AGRICULTURAL COMPLIANCE STATEMENT

FOR THE PROPOSED LION ENERGY CONVERSION FACILITY (ECF), LOCATED IN THE STEELPOORT AREA, LIMPOPO

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LAND MATTERS ENVIRONMENTAL CONSULTING

Declaration of Independence by Specialist

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

- Act as an independent soil 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.
- 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 ability.
- 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.

Rowena Harrison
Soil Scientist
SACNASP Reg. No. 400715/15
Date: 13th January 2021

EXECUTIVE SUMMARY

Land Matters Environmental Consulting was appointed by Nettzero on behalf of Glencore Operations South Africa (Pty) Ltd – Lion Smelter to conduct an Agricultural Compliance Statement for the proposed Lion Smelter Energy Conversion Facility (ECF) project. A desktop investigation as well as field work were conducted within the study site.

The study site can be classified into two separate soil types, the natural soils and the anthrosols. The natural soils were dominated by the Calcic soil group. Within the site, the neocarbonate soil horizon was identified with the soils classified as either the Palala or Hofmeyr soil forms. Portions of the proposed project site have existing disturbances as a result of dirt roads. Due to the existence of the roads, the soils within these areas are described as Physically Disturbed Anthrosols. This soil is further classified as the Grabouw soil form and is no longer suitable for agricultural production as the original soil profile has been mixed and is no longer identifiable.

Soils were examined within the site and the following 3 major observations were made:

- the presence of a pedocutanic layer in the Palala soils is a clear textural contrast between the overlying neocarbonate layer. A pedocutanic horizon has a strong structure and is seen as a limitation to plant growth as well as the infiltration of stormwater,
- Soil depth for crop growth is limited within the project site as a result of the presence of the pedocutanic horizon as well as the presence of hard rock. Profiles varied from 400mm to 450mm, limiting the type of crop that can be grown within the site. The area is therefore more suited to grazing activities
- The permeability of the soils associated with the site was found to be restricted as a result of the Pedocutanic horizon, the presence of hard solid rock, as well as anthropogenic changes to the soi profiles through the construction of dirt roads. Soil permeability is identified as a limitation to agricultural productivity within the site.

As a result of these limitations, the site is classified as having a low sensitivity to agricultural production. This is a change from the high sensitivity categorisation in the screening tool. It is therefore the author's opinion that the project should go ahead. No impact on agricultural production will occur as a result of this project. Mitigation measures should be aimed at limiting the impact of soil erosion as well as soil contamination during the construction phase.

A cross reference table regarding where each section of the requirements of the Compliance Statement can be found in the report is provided in the following table.

Cross Reference Table to the requirements of the Compliance Statement

MINIMUM REPORT CONTENT REQUIREMENTS FOR AGRICULTURAL COMPLIANCE STATEMENT (AS PER GN 320 GG 43110, DATED 20 MARCH 2020)	CROSS REFERENCE IN THIS REPORT
The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP	Declaration of Independence by Specialist (pg. i). As well as Specialist CV in Section 6 (pg. 11-12).
The compliance statement must be applicable to the preferred site and proposed development footprint.	Section 1 (pg. 1-2).
The compliance statement must confirm that the site is of "low" or "medium" sensitivity for agriculture.	Section 4 (pg. 9).
The compliance statement must indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.	Section 4 (pg. 9).
The compliance statement must contain contact details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae.	Declaration of Independence by Specialist (pg. i). As well as Specialist CV in Section 6 (pg. 11-12).
The compliance statement must contain a signed statement of independence	Declaration of Independence by Specialist (pg. i).
The compliance statement must have a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool;	Section 1.1 and 1.2 (pg. 1-2).
The compliance statement must have a confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities.	Section 4 (pg. 9).
The compliance statement must have a substantiated statement from the soil scientist or agricultural specialist on the acceptability, or not, of the proposed development and a recommendation on the approval, or not, of the proposed development.	Section 4 (pg. 9).

