WEST END OFFICE PARK
Top Soil survey
ECO-1

SEF Reference No: 505449

Prepared for:

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STRATEGIC ENVIRONMENTAL FOCUS

February 2014

Declaration of Independence

I, **Rowena Harrison,** in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Have and will not have vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member;
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgement; and
- Undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study for which I am registered.

14/02/2014

Rowena Harrison *Cand. Sci. Nat.* **Date**

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EXECUTIVE SUMMARY

Strategic Environmental Focus (Pty) Ltd. (SEF) was appointed by Abland to undertake a topsoil assessment as part of a Green Star SA Office Design on the area to be affected by a proposed West End Office Park, Centurion, City of Tshwane, Gauteng. The ECO-1 Topsoil Technical Manual was used to determine the Terms of Reference for the assessment.
The terms of reference for the current study were as follows:

- Conduct a soil survey to determine soil types present on site;
- Determine the depth of topsoil present on site; and
- Determine the amount of topsoil on site worth salvaging before development.

Soil observations were made by means of a standard hand auger method and one soil type was identified and classified as a Hutton soil form according to the South African soil classification system (Soil Classification Working Group, 1991). The diagnostic horizon, texture, colour, and depth were then used to classify the Hutton soil form into family level and this was determined to be a 1200 (Kelvin) soil family due to the luvic nature of the soil.

The soil was recorded as being shallow with the majority of profiles falling within the range of 20mm – 30mm depth. This is as a result of the reshaping of the original topography of the area and the removal of soil layers.

Soil profiles were recorded as being mixed and the original sequence of soil horizons was not identified in the majority of soil profiles observed. Topsoil, when identified, was mixed with the sub-horizon and showed a marked loss of organic matter as well as silicate clay. The soil is not considered productive without the addition of appropriate fertilisers, organic material, or nutrient supplements.

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Topsoil is defined as the mineral horizon formed at the surface of the soil, consisting predominantly of mineral particles intimately mixed with a greater or lesser amount of humified organic matter. Topsoils can be classified into five separate surface horizons including organic, humic, vertic, melanic, and orthic. The majority of soils in South Africa have orthic topsoil, which can vary widely in organic carbon content, colour, texture, structure, base status and mineral composition (Soil Classification Working Group, 1991). Strategic Environmental Focus (Pty) Ltd (SEF) was appointed by Abland to undertake a topsoil survey as part of a Green Star SA Office Design on the area to be affected by a proposed West End Office Park situated, Centurion. The ECO-1 Topsoil Technical Manual was used to determine the Terms of Reference for the assessment.

1.1 Terms of Reference

The scope of works for the impact assessment entailed the following:

- Grouping uniform soil patterns within uniform terrain into map units, with respect to observed limitations;
- Determine the depth of topsoil within the site;
- Determine the topsoil worth salvaging before development takes place.

1.2 Assumptions and Limitations

For purposes of this study, the following assumptions are applicable;

- Soil depth and quality was inferred from extrapolations from the observation points.

2. BACKGROUND INFORMATION

2.1 Locality

The study area is located off Hall Street and Von Willich Avenue, Centurion in the City of Tshwane municipality. The site is bounded on all sides by development and currently consists of an open undeveloped area which has been disturbed. The study site falls within the 2528CC quarter degree square.

2.2 Climate

The area normally receives about 556mm of rain per year, with most rainfall occurring during summer. The average monthly rainfall values are 0mm in June when the lowest rainfall is received and 105mm in January when the highest rainfall is received. The monthly average midday temperatures for Centurion range from 17.6°C in June to 27°C in January. The region is the coldest during July when the temperature drops to 1.3°C on average during the night.

3. Methodology

3.1 In situ Soil Survey

Soil observations were conducted on the 28th of January 2014. The survey was carried out in three (3) phases as illustrated below:

- *In situ* Data Collection;
- Mapping; and
- Report Compilation.

Soil observations were made by means of a standard hand auger method, and dominant soil types, and soil boundaries classified according to the South African soil classification system (Soil Classification Working Group, 1991). The diagnostic horizon sequence of the soil profiles, texture, colour, and depth were used to classify and allocate soils into soil forms.

4. RESULTS

4.1 Soil Classification

One soil type was identified on site and recorded as the Hutton soil form (Photograph 1). The Hutton soil form occurred with varying depths and was in all cases underlain by hard rock. The Hutton soil form was further classified to soil family level according to the Taxonomic Soil Classification System for South Africa (1991), as illustrated in Table 1 below.

