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**ENVIRONMENTAL IMPACT ASSESSMENT
ENVIRONMENTAL IMPACT REPORT (EIR)
(Gaut 002/13-14/E0343)**

FOR

**PROPOSED MIXED USE TOWNSHIP ESTABLISHMENT
(ONDERSTEPOORT X34, A, B, C & D)**

ON

**Part of Portions 68, 69, 112, 113 & 115 and Portions 114 & 116 of the farm
Onderstepoort 266-JR, Tshwane Metro**

SEPTEMBER 2014
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FOR

ABLAND (PTY) LTD

EXECUTIVE SUMMARY

The Environmental Impact Report (EIR) for proposed mixed use township establishment on Part of Portions 68, 69, 112, 113 & 115 and Portions 114 & 116 of the farm Onderstepoort 266-JR deals with an overview of the site in both its regional and site specific context.

Aspects to be investigated include natural (geology, soil, topography, hydrology, climate & microclimate, vegetation, wildlife), physical (location, access, traffic, infrastructure, landuse, safety & security, legal, social, economic, heritage) and sensorial (visual, spirit, smell, sound) characteristics, ecological and environmental processes, environmental policies and the legislative framework, evaluation of the proposed project, as well as public participation.

The environmental impact assessment deals with the following aspects: conservation status, site opportunities and constraints, ecological sensitivity, site development potential, community involvement, formulation of environmental impacts, the significance of impacts, the mitigation of impacts, and an Environmental Management Programme (EMPr).

Aspects reflected in the Plan of Study in the Scoping report, as well as feedback received from Authorities, have been integrated into the EIR.

No aspects that could not be mitigated or integrated, both from an environmental and development perspective, have been found and the proposed development is, thus, recommended.

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1 INTRODUCTION

1.1 Purpose of report

Application for Authorisation for an EIA Scoping for the proposed mixed use township establishment on Part of Portions 68, 69, 112, 113 & 115 and Portions 114 & 116 of the farm Onderstepoort 266-JR. **ecologic AFRIKA** was appointed as Environmental Assessment Practitioner (EAP) (Annexure A) for the EIA Scoping study and an Application for Authorisation was submitted to Gauteng Province's Department of Agriculture & Rural Development (GDARD) on 14 March 2014. The EIA Scoping report was submitted to GDARD on 28 August 2014 and feedback on the report was received on 04 September 2014.

1.2 The property (Drawing 1)

The proposed development is located both sides of Mopanie Road (link road between R80 Mabopane freeway and road M35 (Onderstepoort to Soutpan) on Portions 68, 69, 112, 113 and 115 of the farm Onderstepoort 266-JR, Tshwane. The site measures 48,95ha.

1.3 The project (Drawing 4)

The EIA Scoping for the proposed mixed use township establishment forms part of another EIA Basic Assessment study for proposed Business 2 development (mall) - (Gaut 002/13-14/E0344) adjacent south of Mopanie Road.

The proposed mixed use township establishment will consist of Residential 1 (21,3683ha), Special for Mixed Uses (9,39ha), Public Open space (8,0837ha), Public Streets (7,604ha), Special for Public Garage/Car Wash/Place of Refreshment (1,39ha), Special for Various Uses (0,83ha), Special for Community Uses (0,224ha) and Municipal (0,06ha). The initial reference to Onderstepoort X34, A, B, C & D has subsequently changed to Onderstepoort X34 (as previously), Onderstepoort X38 (previously A,B&C), and Onderstepoort X39 (previously D). Two alternative layouts will be investigated (Layout 1 represents the initial layout prior to environmental studies and referring to Onderstepoort X34, A, B, C & D – see Dwg 3), and the subsequent preferred Layout 2 referring to Onderstepoort X34, X38 & X39 (see Dwg 4). The Mabopane freeway (road R80) west of the site currently ends at Mopanie Road, where the intersection requires upgrading due to traffic increase. Three alternative intersection layout have been prepared, which is currently under discussion between the consulting engineers and Gautrans/Tshwane Metro. The preferred alternative forms a T-intersection from road R80 onto Mopanie Road.

1.4 Terms of reference

A team of consultants have been appointed to assist with the application.

The team of consultants:

Town planning – Plandev Town Planners

Environmental Impact Assessment – ecologic AFRIKA

Architecture – Boogertman Pretoria

Electrical engineering – Greycon Consulting Engineers

Civil and traffic engineering – Civil Concepts Consulting Engineers

This report is concerned with the environmental impact assessment and, as such, input from the landowners, consultants/specialists and authorities were and will be obtained and integrated into this report. The activities applied for are listed in Government Notice **544 and 545** dated 18 June 2010: **Activity 545.15** – Physical alteration of undeveloped, vacant or derelict land to residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area of development to be transformed is 20 hectares or more; and **Activity 544.22(i) and (iii)** – The construction of a road, outside urban areas (i) with a reserve wider than 13,5m, or (iii) for which an environmental authorisation was obtained for the route determination in terms of Activity 5 in Government Notice 387 of 2006 or Activity 18 of Notice 545 of 2010. This listed activity deals with the upgrading of road R80 (Mabopane freeway) intersection with Mopanie Road.

1.5 Methodology

ecologic AFRIKA submitted an Application for Authorisation on 14 March 2014 and feedback from GDARD was received on 28 March 2014. Upon registration of the project a literature search, site evaluation, and advertising and notifications commenced.

This EIA Scoping consisted of the following steps:

Site evaluation (natural, physical, sensory)

Legal procedures and legislation (national, provincial, local)

Proposed project evaluation (need & desirability, alternatives, phasing)

Interested & Affected Parties (IAPs) involvement

Environmental impact assessment overview

Plan of Study for further studies

The EIA Scoping report was accepted by GDARD and preparation and finalisation of the Environmental Impact Report (EIR) commenced.

The Environmental Impact Report (EIR) herewith presented consists of the following steps:

Site evaluation (natural, physical, sensory)
Legal procedures and legislation (national, provincial, local)
Proposed project evaluation (need & desirability, alternatives, phasing)
Interested & Affected Parties (IAPs) involvement
Environmental impact assessment
Integration of feedback from Authorities
Significance of impacts
Mitigation of impacts
Environmental Management Programme (EMPr)
Recommendations: Environmental impact statement
Conclusion

2. SITE EVALUATION

2.1 Regional context

The regional context represents a broader overview of the area in which the site is located, in order to understand its function and purpose relating to other facilities and activities in the area.

