



**DESKTOP PALAEOLOGICAL
HERITAGE IMPACT ASSESSEMENT
REPORT ON THE SITE OF THE
PROPOSED MIXED-USE
DEVELOPMENT ON THE
REMAINING PORTION OF PORTION
79 (A PORTION OF PORTION 70)
OF THE FARM STERKSPRUIT 33 JT,
IN LYDENBURG, THABA CHWEU
LOCAL MUNICIPALITY,
MPUMALANGA PROVINCE**

9 December 2014

Prepared for:
Interdesign Landscape Architects (Pty)
Ltd

On behalf of:
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**DESKTOP PALAEOLOGICAL HERITAGE IMPACT ASSESSEMENT REPORT ON
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MPUMALANGA PROVINCE**

Prepared for:

Interdesign Landscape Architects (Pty) Ltd

On Behalf of:

Reach More Lydenburg 1 (Pty) Ltd

Prepared By:

Prof B.D. Millstead

Palaeontological Impact Assessment Report – On the site of a proposed mixed-use development near Lydenburg, Mpumalanga Province.

EXECUTIVE SUMMARY

Reach More Lydenburg 1 (Pty) Ltd is proposing the construction of a mixed-use development on the Remaining Portion of Portion 79 (a Portion of Portion 70) of the farm Sterkspruit 33 JT, located approximately 3 km south of Lydenburg, Thaba Chweu Local Municipality, Mpumalanga Province. The aerial extent of the project area is approximately 9 ha.

Reach More Lydenburg 1 (Pty) Ltd has appointed Interdesign Landscape Architects (Pty) Ltd to apply for an environmental authorisation for the proposed mixed-use development. Interdesign Landscape Architects (Pty) Ltd has contracted BM Geological Services to provide a desktop Palaeontological Heritage Impact Assessment Report in respect of the proposed project.

Any negative impacts to the palaeontological heritage of the region will be limited to the footprint area of the required infrastructure and the extent of any impacts is accordingly characterised as local. The project area is completely underlain by unfossiliferous Palaeoproterozoic rocks of the Silverton Formation and, therefore, there is nil potential for any negative impacts on the palaeontological heritage of the area. Accordingly, **no damage mitigation protocols are required**. The project will, on the positive side, provide residential dwellings as well as other built structures to facilitate and enhance the life style of the inhabitant.

This desktop study has not identified any palaeontological reason to prejudice the progression of the Sterkspruit multi-use development.

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1 INTRODUCTION

Reach More Lydenburg 1 (Pty) Ltd is proposing the construction of a mixed-use development on the Remaining Portion of Portion 79 (a Portion of Portion 70) of the Farm Sterkspruit 33 JT, located approximately 3 km south of Lydenburg, Thaba Chweu Local Municipality, Mpumalanga Province (Figure 1). The aerial extent of the project area is approximately 9 ha.

Reach More Lydenburg 1 (Pty) Ltd has appointed Interdesign Landscape Architects (Pty) Ltd to apply for an environmental authorisation for the proposed mixed-use development. Interdesign Landscape Architects (Pty) Ltd has contracted BM Geological Services to provide a desktop Palaeontological Heritage Impact Assessment Report in respect of the proposed project.

2 TERMS OF REFERENCE AND SCOPE OF THE STUDY

The terms of reference for this study were as follows:-

- Conduct a desktop assessment of the potential impact of the proposed project on the palaeontological heritage of the project area.
- Describe the possible impact of the proposed development on the palaeontological heritage of the site, according to a standard set of conventions.
- Quantify the possible impact of the proposed development on the palaeontological heritage of the site, according to a standard set of conventions.
- Provide an overview of the applicable legislative framework.
- Make recommendations concerning future work programs as, and if, necessary.

