition geohydrological properties of the materials overlying the bedrock and the materials used for cover material.

These measures will ensure that any new disposal site is accompanied by an extensive groundwater monitoring system that adequately and effectively measures any liquid flow from the disposal site so that the origin of contamination arising from the area is unambiguously identified.

²³ *Ibid.*