Table 1: Soil classification and description

Soil Form (Type)	Diagnostic Horizon Sequence	Soil Family	Description
Hutton	Orthic A Red apedal B	Hu 1200 (Kelvin)	Well drained red, sandy loam soil. Luvic

Photograph 1: Hutton soil form identified on site.

4.2 Topsoil Depth and Soil Quality

The soil observations conducted within the site showed that the soil had been disturbed to a great extent in the past. Soil observations indicated shallow soil, soil loss, and the mixing of original soil horizons. Eight soil observation points were made within the area to be developed and the soil depth recorded is shown in Table 2. The maximum soil depth reached was 80mm in observation point 6 and 7. The majority of profiles examined where less than 30mm in depth and were directly underlain by hard rock. In all profiles examined the original soil horizon sequence was absent with the orthic A horizon and apedal sub horizon mixed. This is as a result of disturbances within the site including the reshaping of the topography of the area, and the removal of soil (Photograph 2). Original topsoil from the site has therefore been lost. The soil was also observed to have undergone marked removal of colloidal material, including organic matter and silicate clay. This has an effect on the quality of soil present on site and makes the soil not productive without the additions of appropriate fertilisers or nutrient supplements.

Photograph 2: Site topography including the removal and mixing of soil.

Table 2: Soil depth observations

Soil Parameters	Depth of soil profile (both A and B horizon). (mm)
1	50
2	<20
3	30
4	<20
5	<20
6	80
7	80
8	<20

5. CONCLUSION

Soil observation profiles were dug within the site and were used to identify the soil type, soil depth and production quality of the soil. The soil was recorded as being shallow with the majority of profiles falling within the range of 20mm – 30mm depth and the original soil horizon sequence being lost. This is as a result of the reshaping of the original topography of the area, the removal of soil for past building purposes as well as the dumping of outside soil on top of the original soil profile.

Soils were classified as one soil type, Hutton, however soil profiles were recorded as being mixed and the original sequence of soil horizons was not identified. Topsoil, when identified, was mixed with the sub-horizon and showed a marked loss of organic matter as well as silicate clay. The soil is not considered productive without the addition of appropriate fertilisers, organic material, or nutrient supplements.

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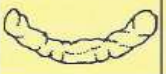
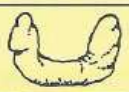
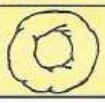
APPENDICES

APPENDIX A

Soil texture can be determined in the field by taking a handful of moist soil, kneading and rolling it between the palms of the hands to form a “spindle” or “sausage” as illustrated in the diagram below:

If no sausage can be rolled, the soil is sandy (less than 10% clay)	No sausage	Sand
If a sausage can just be formed but it cracks upon bending, it is a loamy sand (10 to 15% clay)		Loamy sand
If it will bend a little, it is a sandy loam (15 to 20% clay)		Sandy loam
If it will bend readily before cracking, it is a sandy clay loam (20 to 35% clay)		Sandy clay loam
If it will bend around nearly into a circle, it is a sandy clay (35 to 55% clay)		Sandy clay
If it will bend into a circle, it is a clay (more than 55% clay)		Clay

Structure

- Refers to natural aggregation of primary soil particles into compound units or peds which are separated from one another by planes or surfaces of weakness.
- Cohesion within peds is greater than adhesion between them.
- Structured particles are categorised according to their nature (type, size and degree).

Type	:	angular, apedal, blocky, columnar, crumb, granular, platy, prismatic
Size	:	fine, medium, coarse
Degree	:	strong, moderate, weak, structureless.

- **Strongly structured soils** are those with spaces between clearly defined peds (**blocky** or **prismatic** structure).
- Blocks may vary in size from a few millimetres to 40 or 50 mm in cross section. Prisms are normally 30 to 60 mm across and at least 100 mm deep.
- In **weakly structured soils** it is difficult to see boundaries between peds, e.g. **apedal** is a non-visible structure but each grain is coated with a porous microscopic layer of hydrated iron and aluminium oxides.

Consistency

- Used to describe the physical state of a soil in relation to how it changes with moisture content and its effect on mechanical cultivation in particular.
- As moisture content changes from very dry to very wet, the following descriptive terms can be used for different conditions.

Moisture status:	Very dry	:	harsh, hard, cloddy, powdery
	↓	:	firm
	↓	:	friable, soft
	↓	:	plastic
	Very wet	:	sticky or saturated.

- Both texture and structure have a marked effect on soil consistency, e.g. sands need only little water to become soft, friable and easily worked, while clays need more.
- Strongly structured soils have to be worked when their moisture contents lie between close limits; often they are either too firm or sticky for cultivation.