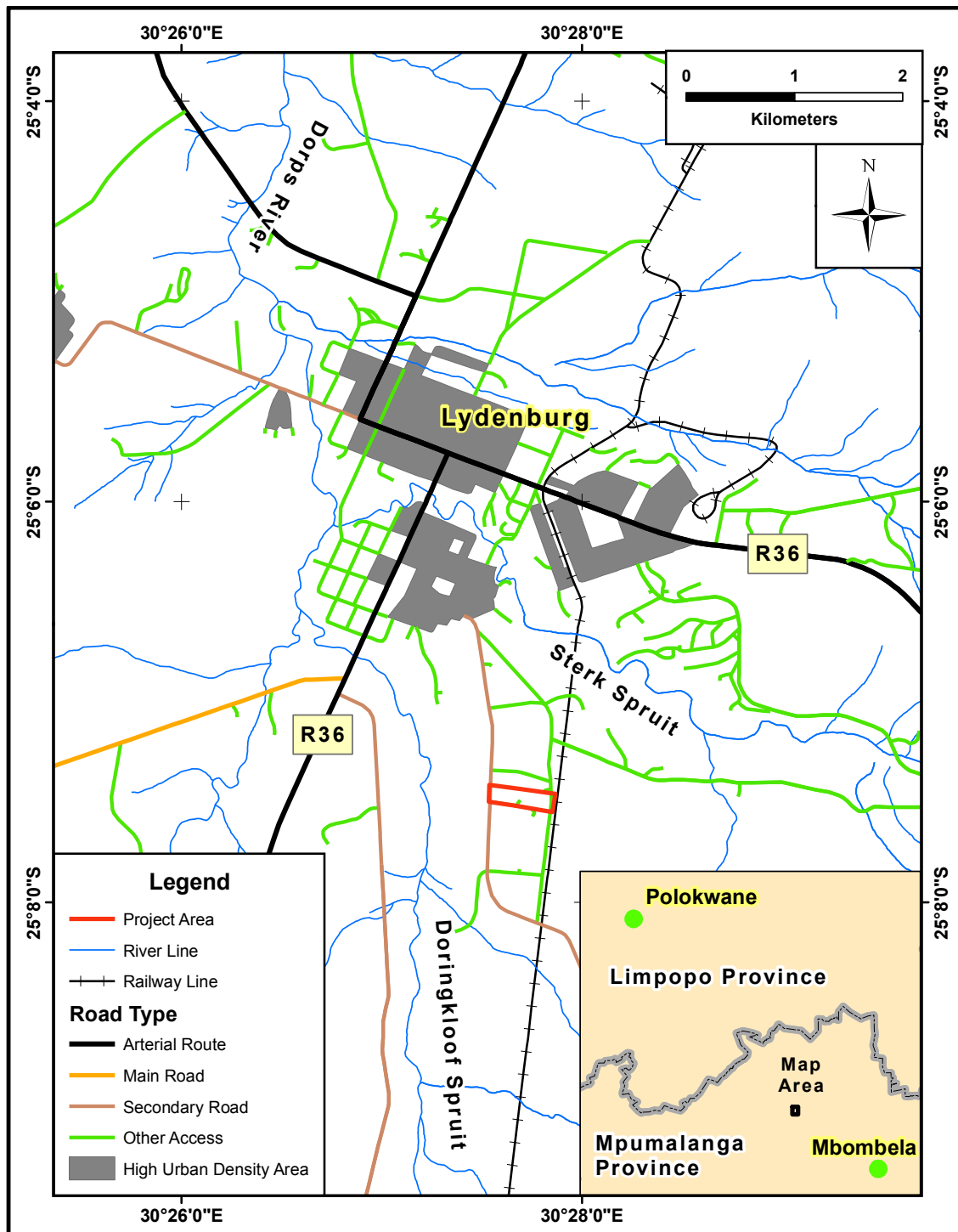


Figure 1: Location map showing the proposed position of the Sterkspruit multi-use development.

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3 LEGISLATIVE REQUIREMENTS

South Africa's cultural resources are primarily dealt with in two Acts. These are the National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998).

3.1 The National Heritage Resources Act

The following are protected as cultural heritage resources by the National Heritage Resources Act:

- Archaeological artefacts, structures and sites older than 100 years,
- Ethnographic art objects (e.g. prehistoric rock art) and ethnography,
- Objects of decorative and visual arts,
- Military objects, structures and sites older than 75 years,
- Historical objects, structures and sites older than 60 years,
- Proclaimed heritage sites,
- Grave yards and graves older than 60 years,
- Meteorites and fossils,
- Objects, structures and sites of scientific or technological value.

The Act also states that those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities. The national estate includes the following:

- Places, buildings, structures and equipment of cultural significance,
- Places to which oral traditions are attached or which are associated with living heritage,
- Historical settlements and townscapes,
- Landscapes and features of cultural significance,
- Geological sites of scientific or cultural importance,
- Sites of Archaeological and palaeontological importance,
- Graves and burial grounds,
- Sites of significance relating to the history of slavery,
- Movable objects (e.g. archaeological, palaeontological, meteorites, geological specimens, military, ethnographic, books etc.).

3.2 Need for Impact Assessment Reports

Section 38 of the Act stipulates that any person who intends to undertake an activity that falls within the following:

- The construction of a linear development (road, wall, power line, canal etc.) exceeding 300 m in length,

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- The construction of a bridge or similar structure exceeding 50 m in length,
- Any development or other activity that will change the character of a site and exceed 5 000 m² or involve three or more existing erven or subdivisions thereof,
- Re-zoning of a site exceeding 10 000 m²,
- Any other category provided for in the regulations of SAHRA or a provincial heritage authority.

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. If there is reason to believe that heritage resources will be affected by such development, the developer may be notified to submit an impact assessment report. A Palaeontological Impact Assessment (PIA) only looks at the potential impact of the development palaeontological resources of the proposed area to be affected.