2.1.1 Natural environment

The site is on a slight ridge with crest, fairly undisturbed, somewhat overgrazed, and has been used primarily for grazing. Two wetlands occur on site, one towards the northeast of the site and the other along the southern boundary. The northeastern wetland is in the headwaters of the Soutpanspruit which flows into the Kutswane River, which flows into the Moretele River. The southern wetland is a tributary of the Metsi Metsuane stream, which flows into the Kaalplaas spruit, which flows into the Apies River. Hillslope seepage has been observed, especially along the Metsi Metsuane stream along the southern boundary. Vegetation in the area is classified as the Grassland biome: Central Sandy Bushveld (Musina & Rutherford). Very few trees (*Acacia caffra*, *Burkea africana* and *Lannea discolor*) occur on the site. Scattered natural koppies occur in the area. Geology appears to consist of sandy soils underlain by granite of the Lebowa Granite Suite and granophyre of the Rashoop Granophyre Suite. Soils appear to be shallow with a moderate clay content in lower lying areas. The climate is typically highveld, warm summers with severe frost in winter, and typically with summer afternoon thunderstorms and average rainfall of about 500-700mm annually.

2.1.2 Physical environment

The site is located east of Soshanguve, both sides (north and south) of Mopanie road and adjacent east of the R80 Mabopane freeway, which currently ends at the intersection with Mopanie Road, typically with residential and agricultural activity. The area around the site is fairly developed, with Soshanguve residential township west of the site, primarily agricultural residential activity south and north of the site, and a half-completed church and agricultural residential activity east of the site. An informal waste dump has developed northwest of the site. Existing access to the site is by means of farm entrances along both sides (north and south) of Mopanie Road. The site surrounds and forms part of the Business 2 mall application adjacent south of Mopanie Road (Gaut 002/13-14/E0344).

2.1.3 Sensory environment

The character of the area is fairly natural to the north, south and east, half-completed church to the east, urban to the west (Soshanguve), and fast traffic/noise to the west (R80 Mabopane freeway). Pollution is limited, with informal

waste dump northwest, smoke from veld fires and traffic noise from roads in the area that may pose problems. Overgrazing is evident in some areas.

2.2 Natural characteristics (see Drawing 2)

These characteristics are more site specific and deals with the site and its immediate surroundings. These characteristics were also investigated in more detail pertaining to the site and the proposed development thereof.

2.2.1 Geology & geotechnical (see Annexure F)

The site consists of sandy soils underlain by granite of the Lebowa Granite Suite and granophyre of the Rashoop Granophyre Suite of the Bushveld Igneous Complex. A geotechnical investigation has been conducted, and confirm the above geology.

2.2.2 Soils (see Annexure F)

The site exhibits hillwash silty sand soils of varying depth (300-500mm) in the higher-lying areas, but shallow with a moderate clay content in lower lying areas. Ferricrete is also present and exhibits weakly cemented, nodular, sandy material which is equivalent to a ferrogenised sandy gravel.

2.2.3 Topography

The site is located on a slight ridge with crest towards the north of the site. The northern portion of the site slopes downwards to the Soutpanspruit tributary in the northeast, at an average slope of 2,5%. The bulk of the site slopes downwards to the Metsi Metsuane stream tributary in the south, at an average slope of 4%. A prominent and few less prominent koppies (slightly elevated areas) are located in the northeast of the site, with boulders and indigenous trees present. The site elevation varies from 1080m to 1300m above mean sea level.

2.2.4 Hydrology (see Annexure G & H)

The average rainfall in the area is approximately 500-700mm during November to March. The northern part of the site slopes to the northeast towards the Soutpanspruit, while the bulk of the site slopes towards a tributary of the Metsi Metsuane stream to the south. Stormwater runoff occurs in the form of sheetwash, with hillslope seepage evident along the southern portion of the site. A seasonal perched water table may be present in low lying areas. A wetland study has been conducted (see Annexure G). A stormwater management plan has also been prepared (see Annexure H). No development will take place within the hillslope seepage areas or within the 1:100 year floodline).

2.2.5 Climate & microclimate

The climate of the area is characterised by warm summers and cold winters, with summer rainfall, with dry winters and frost in winter. Monthly maximum temperature is 35°C in summer and -3°C in winter. Average rainfall is 500-700 mm per annum. The microclimate of the site is slightly affected by the topography of the site – cold air drainage during winter nights, and a slightly colder south orientating slope is anticipated.

2.2.6 Vegetation (see Annexure J)

The site is classified as transition between Central Sandy Bushveld and Marikana Thornveld (Musina & Rutherford) dominated by *Hypharrena hirta* and *Trachypogon spicatus*. Some *Acacia caffra*, *Burkea africana* and *Lannea discolor* trees are concentrated on two koppies on the site. Three plant communities have been identified on site: grassland, bushveld on koppies, and two spruits with associated wetland/riparian zones. One Red Data species has been identified for the site – *Boophane disticha*, which will be transplanted. A vegetation study has been conducted.

2.2.7 Wildlife

No mammals have been observed on site, although small mammals, reptiles, amphibians and insects may occur. Some birdlife have been observed. The following species have been identified on site: hadeda, doves, grey lourie, guineafowl, korhaan, widows, bishops and sparrows. One Red Data species have been identified on the site/koppie – *Python natalensis*, which will be relocated. The GDARD Biodiversity Unit did not identify any potential wildlife to be investigated (see Annexure O).

2.3 Physical characteristics (see Drawing 1, 2 and 4)

These characteristics represent all manmade intrusions on and/or manipulations of the site and the surrounding area.

2.3.1 Location & access

The site is located east of Soshanguve, both sides (north and south) of Mopanie road and adjacent east of the R80 Mabopane freeway. The freeway currently ends at the intersection with Mopanie Road, and upgrading of the intersection is recommended (see Annexure K). Access to the site is by means of farm entrances along Mopanie Road, which will be substituted with 2 intersections along Mopanie Road and M35 Soutpan/Onderstepoort road, to be finalised with Gautrans and Tshwane Metro. These intersections will also provide access to the proposed Business 2 mall development surrounded by this application (under

application – Gaut 002/13-14/E0344). The intersection from the R80 freeway onto Mopanie Road will also be upgraded.