The compliance statement must have any conditions to which the statement is subjected.	Section 4 (pg. 9).
The compliance statement must have a description of the assumptions made as well as any uncertainties or gaps in knowledge or data.	Section 1.4 (pg. 3).

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1 INTRODUCTION

1.1 Project Locality and Description

Land Matters Environmental Consulting was appointed by Nettzero on behalf of Glencore Operations South Africa (Pty) Ltd – Lion Smelter to conduct an Agricultural Compliance Statement for the proposed Lion Smelter Energy Conversion Facility (ECF) project. The proposed project is situated on a 4.26 hectare (ha) site, within the boundaries of the existing Glencore Lion Smelter property. The actual ECF area will be approximately 0.53ha. The site is situated adjacent to the R555 approximately 8km to the south-west of Steelpoort town, Sekhukhune District Municipality, Limpopo (Figure 1).

The ECF is a stand-alone plant which will use excess furnace gas from the Glencore Lion Smelter complex to generate electricity. It will consist of 25 PWR BLOK Modules (containerised generation plant with 14 engines and all necessary ancillaries). This will result in a total power generation capacity of 10MW. All necessary civil, electrical, control and general infrastructure for the operations will be installed (Robertson, 2021)

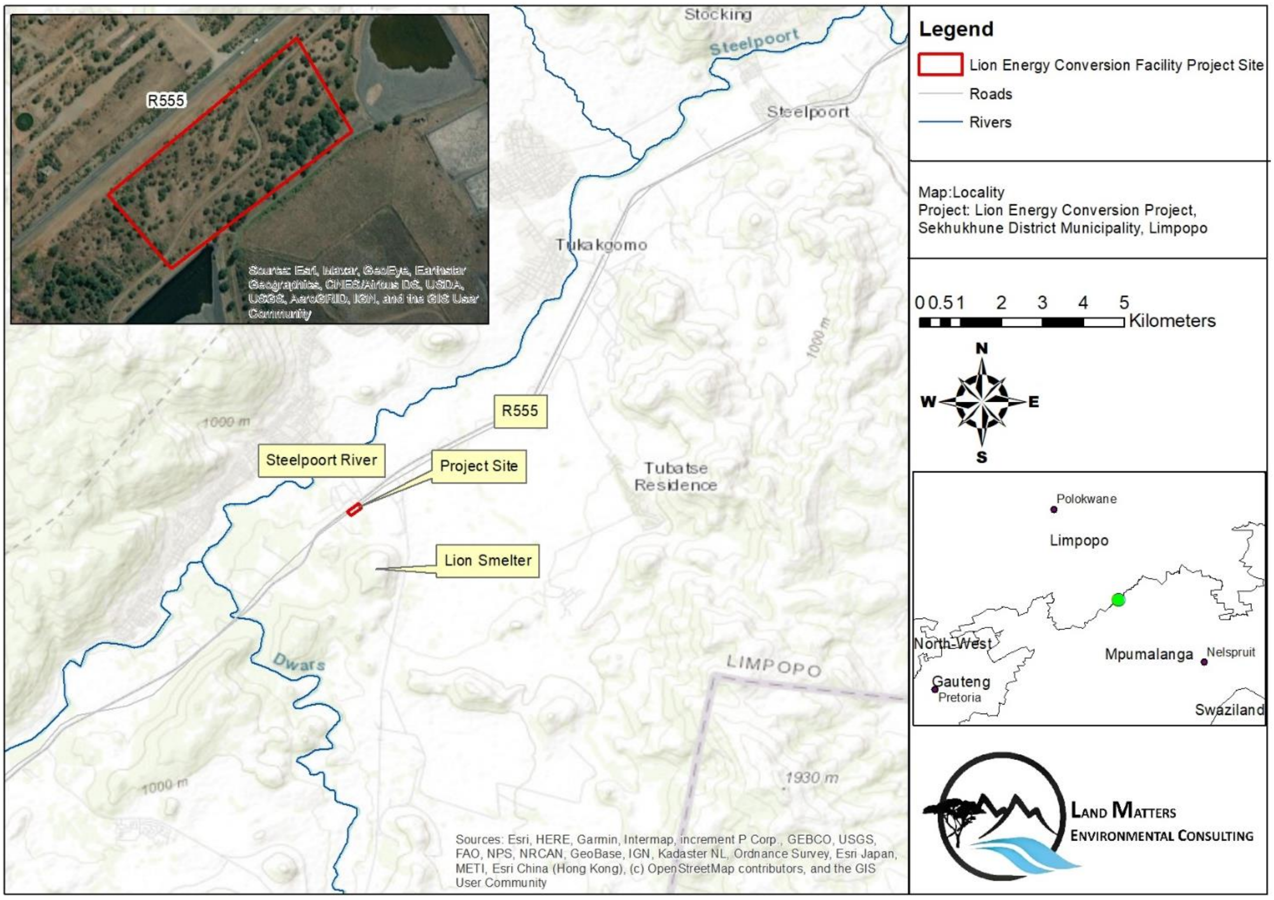
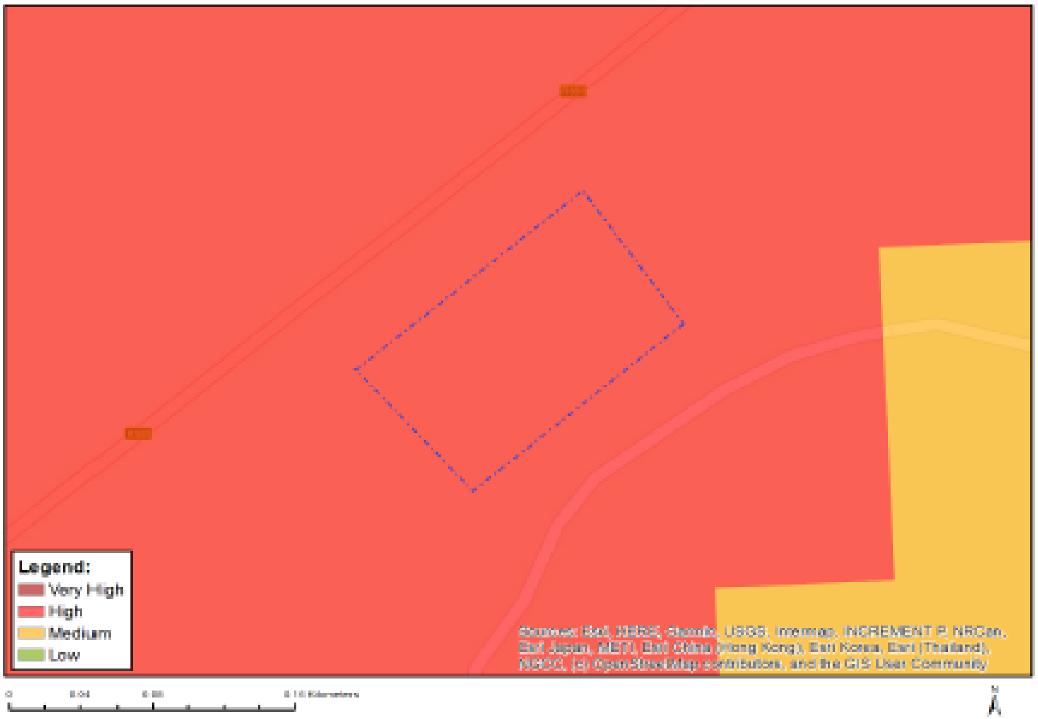


Figure 1: Locality map of the project area

1.2 Screening tool

The study site was classified as having a high sensitivity to agricultural production by the Department of Environmental Affairs (DEA) in the screening tool (Figure 2).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High

Figure 2: Agricultural results from the screening tool

The primary aim of this compliance statement is therefore to confirm or dispute the site's current environmental sensitivity classification of 'High' for agricultural production. This is undertaken by determining the agricultural capability and potential of the property on which the ECF will be contained, according to the protocols for a specialist Agricultural Compliance Statement as per Government Notice No. 320; Government Gazette No. 43110 of 2020.