3.3 Legislation Specifically Pertinent to Palaeontology*

*Note: Section 2 of the Act defines “palaeontological” material as “any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains”.

Section 35(4) of this Act specifically deals with archaeology, palaeontology and meteorites. The Act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial):

- Destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite,
- Destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite,
- Trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
- Bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites,
- Alter or demolish any structure or part of a structure which is older than 60 years as protected.

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The above mentioned palaeontological objects may only be disturbed or moved by a palaeontologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Further to the above point, Section 35(3) of this Act indicates that “any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority”. Thus, regardless of the granting of any official clearance to proceed with any development based on an earlier assessment of its impact on the Palaeontological Heritage of an area, the development should be halted and the relevant authorities informed should fossil objects be uncovered during the progress of the development.

3.4 The National Environmental Management Act [as amended]

This Act does not provide the detailed protections and administrative procedures for the protection and management of the nation’s Palaeontological Heritage as are detailed in the National Heritage Resources Act, but is more general in its application. In particular Section 2(2) of the Act states that environmental management must place people and their needs at the forefront of its concerns and, amongst other issues, serve their cultural interests equitably. Further to this point section 2(4)(a)(iii) states that disturbances of sites that constitute the nation’s cultural heritage should be avoided, and where it cannot be avoided should be minimised and remedied.

Section 23(1) indicates that a general objective of integrated environmental management is to identify, predict and evaluate the actual and potential impact of activities upon the cultural heritage. This section also highlights the need to identify options for mitigating of negative effects of activities with a view to minimising negative impacts.

In order to give effect to the general objectives of integrated environmental management outlined in the Act the potential impact on cultural heritage of activities that require authorisation or permission by law must be investigated and assessed prior to their implementation and reported to the relevant organ of state. Thus, a survey and evaluation of cultural resources must be done in areas where development projects that will potentially negatively affect the cultural heritage will be performed. During this process the impact on the cultural heritage will be determined and proposals for the mitigation of the negative effects made.

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4 RELEVANT EXPERIENCE

Prof Millsteed holds a PhD in palaeontology and has previously been employed as a professional palaeontologist with the Council for Geoscience in South Africa. He is currently the principle of BM Geological Services and has sufficient knowledge of palaeontology and the relevant legislation required to produce this Palaeontological Impact Assessment Report. Dr Millsteed is registered with the South African Council for Natural Scientific Professions (SACNASP), and is a member of the Palaeontological Society of South African and the Geological Society of South Africa.

5 INDEPENDENCE

Prof Millsteed was contracted as an independent consultant to conduct this Palaeontological Heritage Impact Assessment study and shall receive fair remuneration for these professional services. Neither Prof Millsteed nor BM Geological Services has any financial interest either in the Sterkspruit multi-use development or any company or individual associated with it.

6 GEOLOGY AND FOSSIL POTENTIAL

Figure 2 shows that the entire project area is underlain by rocks of the Palaeoproterozoic Silverton Formation, Pretoria Group, Transvaal Supergroup. A summary of the characteristics the Silverton Formation its fossiliferous potential follows.

6.1 Silverton Formation, Transvaal Supergroup

6.1.1 Geology

The Palaeoproterozoic shales of the Silverton Formation reflect a period of higher sea levels than those which existed during the deposition of the underlying sandstone rich Daspoort Formation. They were deposited during later stages of an advance of an epi-epiric sea onto the Kaapvaal Craton with the associated deepening of sea levels (Eriksson *et al.*, 2006).