2.3.2 Traffic (see Annexure K)

Access to the site has already been discussed under Item 2.3.1 above. The traffic generation will increase over time, linked with the progression of development. A traffic impact study has been conducted, including access to the site and upgrading of intersections, including the upgrade of road R80 intersection with Mopanie Road.

2.3.3 Infrastructure (see Annexure L&M)

Bulk infrastructure (water, stormwater, sewer, electricity, Telkom) will have to be provided to the site. Water, sewer and stormwater reticulation (both bulk provision and internal circulation) as well as electricity provision investigations are in progress between the consulting engineers and the Tshwane Metro. Waste disposal will be integrated into the Tshwane waste disposal system currently in operation for Soshanguve. A civil engineering and electrical engineering services report have been prepared. The services agreements with Tshwane Metro is still in process, although the consulting engineers have confirmed the availability and capacity of services for the proposed development.

2.3.4 Landuse

The current landuse of the site consists of agricultural activity (grazing). The zoning is currently Agriculture. Adjacent landuses consist of urban development to the west (Soshanguve) adjacent to the R80 Mabopane freeway, an informal waste dump northwest of the site, a half-completed church to the east, agricultural residential to the north, south and east, and the proposed Business 2 mall developed adjacent south of Mopanie Road and surrounded by this application (under application – Gaut 002/13-14/E0344).

2.3.5 Safety & security

Safety in the area is marginal, as is the general state in the country, especially in the more rural areas. Fencing off is problematic due to theft of materials. The illegal informal dump site is under investigation.

2.3.6 Legal

Legal constraints on the site consist of the current landuse zoning, which has to be changed to accommodate the proposed development. Negotiations with Gautrans and Tshwane Metro regarding the proposed access must be finalised, as well as service agreements for the provision of services to the proposed

development. A water use license application must also be submitted for stormwater disposal into the watercourses northeast and south of the site

2.3.7 Social

The social profile of the area is primarily middle to low income rural residential/urban residential, and farming. The proposed use is compatible with the existing Soshanguve urban development in the area.

2.3.8 Economic

Economic activity in the area consists of residential, agricultural, and limited commercial activities in the area. The proposed development forms part of a Business 2 mall development adjacent south of Mopanie Road and surrounded by this application (Gaut 002/13-14/E0344).

2.3.9 Heritage (see Annexure N)

Signs of historical significance have been found on the site. A heritage impact assessment has been done, which confirmed the occurrence of 14 sites of variable significance: 12 structures of which 3 does not require any mitigation, while the other 9 should be recorded and permit should be obtained for demolition; also 2 cemeteries which should be preserved in situ.

2.4 Sensory characteristics

These characteristics influence the senses (sight, sound, touch, taste) and may be subjective, based upon perceptions, conditioning and personal preferences.

2.4.1 Visual

The visual quality of the site is primarily natural/agricultural, with residential activity in the west. Visual quality of the surrounding area varies from urban residential (Soshanguve township) and traffic on R80 Mabopane freeway to the west, fairly natural grassland north, south and east, an illegal waste dump to the northwest, a half-completed church to the east of the site, and traffic on Mopanie Road bisecting the site from east to west. Views from the site are minimal due to the fairly flat topography. Visibility to the site is also limited, although exposure to the R80 Mabopane freeway and M35 Soutpan road is good, also due to the fairly flat topography.

2.4.2 Spirit & site atmosphere

The character of the site is rural to urban, with existing agriculture and urban residential and the half-completed church development, the R80 Mabopane

freeway, as well as illegal waste dump disturbing the open grassland/agricultural feeling.

2.4.3 Smell

Smells consist of natural and farming associated fragrances of no significance. Odours are limited, pending wind direction. These odours are caused by residential activities (cooking, heating) in Soshanguve and may increase in winter (heating, veld fires). The illegal waste dump northwest of the site, which are currently investigated, causes limited odours.

2.4.4 Sound

The primary sources of noise are traffic on the R80 Mabopane freeway west of the site, Mopanie Road bisecting the site, and M35 Soutpan road further east of the site.

2.5 Ecological & environmental processes

These processes represent site and surrounding area characteristics (natural, physical, sensory) combining/interacting to form substantial causes and affects relating to the site.

2.5.1 Biodiversity

Biodiversity represents the variety of plant (trees, shrubs, groundcovers, grasses, aquatics, succulents) and animal (mammals, birds, reptiles, amphibians, fish, insects) species that occurs or may occur in the area. The biodiversity is low, due uniform grassland habitat, with few scattered trees especially on the two koppies in the northeast of the site, the tributary of the Metsi Metsuane Spruit to the south, and the tributary of the Soutpanspruit northeast of the site creating some variation.

2.5.2 Sustainability

The agricultural potential of the site is deemed low, with the carrying capacity for grazing and the low soil fertility negating the sustainable use on an economic basis. The site is located between east of an existing urban development (Soshanguve), with agricultural activity present, thus lending itself to urbanisation.

2.5.3 Habitats

Habitats are limited and consist primarily of grassland/grazing, with two koppies with some scattered trees, a tributary of the Metsi Metsuane Spruit to the south, and the tributary of the Soutpanspruit northeast of the site adding variety.

2.5.4 Corridors

Corridors for the movement of wildlife consist of the Metsi Metsuane Spruit tributary south of the site, as well as the Soutpanspruit northeast of the site. The tributary of the Metsi Metsuane Spruit south of the site flows to the east and flows into the Apies River. The Soutpanspruit northeast of the site flows towards the northwest and flows into the Kutswane River, and then into the Moretele River.

2.5.5 Pollution

Pollution on the site and surrounding area is average. Sources of pollution in the area consist of urbanisation (Soshanguve township), the illegal waste dump, traffic noise and movement, and limited agricultural activity. None of these has, however, a direct or detrimental impact on the proposed development of the site.