1.3 Scope of this Assessment

The terms of reference for the current study were as follows:

- Conduct a soil survey and mapping exercise of the project site.
- Describe the physical properties of the soils sampled at each sampling location.
- Describe the agricultural potential of the site and the sensitivity of the site to agricultural production.
- Confirm or dispute the project site's current environmental sensitivity classification of High for Agricultural Production as identified by the screening tool.

1.4 Assumptions and Limitations

It is difficult to apply pure scientific methods within a natural environment without limitations or assumptions. The following apply to this study:

i. Soil mapping was inferred from extrapolations from the auger sampling points, whose locations were recorded on GPS coordinate waypoints with an accuracy of 3m to 6m. The boundaries of the soil forms delineated within the site are based on these waypoint locations. However, it is impossible to achieve 100% purity in soil mapping, the delineated soil map units could include other soil type(s) as the boundaries between the mapped soils are not sharp but rather gradual in reality.
ii. Soil fertility status was not undertaken in this assessment.

1.5 Reporting Conditions

The findings, results, observations, conclusions, and recommendations provided in this report are based on the author's best scientific and professional knowledge as well as information available at the time of compilation. The author, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, and by the use of the information contained in this document. No form of this report may be amended without the prior written consent of the authors.

2 METHODOLOGY

2.1 Assessment techniques and tools

A desktop investigation as well as a field investigation were undertaken to compile the Compliance Statement

2.2 Baseline data

The desktop study involved the examination of aerial photography and Geographical Information System (GIS) databases. The study made use of the following data sources:

- Google Earth™ satellite imagery was used at the desktop level.
- Relief dataset from the Surveyor General was used to calculate slope.
- Background Information was gathered from the Energy Conversion Facility – Overview of Works for Environmental Assessment' document prepared by Craig Roberson. (2021).

2.3 Site Investigation

In field data collection was taken on the 30th of November 2021. Soil sampling was conducted throughout the project area using a standard hand-held auger with a depth of 1200mm. At each sampling point the soil was described to form and family level according to "Soil Classification: A Natural and Anthropogenic System for South Africa" (Soil Classificatoin Working Group, 2018).

The following properties were recorded:

- Soil diagnostic horizons.
- Depth of the profile.
- Soil colour – as per the Munsell System.
- Soil field texture.

- Permeability of the B horizon (wetness indicators).
- Effective rooting depth.
- Observations at the sampling point including any surface crusting, vegetation cover and rockiness.

The infield methods of determining soil texture and clay percentage are described in more detail in Appendix A. Information from the soil samples, the topography, and the Land type information was utilised to produce the Soil and Land Capability Classes maps.

3 RESULTS

3.1 Climate

The climate of the Steelpoort area is characterised by summer rainfall patterns. The mean annual precipitation is 415mm, with the bulk of the rainfall occurring between October and March (summer months). These high intensity rainfall conditions are conducive to high levels of surface runoff and subsequent erosion where soils are shallow, occur on steep slopes or are overgrazed. The wettest time of the year is January with an average of 80mm and the driest is June with 2mm. The seasonality of precipitation is a driving factor behind the hydrological cycles of water resources within the area. Typically, watercourses have a higher flow rate during the summer months.

Mean temperatures vary between 8.0^{O}C to 32^{O}C for the region. The area is coldest in July with average minimum temperatures of 8^{O}C and hottest in December and January with average maximum temperature of 31^{O}C and 32 ^{O}C (Climate-data.org; Mucina & Rutherford, 2006; updated 2018).

3.2 Topography

The larger area in which the project is to be located is characterised by a landscape dominated by flat plains which are surrounded by hills of moderately steep topography. The project site is situated within an anthropogenically modified environment as a result of the existing Lion Smelter infrastructure. It has a north-westerly aspect with a gentle slope. Average slopes are 3-4%, while maximum slope of 8.5%. The project site ranges in altitude from 812m above sea level (absl) along the eastern boundary to 806m absl along the western boundary. Topography is therefore not a limitation to agricultural production.