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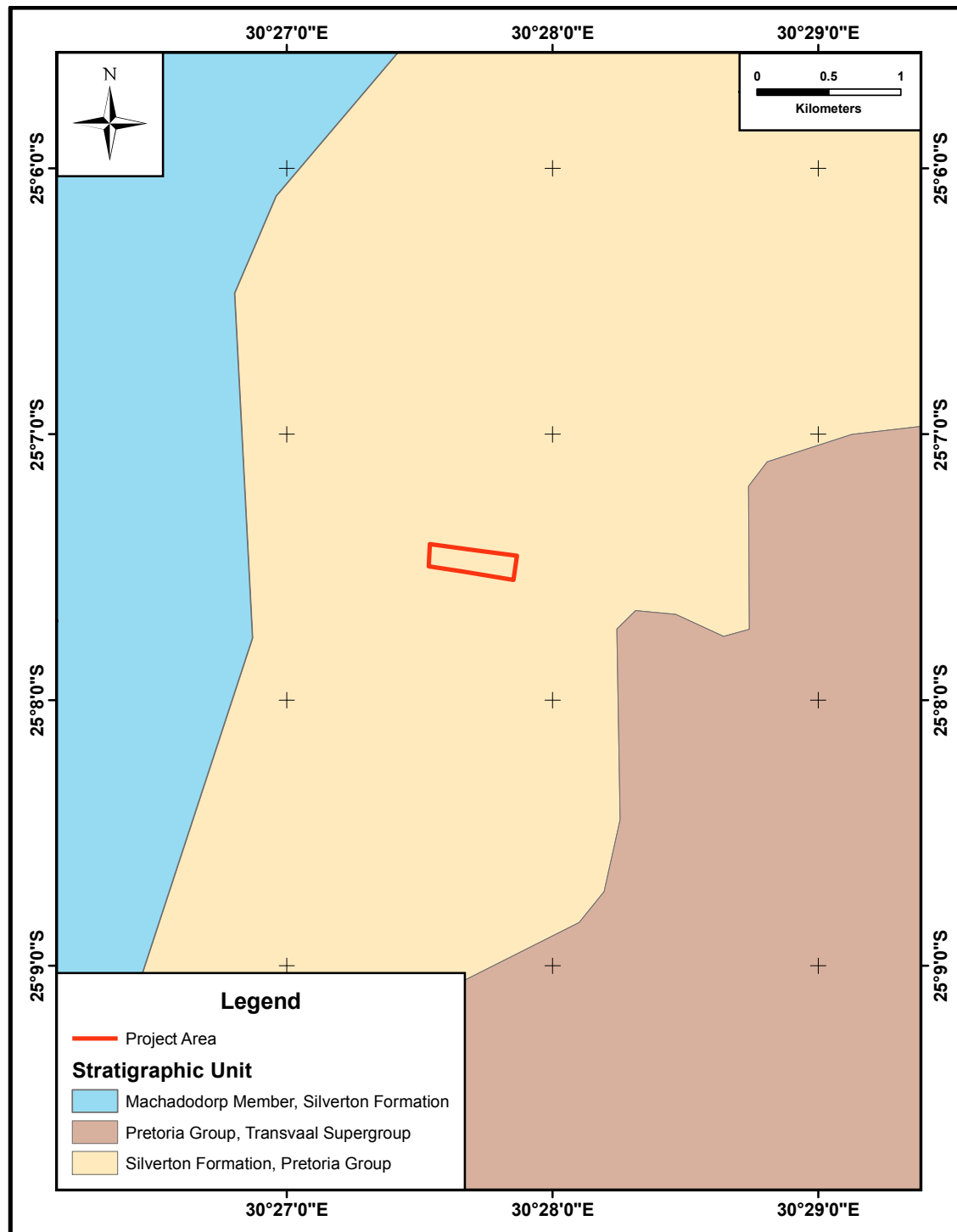


Figure 2: Simplified geological map of the area underlying proposed Sterkspruit mixed-use development the project area and its immediate environs.

6.1.2 Palaeontological potential

During the Palaeoproterozoic there was no known metazoan life on Earth. The only macrofossil materials present in the South African stratigraphic sequence of this age interval are stromatolites. Stromatolites are often found in dense accumulations within carbonate sequences (dolomites) in rocks of this age. The age and non-carbonate lithology of the Silverton Formation mitigate against any fossil potential for the formation. Indeed, no fossil materials are known to occur anywhere within the Silverton Formation where ever it occurs. The palaeontological potential of the formation is accordingly assessed as being nil.

7 ENVIRONMENT OF THE PROPOSED PROJECT SITE

The site for the proposed Sterkspruit Mixed-Use Development is moderately large; being approximately 9 ha in aerial extent. It is located on the north-western toe of the slope of a prominent hill and is located between the Doringkloof Spruit (to the west) and the Sterk Spruit to its east. These two fluvial drainage lines flow to the north where they coalesce north-west of the project area (and immediately west of Lydenburg) to form the Dorps River (Figure 3). No significant fluvial drainage lines are evident as being located within the project area.

Figure 4 shows that the entire extent of the project area is expected to have been originally vegetated with the grasses, trees and shrubs of the Lydenburg Thornveld veld type (Mucina and Rutherford, 2006). Mucina and Rutherford (2006) describe the conservation status of the Lydenburg Thornveld as vulnerable.

Examination of Google earth imagery (Figure 5) indicates that the project area must have been historically cleared as almost no vegetation that could be ascribed to a Lydenburg Thornveld vegetation type remains evident, the majority now being possibly grassland with a few isolated trees evident. The area and its surrounding environs appear also to have been cultivated for agriculture with what appear to be ploughed field evident over the majority of the area. The central portions of the project area contain a number of built structures (Figure 5). Otherwise the project area is essentially flat and topographically featureless in appearance.