3. ENVIRONMENTAL POLICIES & LEGISLATIVE FRAMEWORK

Environmental policies guide development in specific areas, whereas the legislative framework governs environmental controls relating to development.

3.1 National Government policies & legislation

3.1.1 Constitution of South Africa

The Constitution (Act 200 of 1993) gives every person the right to an environment that is not harmful to their health and wellbeing. Everyone, thus, has the right to have the environment protected for present and future generations through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

3.1.2 Development Facilitation Act (DFA)

The Development Facilitation Act (Act 67 of 1995) has 3 main objectives. Firstly to provide a coherent policy framework for land development, land registration and planning; secondly to speed up and facilitate the approval of land development applications; and thirdly to provide for the overhaul of existing planning and land development frameworks. The DFA, thus, introduces extraordinary measures to facilitate and speed up the implementation of reconstruction and development programmes and projects. The Act further includes general principles governing land development, including nationally uniform procedures for the subdivision and development of land in urban and rural areas so as to promote the speedy provision and development of land for residential, small-scale farming or other needs and uses.

3.1.3 Environmental Conservation Act (ECA)

The Environmental Conservation Act (Act 73 of 1989) requires that likely environmental effects of activities be taken into consideration before decisions in this regard are taken. The objective of such an assessment is to promote sustainable development towards achieving and maintaining an environment that is not harmful to people's health or wellbeing. Sections 21, 22 and 26 of the Act strive to integrate environmental impact management with development activities with the aim to ensure more responsible and environmentally sensitive development.

Buffer zones, although not officially gazetted, for industries, sewage treatment works, landfill sites and mine dumps have been formulated to control development adjacent to the said activities. Criteria against which development applications in close proximity to these listed land uses will be evaluated is

formulated in the policy document *Information layers and buffer zones for industries, sewage treatment plants, landfill sites and mine dumps* (DACEL 2002).

3.1.4 National Water Act (NWA)

The National Water Act (Act 36 of 1998) requires that any water resource, along with the associated natural environment be protected from development that could potentially significantly alter their natural structure and function. Objectives of the Act include the sustainable use of water for the benefit of all users, the protection of the quality of water resources, and the need for integrated management of all aspects of water resources.

3.1.5 National Environmental Management Act (NEMA)

The National Environmental Management Act (Act 107 of 1998) seeks to provide for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment. The Act, furthermore, includes that environmental management must place people and their needs at the forefront of its concern, and to serve their physical, psychological, developmental, cultural and social interests equitably.

3.1.6 National Heritage Resources Act

The National Heritage Resources Act (Act 25 of 1999) aims to promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy for future generations. The national estate may include places, buildings, structures and equipment of cultural significance; landscapes and natural features of cultural significance; archaeological and palaeontological sites; graves and burial grounds.

3.2 Provincial Government policies & legislation

3.2.1 Urban Edge

The site falls within the Urban Edge, which has to do with containing urban spread and the densification of development within the urban edge. The proposed development, thus, falls within the containment of urban development east of Soshanguve.

3.2.2 Buffer Zones

Buffer zones are defined as protection strips between different types of development (ie airports, sewage plants, power plants, mining). No buffer zones are applicable to the site. Buffer strips should be provided along the tributary of the Metsi Metsuane spruit and Soutpanspruit and associated wetland sites.

3.2.3 Ridges policy

The ridges policy, in general, provides for the protection of ridges due to its prominence, sensitivity, steeper slopes, microclimate variation, and landscape value. The slight ridge on the site is not identified within the GDARD C-plan.

3.2.4 Red Data species

Two Red Data species have been established on the site – *Boophane disticha* plant, which will be transplanted, and *Python natalensis* reptile, which will be relocated.

3.2.5 Agricultural Potential

The agricultural potential of the area is deemed low to average due to limited soil depth, occurrence of rock, and slope of the land.

3.3 Local Authority policies & legislation

3.3.1 Land Development Objectives

The land development objectives for the area indicate residential, agricultural and commercial development along the R80 Mabopane freeway corridor.

3.3.2 Integrated Development Plan

The Haakdoornboom Spatial Development Framework (SDF) has recently been revised and supports the proposed development of the area.

4. PROPOSED PROJECT EVALUATION

4.1 Need & desirability

The need for the proposed mixed use township establishment/development in the area (this application as well as the proposed Business 2 mall surrounded by this application) is based on the current and future growth trends anticipated for the area, combined with investment potential, availability large tracts of land, and development opportunity identified by the Applicant. This application deals with the proposed township establishment on just over 48,95ha both sides of Mopanie Road

The desirability of the proposed mixed use township establishment can be defined as its proximity to Soshanguve, convenience for local community, the availability of infrastructure in the area, and the compatibility of the proposed development with surrounding urbanisation.

4.2 Alternatives

Two alternative layouts have been evaluated, namely the initial alternative 1 for township establishment prior to environmental studies, and the preferred alternative 2 consisting of the subsequent integrated site master planning acknowledging environmental sensitivities and constraints. Detail investigations have been or are currently conducted (desktop studies, site investigations, specialist investigations). Again the proposed development forms part of the Business 2 mall development under separate application.

The initial Alternative 1 (Drawing 3) consists of the initial urban design concept formulated during early conceptualisation of the proposed development. This alternative represents a complete development of the site, excluding only the 1:100 year floodline along the southern boundary of the site. This layout represents the initial layout prior to environmental studies and refers to Onderstepoort X34, A, B, C & D (as per project title).

The preferred Alternative 2 (Drawing4) consists of the proposed mixed use township establishment consisting of Residential 1 (21,3683ha), Special for Mixed Uses (9,39ha), Public Open space (8,0837ha), Public Streets (7,604ha), Special for Public Garage/Car Wash/Place of Refreshment (1,39ha), Special for Various Uses (0,83ha), Special for Community Uses (0,224ha) and Municipal (0,06ha).

The initial reference to Onderstepoort X34, A, B, C & D has subsequently changed to Onderstepoort X34 (as previously), Onderstepoort X38 (previously A,B&C), and Onderstepoort X39 (previously D).