3.3 Land Type

Land type data for the site was obtained from the Agricultural Research Council (ARC). The land type data is presented at a scale of 1:250 000 and entails the division of land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units (in the cross section). The soil data is classified according to the Binomial System. The soil data was interpreted and re-classified according to the Taxonomic System (Land Type Survey Staff, 1972-2006).

The project site is situated within the Ae27 Land Type as defined in the relevant Land Type Map (2430 Pilgrims Rest). Ae indicates land with red and yellow soils with a high base status. Soil forms are therefore represented by either a red apedal (structureless), yellow-brown apedal or neocutanic horizons. These soils are classified as the Hutton, Clovelly, Griffin, and Oakleaf soil forms. They are regarded as mature soils and have a high infiltration rate. They generally have an increase in clay content with depth in the profile. The soils are however expected to be shallow in nature (>300mm deep). These soils therefore have limitations for crop cultivation.

3.4 Field Survey – Soil Assessment

Augur sample points were taken within the proposed project site. This was to determine the extent of soil types and this information was then utilised to create a soil map for the study site (Figure 6).

The study site can be classified into two separate soil types, the natural soils and the anthrosols. Natural soil formation gives rise to soil morphological expression and a sequence of soil horizons without significant human intervention. Anthrosols are soils which have been drastically altered by human intervention such that the natural soil properties are no longer identifiable, and an anthropogenic classification is applied.

The natural soils were dominated by the Calcic soil group. Calcic soils are characterised by calcium within the soils that remains behind to form a cemented soil through the evaporation of water. Most commonly it is encountered in the form of carbonate horizons, which was identified within the project site. Within the site, the neocarbonate soil horizon was identified with the soils classified as either the Palala or Hofmeyr soil forms (Figure 3 and Figure 4). The Palala soil form consists of an Orthic A horizon which overlies a neocarbonate B horizon which overlies a pedocutanic C horizon. A Hofmeyr soil form consists of an Orthic A horizon which overlies a neocarbonate B horizon which overlies Hard Rock. The presence of a pedocutanic horizon as well as the presence of Hard Rock are both limiting factors to the agricultural potential of these soils. The Palala soils occupy 2.69ha or 63.1% of the site, while the Hofmeyr soils occupy 0.75ha or 17.6% of the site.

Portions of the proposed project site have existing disturbances as a result of dirt roads (Figure 5). Due to the existence of the roads, the soils within these areas are described as Physically Disturbed Anthrosols. This soil is further classified as the Grabouw soil form and is no longer suitable for agricultural production as the original soil profile has been mixed and is no longer identifiable. The Grabouw soils occupy 0.81ha (19.4%) of the site.


Figure 3: Palala soils showing the neocarbonate horizon


Figure 4: Note the white calcrete deposits on the soil surface

Figure 5: One of the dirt roads within the project site which have been classified as the Physically Disturbed Anthrosol, Grabouw soils

Table 1 gives information on the different soil characteristics identified within the project site. These characteristics include:

- Soil form and family;
- Soil texture;
- Effective rooting depth; and
- Subsoil permeability; and slope at sampling location.

Table 1: Soil data collected at the site

Soil Form	Diagnostic Horizons	Soil Family Code	Field Texture	Effective Rooting Depth (mm)	Permeability	Slope Class (%)
Palala	Orthic A Neocutanic B Pedocutanic	Pl 2120	Sandy Clay	450	Restricted	0-2%
Palala	Orthic A Neocutanic B Pedocutanic	Pl 2120	Sandy Clay	400	Restricted	0-2%
Hofmeyr	Orthic A Neocutanic B Hard Rock	Hf 2122	Sandy Clay Loam	400	Restricted	6-8%
Grabouw	Physically Disturbed Anthrosol	Gr 1000	Sandy Clay	100	Severely Restricted	3-5%

Figure 6: Soil forms identified within the project site

4 COMPLIANCE STATEMENT

The desktop and field investigation identified the following important soil and landscape characteristics of the site:

- **Soil texture:** Analysis of the texture during the field investigation revealed that the soils within the site are a sandy clay loam to a sandy clay texture. These soils therefore have a clay percentage of 30-60%, with an increase in clay content with depth in the soil profile. The soils were found to be luvic in nature, meaning that there was an identifiable increase in clay content with depth in the profile. The presence of a pedocutanic layer in the Palala soils is a clear textural contrast between the overlying neocarbonate layer. A pedocutanic horizon has a strong structure and is seen as a limitation to plant growth as well as the infiltration of stormwater.
- **Soil depth:** Soil depth for crop growth is limited within the project site as a result of the presence of the pedocutanic horizon as well as the presence of hard rock. Profiles varied from 400mm to 450mm, limiting the type of crop that can be grown within the site. The area is therefore more suited to grazing activities.

  Soil permeability: The permeability of the soils associated with the site was found to be restricted as a result of the pedocutanic horizon, the presence of hard solid rock, as well as anthropogenic changes to the soi profiles through the construction of dirt roads. Soil permeability is identified as a limitation to agricultural productivity within the site.
- **Slope:** The site consisted of gentle terrain with the slope percentages recorded in the 0-8% category. Slope is therefore not a limitation to cultivation.
- **Rockiness:** Hard rock was identified within the subsurface horizons and is a limitation to the depth of soils. Surface rocks or surface calcrete was identified throughout the project site and is seen as a limitation to cultivation. The site is more suited to grazing activities.

The site therefore consists of land which is subject to severe permanent limitations including the pedocutanic horizon as well as hard rock. It is therefore only suitable for occasional row cropping in long ley rotations, or for use under grazing. As such the site is classified as having a low agricultural potential. This is a change from the high sensitivity category for the site as set in the screening tool.

As a result of the classification of the site to a low sensitivity for agricultural production it is the author’s opinion that the project should go ahead. No impact on agricultural production will occur as a result of this project. The ECF site is situated within a small portion of the existing Lion Smelter site and will not have an impact on neighbouring properties or any agricultural activities within the area. Mitigation measures should be aimed at limiting the impact of soil erosion as well as soil contamination during the construction phase.

5 BIBLIOGRAPHY

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Mucina, L., Rutherford, M.C. and Powrie, L.W. (eds). (2006). Vegetation Map of South Africa, Lesotho and Swaziland, edn 2, 1:1 000 000 scale sheet maps. South African National Biodiversity Institute, Pretoria. ISBN 978-1-919976-42-6.

Ollis, D., Snaddon, K., Job, N. and Mbona, N. (2013). Classification Systems for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. Pretoria: South African National Biodiversity Institute.

Soil Classification Working Group (2018). Soil Classification: A Natural and Anthropogenic System for South Africa. ARC-Institute for Soil, Climate and Water. Pretoria.

6 ABRIDGED SPECIALIST CV

Rowena Harrison

PERSONAL DETAILS

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ACADEMIC QUALIFICATIONS

2019 – present	PhD Candidate - Soil Science (University of Free State and the University of Burgundy, France)
2015	Certificate in Wetland Rehabilitation – University of the Free State
2009	MSc (Soil Science) – University of KwaZulu-Natal
2008	Certificate course in Wetland Delineation, Legislation and Rehabilitation, University of Pretoria
2006	BSc (Environmental Science) – University of KwaZulu-Natal
2005	BSc (Applied Environmental Science) – University of KwaZulu-Natal

EMPLOYMENT RECORD

July 2021 – Present	Land Matters Environmental Consulting (Pty) Ltd – Director (Soil Scientist and Wetland Specialist)
April 2016 – June 2021	Malachite Specialist Services (Pty) Ltd – Director (Soil Scientist and Wetland Specialist)
March 2014 – March 2016	Afzelia Environmental Consultants (Pty) Ltd. – Soil Scientist and Wetland Specialist
Sept 2012 – February 2014	Strategic Environmental Focus (Pty) Ltd – Junior Wetland Specialist
February 2008 – December 2009	Afzelia Environmental Consultants cc. – Soil Scientist and Junior Environmental Assessment Practitioner

PROFESSIONAL AFFILIATIONS

- South African Council for Natural Scientific Professions – SACNASP (Pr. Sci.Nat 400715/15: Soil Science)

- International Association for Impact Assessments – IAIAsa
- South African Wetland Society

PUBLICATIONS

Harrison, R.L., van Tol, J., and Toucher, M.L. (2022). Using hydropedological characteristics to improve modelling accuracy in Afromontane catchments. Journal of Hydrology: Regional Studies. 39. https://doi.org/10.1016/j.ejrh.2021.100986.