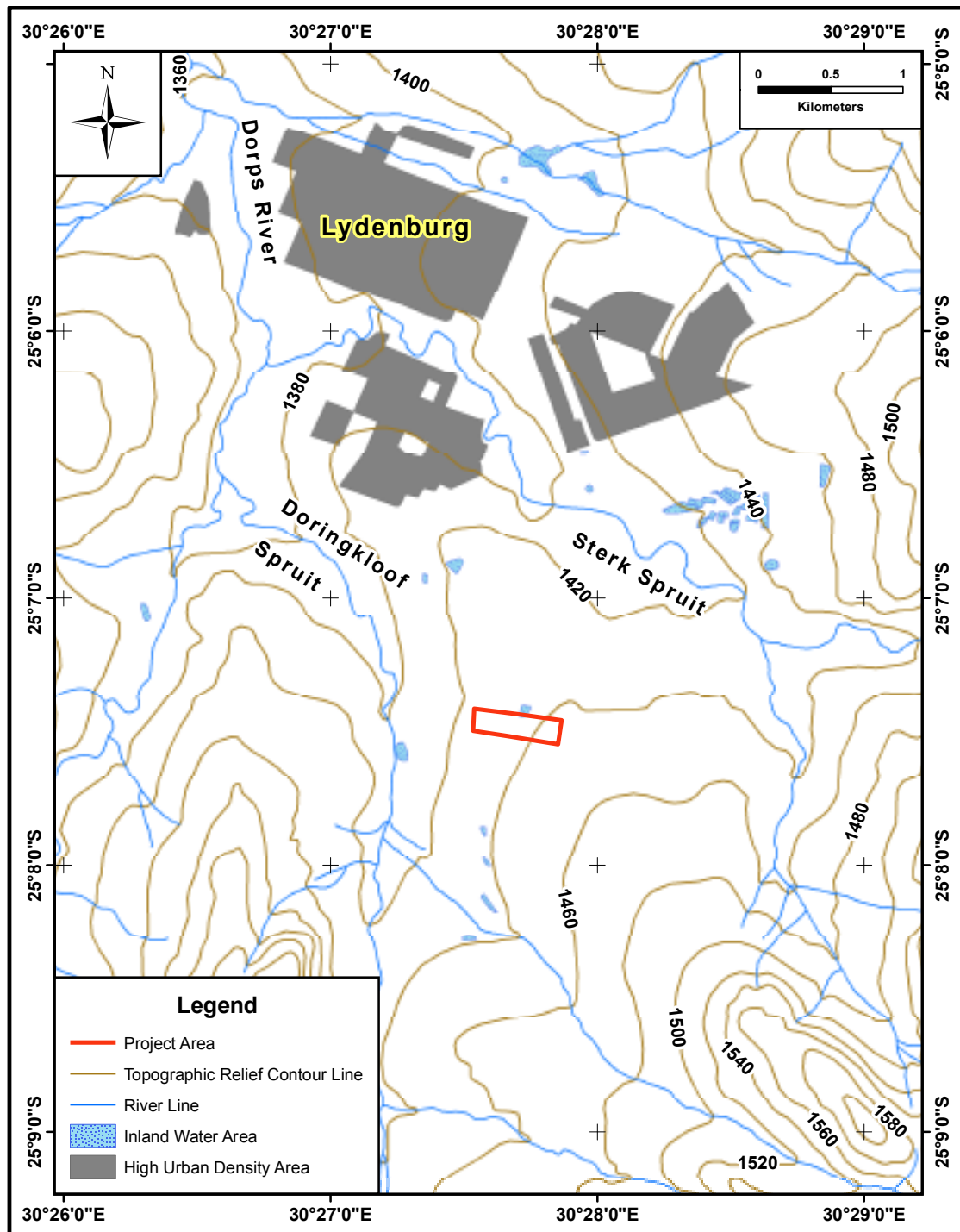


Figure 3: Map of the project area and its immediate environs. The project area lies upon the toe of the north-western slope of a prominent hill. The project area is located between the Sterkspruit and Doringkloofspruit. These two fluvial drainage lines drain northwards and coalesce north-west of the project area where they become the Dorps River. The topographic contour interval is 20 m.