The proposed road network also optimises the circulation between Soshanguve, Soutpan road and Mopanie Road, as well as access and traffic distribution to and from the proposed development to Soshanguve, and to the R80 Mabopane freeway. Three alternatives for the upgrade of the Mabopane freeway (road R80) and mopanie Road intersection have also been investigated, with the preferred alternative a T-junction from the R80 onto Mopanie Road.

4.3 Alternative uses

No alternative uses have been evaluated since the proposed development is based upon a mixed use development representing the current and future development needs of the area. Again it is pointed out that this proposed mixed use development forms an integral part of the proposed Business 2 mall development under separate application.

The no-go option represents the continued use of the site for grazing/cultivation, which is economically marginally viable. The area is also under development pressure due to its location east of Soshanguve, and the location along the R80 Mabopane freeway, with associated exposure, access, and noise generation.

4.4 Development proposal

The preferred Alternative 2 represents an environmentally integrated township layout based on the evaluation and interpretation of existing site resources, needs and tendencies, township layout principles and engineering considerations. The proposed development will consist of a mixed use township, consisting of Residential 1 (21,3683ha), Special for Mixed Uses (9,39ha), Public Open space (8,0837ha), Public Streets (7,604ha), Special for Public Garage/Car Wash/Place of Refreshment (1,39ha), Special for Various Uses (0,83ha), Special for Community Uses (0,224ha) and Municipal (0,06ha). Total area for development measures 48,95ha. Again it is pointed out that this proposed mixed use development forms an integral part of the proposed Business 2 mall development under separate application (Gaut 002/13-14/E0344).

The upgrading of the Mabopane freeway (road R80) and Mopanie Road intersection has also been investigated and a T-junction is recommended, until the Mabopane freeway is constructed further north in the future.

The proposed development will provide convenient and much needed facilities and activities for Soshanguve residents, which will compliment existing facilities in the area.

4.5 Phasing

Phasing of the proposed development will depend upon the economic climate in South Africa as a whole and the Soshanguve area in particular. The anticipated phasing (based upon current trends and demand) as follows:

- The proposed filling station as part of this application (less than 80m³ storage and handling of dangerous materials) – Onderstepoort X34. Bulk services installation (roads, water, sewer, stormwater, electricity) will be installed concurrently and as required.
- The proposed mall – Onderstepoort X33 (under separate application Gaut 002/13-14/E0344).
- Onderstepoort X38 mixed use development.
- Onderstepoort X39 mixed use development.

5. PUBLIC PARTICIPATION

5.1 Interested & affected parties

Interested & Affected Parties (IAPs) were notified as per guidelines prescribed in the National Environmental Management Act (NEMA), Act 107 of 1998. Adjacent landowners' information was obtained from Tshwane Metro and personal contact on site. Ward Councilor and Local Authority information were obtained from Tshwane Metro. No other IAPs could be established.

5.2 Legal procedures

The two (2) EIA applications (Mixed use township establishment, Business 2 mall development) were advertised simultaneously since they represent an integrated whole. IAPs were notified by registered mail on 08 May 2014, with a 30 day period to register as IAPs (Annexure B). The same advertisement were erected on site (Annexure C) and published in the Pretoria News newspaper (Annexure D) on 08 May 2014, also allowing a period of 30 days to register as IAPs. This registration period expired on 08 June 2014. No parties registered as IAPs.

5.3 Information transfer

No parties registered as IAPs and, thus, no further communications were necessitated. The EIA Scoping report was, however, simultaneously submitted to Tshwane Metro, Department of Water Affairs (DWA) and Gautrans, although neither of them registered as IAP. Feedback was only received from Tshwane Metro (see Annexure P).

5.4 Significance of key issues

Although no objections and/or concerns were raised by any party, the significance of key issues were determined by the following methodology:

- Environmental standards
- Literature search of available relevant information
- Site evaluation and sensitivity analysis
- Specialist input
- Level of public concern
- Mitigation potential to reduce severity of impacts
- Professional experience and training
- Internal discussions (brainstorming, nominal group technique, workshops)

6. ENVIRONMENTAL IMPACT ASSESSMENT OVERVIEW

6.1 Conservation status

The conservation status of the site is deemed high, due to natural grassland with some overgrazing, the two spruits with associated wetlands, as well as the koppie in the northeast of the site. The site is primarily covered with veldgrass, with the Soutpanspruit and associated wetland to the northeast, the tributary of the Metsi Mesuane Spruit with associated wetland and hillslope seepage to the south, and some indigenous trees on the koppie in the northeast of the site. The visibility of the site from the R80 Mabopane freeway is good, from Mopanie Road is also good, and from the M35 Soutpan/Onderstepoort road is average. The impact on the wetlands will be reduced by preserving both spruits within the 1:100 year floodline, as well as the associated wetlands and hillslope seepage with a 30m buffer around. Stormwater drainage from the proposed township will be decentralised to prevent concentration of stormwater. A stormwater management plan will be formulated in order to determine outlet positions, siltation prevention mechanisms, attenuation alternatives and velocity reduction methods. Groundwater aquifer recharge is also anticipated due to increased flow in the spruit.

6.2 Site opportunities

Site opportunities are those site characteristics presenting a positive contribution/impact towards the development of the site, from both a development and conservation perspective.

- Soutpanspruit and associated wetland.
- Tributary of the Metsi Mesuane Spruit, with associated hillslope seepage and wetland.
- Natural koppie with indigenous vegetation.
- Low agricultural potential.
- Geotechnical suitability of the site is apparently good.
- Developable slopes orientating south and north.
- Groundwater table apparently deep.
- Potential aquifer recharge.
- Access and exposure to R80 freeway.
- Existing development in the adjacent Soshanguve.
- Demand for development in the area.
- Infrastructure capacity/availability.
- Support of Tshwane Metro.
- Compatibility with adjacent landuses.
- Potential for mixed use development.
- Potential for integrated development including the mall on separate application.

6.3 Site constraints

Site constraints are those site characteristics presenting a neutral to negative impact, thus presenting a challenge towards its meaningful integration into the development of the site. These constraints may be mitigated to some extent, may be converted into an asset/positive impact, or may have to be accommodated as a restrictive or negative impact on the development.