Harrison, R., and van Tol, J. (2022). Digital Soil Mapping for hydropedological purposes of the Cathedral Peak research catchments, South Africa. In Remote Sensing of African Mountains. Springer. (in publication)

PROJECT EXPERIENCE

Rowena has obtained a MSc. In Soil Science from the University of KwaZulu Natal, Pietermaritzburg. She is professionally affiliated to the South African Council for Natural Scientific Professions (Pr. Sci. Nat) and has 13 years consulting experience in the wetland and soil science field. She has conducted numerous wetland, hydropedology and soil assessments for a variety of development types across South Africa, Swaziland, Cameroon, and the Democratic Republic of Congo.

She is a member of the International Association for Impact Assessment (IAIA) as well as a founding member of the South African Wetland Society. She is currently a joint PhD candidate at the University of the Free State and the University of Burgundy in France. Her research is focused on the interactions of dissolved organic carbon and hydropedology at a catchment scale.

7 APPENDIX A

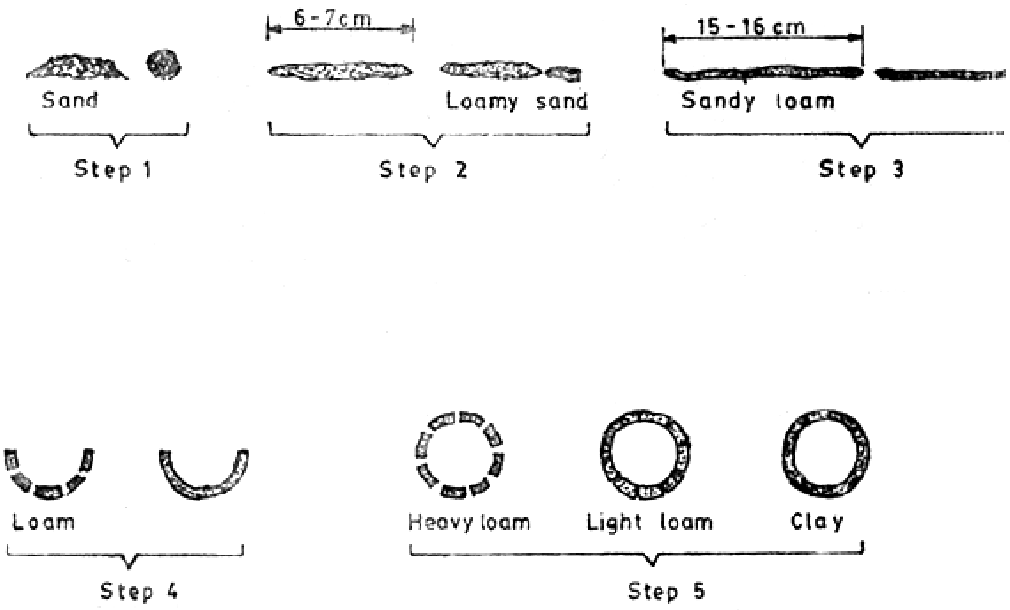
7.1 Soil sampling and mapping

Soil sampling was conducted throughout the site using a standard hand-held auger with a depth of 1200mm. At each sampling point the soil was described to form and family level according to "Soil Classification – A Taxonomic System for South Africa" and the following properties were recorded:

- Soil texture including clay percentage
- Surface rockiness
- Surface crusting
- Vegetation cover
- Permeability of the B horizon (Wetness)
- Effective rooting depth.

An in-field assessment technique was utilised with the texture triangle to determine soil texture.

FEEL METHOD



BALL AND RIBBON METHOD