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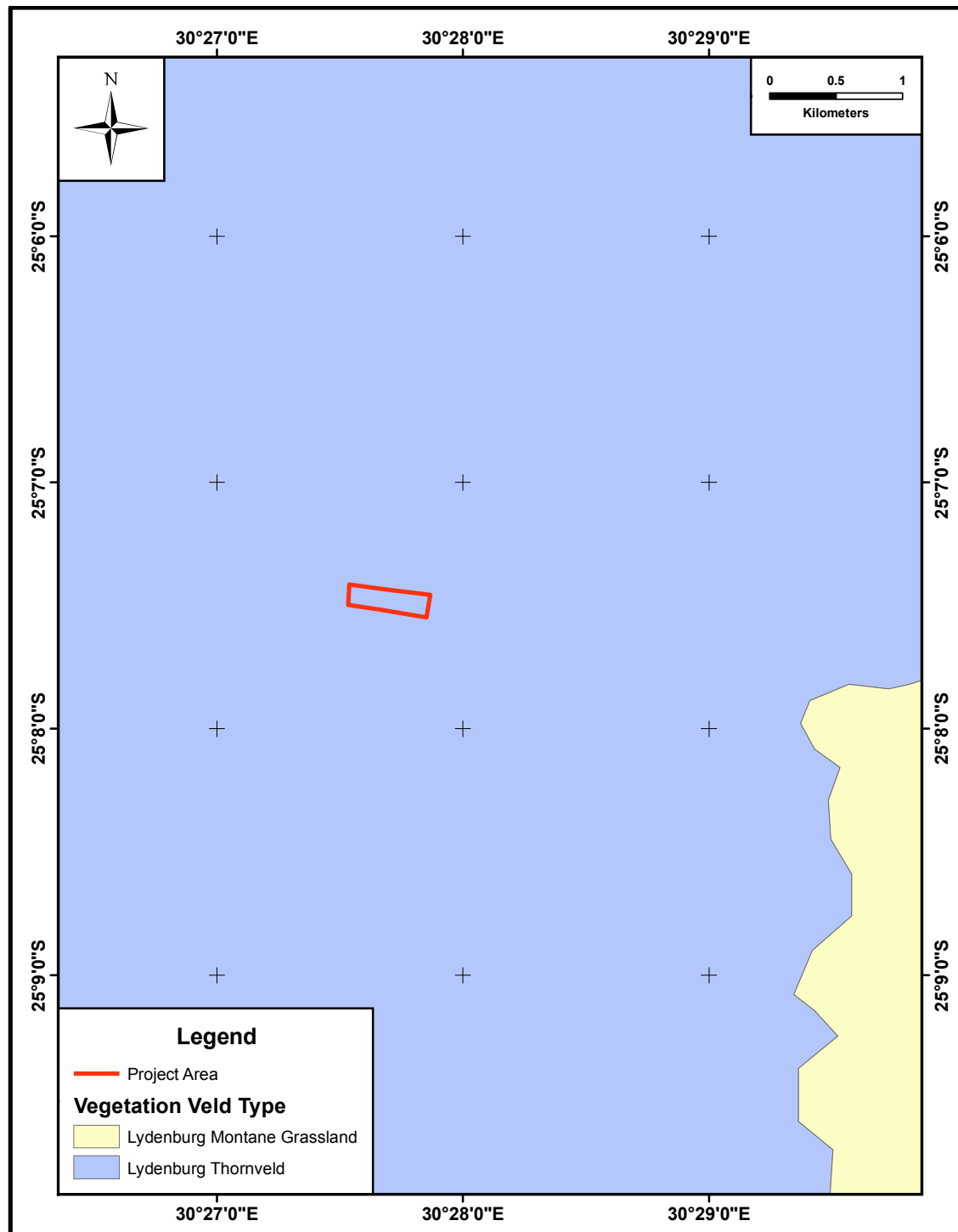


Figure 4: Map of the distribution of the vegetation veld types located beneath the project area and within its immediate environs (after Mucina and Rutherford, 2006).



Figure 5: Google earth image showing the project area (red polygon). It is evident that the project area is topographically flat. The central portion of the project area contains several existing built structures. It is also apparent the remainder of the land surface of the project area and the immediately surrounding area has been cultivated for agriculture (i.e., it appears to have been ploughed).

8 OVERVIEW OF SCOPE OF THE PROJECT

The proposed mixed-use development includes the following land uses:

- Residential;
- Offices;
- Guest House
- Storage facility;
- Nursery;
- Tea Garden;
- Café;
- Greenhouses;
- Admin block and gate house;
- Access roads and parking bays

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The planned location of each of these different land use types within the project area is shown in Appendix A.

8.1 Effect of project on the geology

It may be interpreted from Section 8 above that the development anticipated within the project area could be expected to be restricted to the upper few meters of the land surface, with the deepest anticipated impacts upon the underlying geology resulting from the excavations that will be required for building foundations and for the installation of underground water and sewage pipes.

9 IMPACT ASSESSMENT

The potential impact of the proposed landfill project is categorised according to the criteria outlined below.

9.1 Nature of Impact

The potential negative impacts of the proposed project on the palaeontological heritage of the area are:

- Damage or destruction of fossil materials during the construction of project infrastructural elements to a maximum depth of those excavations. Many fossil taxa (particularly vertebrate taxa) are known from only a single fossil and, thus, any fossil material is potentially highly significant. Accordingly, the loss or damage to any single fossil can be potentially significant to the understanding of the fossil heritage of South Africa and to the understanding of the evolution of life on Earth in general. Where fossil material is present and will be directly affected by the building or construction of the project's infrastructural elements the result will potentially be the irreversible damage or destruction of the fossil(s).
- Movement of fossil materials during the construction phase, such that they are no longer *in situ* when discovered. The fact that the fossils are not *in situ* would either significantly reduce or completely destroy their scientific significance.
- The loss of access for scientific study to any fossil materials present beneath infrastructural elements for the life span of the existence of those constructions and facilities.

