

REPORT ON A GEOTECHNICAL DESK STUDY AND RECONNAISSANCE SURVEY FOR CANDIDATE SITES FOR THE ESKOM LANDFILL AND HAZARDOUS WASTE HOLDING FACILITY

1. THE DEVELOPMENT

A hazardous waste holding facility and general landfill are to be developed by Eskom near their Medupi site located near to Lephalale in the Limpopo Province. Conservatively it is estimated that the total waste generated over the life of the facility will be of the order of 1200 000 m³ for each of the general waste and hazardous waste sites.

2. BACKGROUND

A number of potential sites have been identified by Eskom for the development of waste disposal facilities, and the purpose of undertaking the geotechnical investigation is to provide sufficient information to assist in a site selection process. Employing a range of screening criteria, five candidate sites within which the waste disposal facility may be constructed have been identified, one of which is to be selected for authorisation for construction of the facility and the associated ancillary developments, such as water pipelines, access roads, transmission lines, office and other structures. Once selected a detailed geotechnical investigation will be undertaken within the site.

Four potential sites, numbered 1 to 4 and occupying an area of some 20 hectares each, have been identified on the farm Grootvallei and one site, numbered 5, has been identified within the Matimba Power Station boundaries on the farm Grootestryd.

3. DESK STUDY

A desk study was undertaken to obtain as much information as possible of the area that may provide an indication of the most likely subsoil and associated geotechnical conditions prevailing. By determining the underlying geological setting, together with the prevailing topographical and climatic conditions, the weathering characteristics of the host rock can be estimated and an indication of the likely geotechnical conditions established.

3.1 Geological Setting

Based on the 1:250 000 geological map, an extract of which is attached to this report, sites 1 to 4 are underlain by rocks of the Waterberg Group, which consists primarily of sandstone. It has volcanic rocks near its base but these are very minor. The rocks have also been subjected to numerous periods of faulting and folding.

Site 5, located on the farm Grootestryd, is underlain by rocks of the Karroo sequence comprising sandstones, gritstone, mudstones and coal.

Frequently the rocks mentioned, or their weathered derivatives, are overlain by transported Quaternary deposits.

3.2 Topography

Based on the 1:50 000 topographical map of the area the land surface is for sites 1 to 4 is fairly flat and comprises mainly farmland with scattered scrub and bush and isolated koppies and ridges occurring in places. The Sandloop River flows through the farm Grootvallei near to its northern boundary.

Site 5 is situated adjacent to an existing waste disposal facility where the ground surface is fairly flat and covered with fairly dense bush.

3.3 Climate

Mean annual precipitation for the area is of the order of 400 mm and based on Weinert's N map, the area falls within the region where N is about 4,5. This is at the border between mechanical and chemical weathering of rock and suggests that a deep soil profile is unlikely in the area.

4. RECONNAISSANCE SURVEY

A reconnaissance of each site was carried out to provide more detailed information obtained from the desk study and to obtain a general picture of the topography, geology and any other salient features which may have a bearing on the development and construction of the facility and ancillary works.

The following salient points were noted:

- Sites 1 to 5 are fairly densely vegetated and the terrain is mostly flat.
- Site 3 is located between two rock outcrops.
- A rocky outcrop occurs near to the southern corner of Site 2.
- Site 5 is situated adjacent to a disused waste disposal facility.
- Sites 1 and 2 are situated about 500 m from the Sandloop River, which appears to be a seasonal.

5. POSSIBLE GEOTECHNICAL CONDITIONS

Based on the information obtained from the desk study and reconnaissance survey, the following geotechnical conditions may occur within the candidate sites. A more detailed investigation will have to be carried out once the preferred site has been identified.

The nature of the host rock underlying sites 1 to 4, namely sandstone, together with the flat topography and Weinert's N value of about 4,5 together suggest that the soil profile developed from the host rock will be fairly shallow and comprise mainly a sand. It is nevertheless very likely that a transported soil layer covers the residual material and this is clearly illustrated in the railway cutting near to the sites.

The proximity of rock near to sites 2 and 3 further suggests that the residual soil profile will be fairly thin in these areas.

Depending on the nature of the rock underlying Site 5 the weathered derivatives in the area could range from coarse sand, if the rock is sandstone or gritstone, to fine plastic sand or silt if the rock is mudstone. Again, the thickness of the residual soil formed from the rock is not likely to be very deep.

5.1. Founding conditions

Good founding conditions for the structures are envisaged in all of the candidate sites, since they will very likely be constructed on competent sandstone, gritstone or mudstone.

5.2. Excavatability

Under the rocky and relatively steep site conditions, levelling and preparations for terraces and foundations will be costly since hard excavation or blasting of rock and boulders will be required.

No excavation difficulties are envisaged to depths of the order of 2 to 3 m in the vicinity of sites 1, 4 and 5. The close proximity of rock outcrop near to sites 2 and 3 suggest that rock may occur near to the surface.

5.3. Use of *in-situ* material

The *in-situ* material from all of the sites may be suitable for use as cover material but its extent and the quantity available is very likely to be limited at sites 2 and 3, and possibly site 1. Subject to a more detailed investigation sites 4 and 5 may have a relatively thicker soil layer suitable for use as cover material.

5.4. Slope stability

The area is generally flat and where rock outcrops do occur, they appear stable and thus slope stability problems are unlikely within the sites.

5.5. Undermined ground

As far as is known, this area is not undermined.

5.6. Instability of areas of soluble rock

Based on the geological map of the area no soluble dolomitic rock has been identified.

5.7 Seepage

As previously discussed, bedrock is very likely to occur near to the ground surface and may well be closely to medium jointed providing potential seepage paths to the underlying regional groundwater, particularly in the vicinity of sites 1 and 2, located near to the Sandloop Spruit.

Whilst bedrock may possibly occur at relatively shallow depth at sites 3, 4 and 5 it is likely to be more weathered, but this will have to be determined by means of test pits or core drilling.

6. CONCLUSIONS

Given the above discussions, which have been based on a desk study and site walkover, the candidate sites are unlikely to present any major geological or geotechnical problems which could obstruct development on them. However, in view of the proximity of sites 1 and 2 to the seasonal Sandloop Spruit, and the proximity of rock outcrops to sites 2 and 3, it is recommended that sites 4 and 5 be selected as preferred sites. Site 5 however may be underlain by more favourable mudstone which chemically weathers to plastic and thus less permeable soil than that of site 4 which is likely underlain by permeable sand.

In light of the above, of the five candidate sites selected, site 5 is the preferred.

Yours faithfully



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APPENDIX A
PHOTOGRAPH



Photograph: Exposure of railway cutting