- Potential perched water table in low lying areas.
- Potential expansive clays in low lying areas.
- Potential wetland disturbance during construction.
- Noise from freeway and other roads.
- Disturbance from M80 freeway.

6.4 Ecological sensitivity

The ecological sensitivity of the site is deemed high to average, primarily due to two spruits/watercourses and associated hillslope seepage/wetlands, and the prominent natural koppie, which should be preserved. GDARD Biodiversity feedback has been received and investigated (see Annexure O, G and J)

6.5 Development potential

The site development potential represents the capacity of the site to accommodate the proposed development in an environmentally sensitive and responsible way.

The development potential of the site are considered as good, based upon the above opportunities and constraints, the integration of ecologically sensitive areas (spruits and koppie), existing Soshanguve township west of the site, suitable geology, developable slopes, the proximity to existing development, good access, availability of the land and compatibility with the Tshwane Haakdoringboom SDF.

6.6 Community involvement

Community involvement has been extensive, as has been presented under Item 5 in this report. All legal advertising and notifications have been met and exceeded. No IAPs registered for the project, although Tshwane Metro and Dept of Water Affairs (DWA) have been provided with copies of this report.

6.7 Development alternatives

Two alternative layouts have been evaluated, namely the initial alternative 1 for township establishment prior to environmental studies, and the preferred alternative 2 consisting of the subsequent integrated site master planning

acknowledging environmental sensitivities and constraints. Detail investigations have been or are currently conducted (desktop studies, site investigations, specialist investigations). The proposed development forms part of the Business 2 mall development under separate application.

6.8 Environmental impacts

Environmental impacts can be summarised as follows:

- Environmental impacts on natural resources include the Soutpanspruit and associated wetland, tributary of the Metsi Mesuane Spruit with associated hillslope seepage and wetland, natural koppie, geotechnical precautions required during construction, potential expansive clays in areas, potential perched groundwater table, potential aquifer recharge, and potential disturbance of wetlands during construction period.
- Environmental impacts on physical resources include landuse planning and rezoning, integration of layout with environmentally sensitive features, traffic impact, stormwater management, proximity to existing development, access to the existing and proposed facilities, and provision of bulk infrastructure.
- Environmental impacts on sensorial resources include high visibility/exposure of the site, urbanisation to the west of the site, and noise from the M80 and other roads around the site.

The significance of impacts will be outlined under Item 6.10 below and the identification, significance and mitigation of impacts will be discussed under Item 6.11 below. Further aspects relating to feedback from Tshwane Metro is, however, addressed first, under Item 6.9 below, in order to integrate it into the identification, significance and mitigation of impacts.

6.9 Issues raised by Tshwane Metro

The following issues have been raised by Tshwane Metro's Environmental Management Services Department, which will be presented in the same sequence as listed by them under Item 5 – Recommendations, in feedback dated 23 September 2014 (see Annexure P).

- 5(a) Detailed layout plan, overlaying all sensitivities is attached as Dwg 4 in this report. No IAPs registered, thus no communication of layout plan to IAPs.
- 5(b) Detailed stormwater management plan has been prepared by the consulting engineers and is attached as Annexure H in this report.
- 5(c) Identified specialist studies have been conducted and are included as Annexure F – geotechnical report, Annexure J – Vegetation report, Annexure G – wetland report, Annexure K – Traffic impact study, Annexure N – Heritage impact study, Annexure L – Civil engineering services report, and Annexure M – Electrical engineering services report.

- 5(d) Confirmation of service capacities are included in the engineering services reports – Annexure L – Civil engineering, and Annexure M – Electrical engineering.
- 5(e) Same as Item 5(c) above.
- 5(f) General rehabilitation plan – Rehabilitation guidelines and requirements are presented in the Environmental Management Programme included as Annexure Q in this report.
- 5(g) Environmental Management Programme – See Annexure Q.

No specific requirements have been identified by GDARD in their feedback dated 04 September 2014, and the EIA Scoping report has thus been finalised into this EIR by integrating the feedback received from Tshwane Metro, as well as aspects identified in the Plan of Study included in the EIA Scoping report.

6.10 Significance of impacts

The significance of impacts was determined by the following methodology:

- Environmental standards
- Literature search of available relevant information
- Site evaluation and sensitivity analysis
- Level of public concern
- Mitigation potential to reduce severity of impacts
- Professional experience and training
- Internal discussions (brainstorming, nominal group technique, workshops)

The identification and significance of impacts are presented as part of the mitigation measures tabled under Item 6.11 below.

The identification, significance, and mitigation of impacts are presented together in table form for ease of reference, since they are all interrelated and culminating in either the integration/incorporation, omission, or reducing/mitigation of the anticipated environmental impacts, thus ensuring an environmentally integrated, ecologically sensitive, and optimally utilised development proposal.

6.11 Mitigation of impacts

Mitigation measures are formulated to reduce the significance of negative impacts and to increase the significance of positive impacts on the site/environment or the proposed development, towards the optimal utilization of site resources in an environmentally sensitive manner. These measures will be presented as the nature, probability, duration, extent, and intensity of impacts.

These aspects will also be addressed in the Environmental Management Programme (EMPr) – see Annexure Q in this report.

The following definitions of terms used will apply:

- Nature of impact – whether the impact is positive, neutral, or negative.
- Probability – The likelihood of the impact occurring
 - Improbable – the possibility of the impact to materialize is very low.
 - Probable – a distinct possibility that the impact will occur.
 - Definite – the impact will occur regardless.
- Duration – The lifetime of the impact
 - Short – 0-5years.
 - Medium – 5-15years.
 - Long – the impact will cease after the operational life of the activity.
 - Permanent – impact will remain.
- Extent – Whether the impact is on a local, regional or national scale.
- Intensity – The severity of the impact
 - Low – the impact affects the environment in such a way that natural and social functions and processes are not affected.
 - Medium – the affected environment is altered by natural and social functions and processes and will continue albeit in a modified way.
 - High – where natural and social functions or processes are altered to such an extent that it will temporarily or permanently cease.
- Recommendations – Ways in which the impact will be integrated or mitigated.