9.2 Extent of impact

The possible extent of the permanent impact of the proposed project on the palaeontological heritage of South Africa is restricted to the damage, destruction or accidental relocation of fossil material caused by the excavations and construction of the necessary infrastructure elements forming part of the project. The possible source of a

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less permanent negative impact on the palaeontological heritage is the loss of access for scientific research to any fossil materials that become covered by the various infrastructural elements that comprise the project. The **extent of the area of potential impact is, accordingly, categorised as local** (i.e., restricted to the project site).

9.3 Duration of impact

The anticipated duration of the identified potential impact is assessed as potentially **permanent to long term**. This assessment is based on the fact that, in the absence of mitigation procedures (should fossil material be present within the area to be affected) the damage or destruction of any palaeontological materials will be permanent. Similarly, any fossil materials that exist below the landfill will be sterilised for scientific study due to the existence of a thick layer of buried refuse. To subsequently re-excavate the area would require exposure to potential pollutants, toxins and medically dangerous microbial accumulation. The life of the facility is expected to be permanent herein.

9.4 Probability of impact

The sediments of the Silverton Formation are considered to be unfossiliferous. As such, the probability of a negative impact in this area is accordingly categorised as **nil**.

9.5 Significance of the impact

The sediments of the Silverton Formation are considered to be unfossiliferous. As such, no fossil materials are expected to be negatively impacted upon by the construction of the multi-purpose development and no negative impacts are expected. Accordingly, the significance of any impacts resulting from this project are categorised as being **nil**.

9.6 Status

The proposed project is categorised, herein, as being **positive** in status. This classification is based on the intention that the project will provide residential dwellings as well as other built structures to facilitate and enhance the life style of the inhabitants.

9.7 Severity / Benefit scale

The proposed project is categorised, herein, as being potentially **beneficial**. This classification is based on the intention that the project will provide residential dwellings as well as other built structures to facilitate and enhance the life style of the inhabitants, thus make a positive contribution to the community of the region.

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The probability of a negative impact on the palaeontological heritage of the project areas has been categorised as being nil. And, thus, the severity to benefit scale for assessing the project is wholly skewed towards being beneficial.

10 DAMAGE MITIGATION, REVERSAL AND POTENTIAL IRREVERSABLE LOSS

The degree to which the possible negative effects of the proposed project can be mitigated, reversed or will result in irreversible loss of the palaeontological heritage can be determined as discussed below.

10.1 Mitigation

The project area is completely underlain by unfossiliferous rocks of the Silverton Formation and, therefore, there is nil potential for any negative impacts on the palaeontological heritage of the area. Accordingly, **no damage mitigation protocols are required.**

10.2 Reversal of damage

Should fossil materials be present within the project area any damage to, or the destruction of, those palaeontological materials or the reduction of their scientific value due to a loss of the original location would be **irreversible**. However, the geological unit underlying the project area is unfossiliferous.

10.3 Degree of irreversible loss

Once a fossil is damaged, destroyed or moved from its original position without its geographical position and stratigraphic location being recorded the **damage is irreversible.**

Fossils are usually both scarce and sporadic in their occurrence and the chances of negatively impacting on a fossil in any particular area are low. However, any fossil material is potentially of the greatest scientific and cultural importance. Thus, the potential always exists during construction and excavation within potentially fossiliferous rocks for the permanent and irreversible loss of extremely significant or irreplaceable fossil material. This said, many fossils are incomplete in their state of preservation or are examples of relatively common taxa. As such, just because a fossil is present it is not necessarily of great scientific value. Accordingly, not all fossils are necessary significant culturally or scientifically significant and the potential degree of irreversible loss will vary from case to case. The judgement on the significance of the fossil must be made by an experienced palaeontologist.

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11 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

The information provided within this report was derived from a desktop study of available maps and scientific literature; no direct observation was made of the area as result of a site visit.

12 ENVIRONMENTAL IMPACT STATEMENT

A desktop Palaeontological Impact Assessment Study has been conducted on the location of the proposed Sterkspruit multi-use development. The proposed project area is moderately large; being approximately 9 ha in size.

Any negative impacts to the palaeontological heritage of the region will be limited to the footprint area of the required infrastructure and the extent of any impacts is accordingly characterised as local. The project area is completely underlain by unfossiliferous Palaeoproterozoic rocks of the Silverton Formation and therefore there is nil potential for any negative impacts on the palaeontological heritage of the area. Accordingly, **no damage mitigation protocols are required**. The project will, on the positive side, provide residential dwellings as well as other built structures to facilitate and enhance the life style of the inhabitant.

This desktop study has not identified any palaeontological reason to prejudice the progression of the Sterkspruit multi-use Development.