The following mitigation measures are recommended:

ENVIRONMENTAL IMPACTS, SIGNIFICANCE AND MITIGATION FOR ONDERSTEPSPOORT X34, A, B, C & D

DESCRIPTION	NATURE	PROBABILITY	DURATION	EXTENT	INTENSITY	RECOMMENDATIONS
Planning and design	positive	definite	long	regional	medium	In accordance with national, provincial & local legislation & regulations.
Geology & geotechnical aspects	negative	probable	short	local	low	Test pits to be dug & evaluated for all foundations. Foundation designs by civil/ structural engineers to geotechnical report recommendations.
Soil - topsoil	negative	probable	short	local	low	Topsoil (top 250mm layer) to be removed from construction areas and to be stockpiled in rows not exceeding 2m high for use during landscaping.
Blasting	negative	probable	short	local	medium	If blasting is required the community within a 2km radius from the site shall be notified in advance. Blasting shall be done in accordance with the Explosives Act of 1956, at appropriate times. All buildings and structures in the area shall be inspected for damage prior to and after blasting operations, and all damage shall be repaired by the Contractor.
Vegetation - indigenous	positive	definite	long	local	medium	Riparian zones, hillslope seepage areas, and indigenous vegetation on prominent koppie/elevation in the northeast of the site to be protected and to be considered as no-go areas. No plants should be removed from these areas. All new planting in road reserves and public spaces to consist of primarily indigenous trees and shrubs.
Wetlands	negative	probable	short	local	medium	DWA water use licensing to be obtained for stormwater outlets into the two watercourses, and for vehicle bridge crossing the spruit. No other access to be allowed into 1:100year floodline, 32m buffer zone or hillslope seepage areas.

DESCRIPTION	NATURE	PROBABILITY	DURATION	EXTENT	INTENSITY	RECOMMENDATIONS
Hydrology - groundwater table	negative	definite	short	local	low	Seasonal perched groundwater table anticipated.
Hydrology - stormwater drainage	negative	probable	short	local	low	Stormwater management system designed by engineers to be implemented. Cutoff drains to be provided at excavations during construction activities.
Low agricultural potential	negative	definite	long	local	medium	Topsoil to be removed and stockpiled for later use.
Vegetation - exotic invaders	negative	definite	short	local	medium	<i>Exotic</i> trees to be removed from the site. All other exotic invaders also to be removed.
Vegetation - existing indigenous	positive	definite	long	local	low	Existing indigenous/natural vegetation, especially koppie and wetlands, to be protected and enhanced.
Vegetation - biodiversity	positive	definite	long	local	medium	Wetland and hillslope seepage areas to be protected and enhanced.
Vegetation - rehabilitation	negative	definite	short	local	medium	All disturbed areas should be revegetated upon completion of construction.
Wildlife - Risk of loss and damage/destruction of habitat.	negative	probable	short	local	low	No wildlife to be harvested for food. No wildlife to be caught or injured. No nesting or roosting sites to be disturbed.
Red Data species	negative	slight	medium	local	low	Python found on site to be relocated by snake expert to suitable habitat. If specimens of unique character is encountered it should be reported.
DWA registration and licensing	positive	definite	long	local	medium	DWA licensing applications for stormwater outlets into the spruit and for crossing the spruit to be obtained.
Access	negative	definite	long	local	low	Access to be provided as indicated on the Site Development Plan and to be approved by Gautrans and Tshwane Metro. Mabopane freeway (road R80) and Mopanie Road intersection also to be upgraded to Gautrans and Tshwane Metro approval.

DESCRIPTION	NATURE	PROBABILITY	DURATION	EXTENT	INTENSITY	RECOMMENDATIONS
Construction camp	negative	definite	short	local	high	<p>Location of construction camp to be clearly demarcated and to be at least 100m from spruit. Site facilities to include kitchen and ablution facilities. Chemical toilets shall be provided. Toilets to be serviced once per week, toilet paper to be provided at all times, and daily inspections to be done to ensure proper use and hygiene. Refuse generated shall be collected on a daily basis, placed in a suitable closed container on site, and shall be removed weekly from the site to a licensed commercial disposal facility. Potable water shall be sufficient for drinking, cooking, and ablutions and shall be available at all times. Pollution (dust, noise, smoke, spillage) shall be minimised according to Recommendations under POLLUTION in this document. Any pollution of ground or surface water shall be reported to both the Environmental Officer and the Dept of Water Affairs (DWA).</p>
Construction camp	negative	definite	short	local	high	<p>Fuelling and servicing of vehicles shall be done off site. If fuelling on site, then dedicated bunded area for fuel tanks (to contain any spillage - size to be the capacity of the fuel tanks + 10%), and plastic lining under soil around fuelling area (where vehicles park to fuel up). In the event of a breakdown immediate steps shall be taken to prevent any spillage. If spillage occur, it shall be reported immediately to the ELO, ECO and shall be contained and cleaned up immediately.</p>

DESCRIPTION	NATURE	PROBABILITY	DURATION	EXTENT	INTENSITY	RECOMMENDATIONS
Construction camp	negative	definite	short	local	high	Cement mixing shall only be done at areas allocated by the Engineer, in consultation with the Environmental Officer. Cleaning of cement mixing and handling equipment shall only be done using proper cleaning trays. All empty containers shall be removed from the site. Any spillage must be reported to the Environmental Officer for cleanup measures. No dumping of concrete on or around the site.
Construction camp	negative	definite	short	local	high	Dangerous and toxic materials such as fuel, oil, paint, and herbicides shall be stored in bunded areas under lock and key in well-ventilated areas. Sufficient precautions shall be taken during handling to prevent any pollution. Any spillage shall be reported immediately to the ELO/ECO for cleanup measures. Rehabilitation of campsite upon completion of construction shall be by removal and cleanup of all plant, equipment, material, and waste. Thereafter the site shall be scarified, seeded with indigenous veld grass seed, and maintained until coverage of the area to the satisfaction of the ELO/ECO.
Infrastructure - electrical	negative	definite	long	local	high	Planning to be finalised, documentation to be completed, and tenders to be obtained for bulk supply for the proposed project.
Landuse and bulk services	positive	definite	long	local	high	Provision of bulk services (water, stormwater, sewer, electricity) to be finalised with Tshwane Metro.
Landuse - servitudes	positive	definite	long	local	medium	Servitudes to be registered for bulk electrical supply, bulk water, sewer supply, and stormwater disposal across other properties to spruit.