13 REFERENCES

Eriksson, P.G., Altermann, W. and Hartzler, F.J., (2006). *The Transvaal Supergroup and its precursors*. in Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds) *The Geology of South Africa*, Johannesburg: Council for Geoscience, Pretoria: Geological Society of South Africa: 237–260.

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Prof B.D. Millstead

9th December 2014

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APPENDIX A

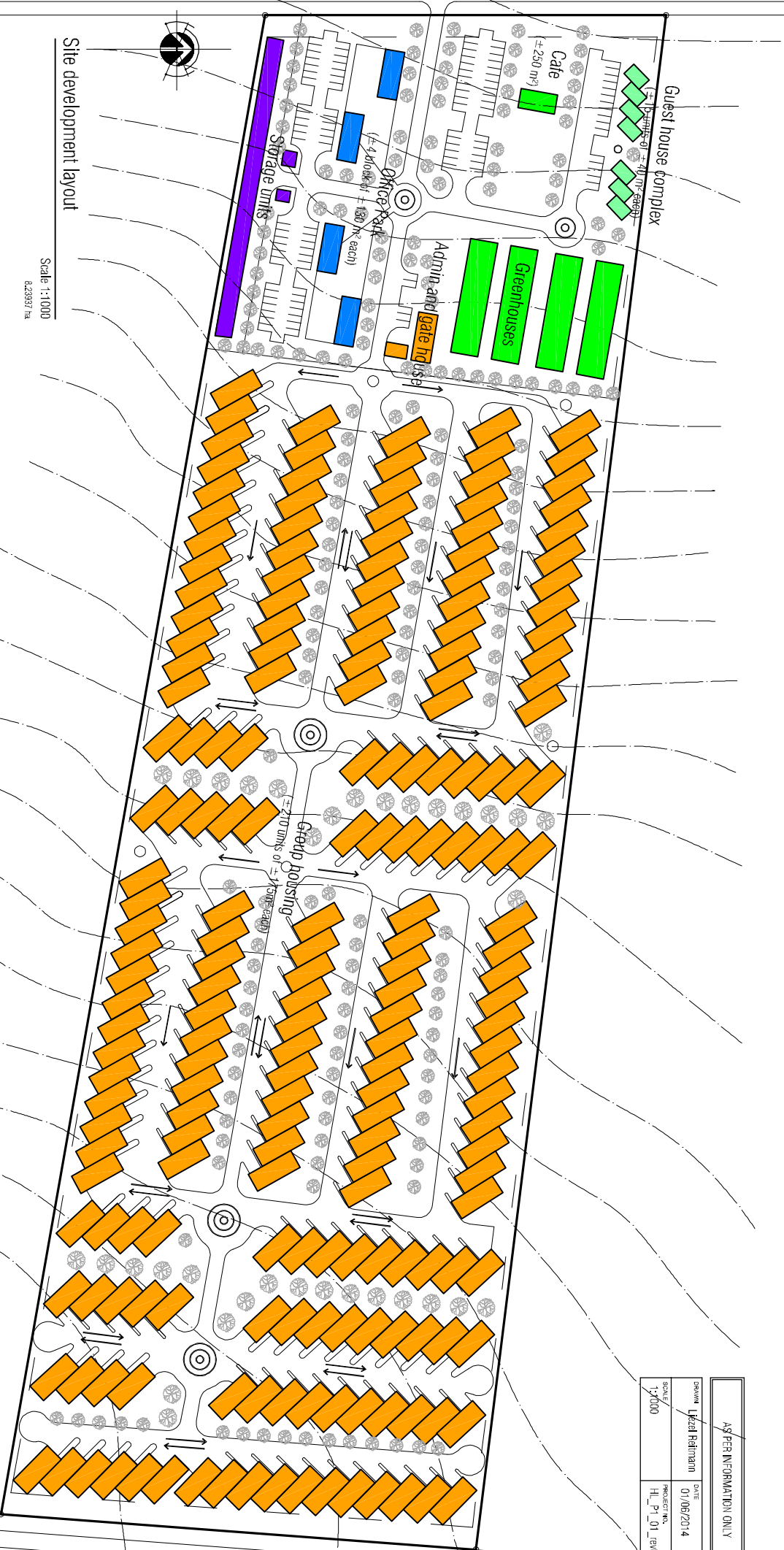
Plan of the Proposed Project

PROJECT
 Resterende gedeelte van gedeelte 79 (1ⁿ gedeelte van gedeelte 70) van die plaas Sterkspruit 38 registrasie afdeling J.T. Provinsie van Mpumalanga

DESCRIPTION

Site development layout

AS PER INFORMATION ONLY	
DRAWN	DATE
Lizel Reitmam	01/06/2014
SCALE	PROJECT NO.
1:1000	HL_P1_01_rev00



Site development layout

Scale 1:1000
 8.23937.mxd