DESCRIPTION	NATURE	PROBABILITY	DURATION	EXTENT	INTENSITY	RECOMMENDATIONS
Health & safety	negative	definite	short	local	medium	Health & Safety practitioner to be appointed. Health & Safety plan to be formulated and implemented on site during construction. Extreme care to be exercised while working in proximity of existing live power lines and substation.
Safety and security	positive	probable	long	local	low	Provide fence around transmission line and controlled access, with 24hour security, at substation. Security to be strict during construction activities due to nature of materials to be used.
Safety and security	negative	probable	long	local	medium	Emergency contingency plans for fire, accident and criminal activities to be finalised with SAPD, Local Authority and engineers.
Specialist reports	positive	definite	long	local	medium	All mitigation measures and requirements stipulated in the specialist reports to be strictly adhered to. Penalties to be instituted for non-compliance
Influx of labour during construction	negative	probable	short	local	medium	No labour to be hired at the entrance to the site. No loitering to be allowed outside the entrance to the construction site.
Employment opportunities	positive	probable	long	regional	medium	Employment during construction (contractors, sub-contractors, labourers) and limited employment during operational phases.
Environmental awareness	positive	probable	long	local	low	Awareness of the importance and conservation of especially the spruit to be stimulated.
Waste disposal	negative	probable	long	local	medium	Waste disposal during construction as per recommendations under CONSTRUCTION CAMP. Waste disposal during operational phase to be handled on a weekly basis by Local Authority contractors. Recycling of paper, plastic, glass, tins, oil and fluids.

DESCRIPTION	NATURE	PROBABILITY	DURATION	EXTENT	INTENSITY	RECOMMENDATIONS
Heritage	negative	definite	short	local	medium	Two cemeteries to be preserved in situ. In the event that graves or other artefacts or bones are found during excavations, all work shall stop and the ELO/ECO shall be informed.
Heritage	negative	definite	short	local	medium	All structures/buildings identified in the Heritage Impact Study to be recorded and permits to be obtained from SAHRA prior to demolition.
Pollution	negative	probable	medium	local	medium	Veld fires/smoke to be minimized through controlled burning. Open fires to be minimized. Gaseous emissions by construction vehicles to be minimized by ensuring that vehicles and equipment/ plant are in good working order. Noise during construction to be limited to normal working hours and proper mechanical fittings. Dust during construction to be controlled by damping off/spraying of haul roads and stockpiles. Surface water to be contained by earth berms during construction. All water pollution to be reported to the Regional Office of Water Affairs. Spillage of any kind shall be contained where possible, reported immediately to ELO/ECO, and cleaned up.
Stormwater management	positive	definite	long	local	low	Stormwater management plan prepared by engineers to be implemented, in consultation with ECO.
Rehabilitation after construction	positive	definite	short	local	low	All disturbed areas to be rehabilitated to its former natural state upon completion of construction.
Compliance with legislation	positive	definite	long	local	medium	All construction to comply with NHBRC, NBR and SABS standards and regulations.

DESCRIPTION	NATURE	PROBABILITY	DURATION	EXTENT	INTENSITY	RECOMMENDATIONS
Solid waste disposal	negative	definite	long	local	low	Waste to be removed weekly to a registered dump site, either by the local Authority or a contractor to a registered dump site.
Disturbed areas	negative	definite	medium	local	high	All disturbed areas to be rehabilitated or to be integrated into landscaping around the site.
Environmental Management Programme (EMPr)	positive	definite	long	local	medium	EMPr to be implemented on site to regulate pre-construction, construction and post-construction phases of the development.
Clearing of vegetation	negative	definite	short	local	medium	Vegetation shall be cleared from construction areas in order to provide vehicular access to the site, both for construction and delivery of materials. Only areas necessary for construction should be cleared to minimise erosion.
Financial constraints	negative	probable	short	local	medium	Financial constraints (Professional fees, interest) and time constraints (access, approvals, price increases) to be minimised.

6.12 Environmental Management Programme (see Annexure Q)

The Environmental Management Programme (EMPr) is submitted in support of this Environmental Impact Report (EIR) and consists of aspects relating to environmental compliance during pre-construction, construction, and post-construction/operational phases of the proposed development.

7. RECOMMENDATIONS

Recommendations pertaining to the granting of EIA Authorisation for the proposed development consist of an Environmental impact statement, based upon this EIR and the expertise of the EAP, as well as a Conclusion to finalise the application.

7.1 Environmental impact statement

This EIA Scoping report evaluated all the available and relevant information, combined with the site evaluation (opportunities and constraints), environmental policies and legislative framework, interested & affected parties involvement, and assessment of the proposed development on the site.

This statement is based upon the following considerations:

- Environmental considerations
 - Soutpanspruit and associated wetland
 - Tributary of the Metsi Mesuane spruit, hillslop seepage and wetland
 - Geological suitability
 - Deep to shallow soils with expansive clays
 - Stormwater management
 - Potential perched groundwater table
 - Low agricultural potential
 - High visibility
 - High ecological sensitivity
 - Low levels of pollution
 - Two Red Data species

- Socio-economic considerations
 - Essential services provision
 - Investment opportunities
 - Employment
 - Convenience
 - Adjacent landowner consent
 - IAP liaison
 - Safety and security
 - Economic empowerment

- Technical considerations
 - Geotechnical precautions
 - Developable slopes
 - Compatibility with Haakdoringboom SDF
 - Local Authority support

- Financial considerations
 - Investment within Tshwane Metro
 - Development within Tshwane Metro and Mabopane corridor
 - Provision of essential services
 - Financial feasibility

7.2 Conclusion

The Environmental Impact Report (EIR) for proposed mixed use township establishment on Part of Portions 68, 69, 112, 113 & 115 and Portions 114 & 116 of the farm Onderstepoort 266-JR deals with an overview of the site in both its regional and site specific context.

Aspects to be investigated include natural (geology, soil, topography, hydrology, climate & microclimate, vegetation, wildlife), physical (location, access, traffic, infrastructure, landuse, safety & security, legal, social, economic, heritage) and sensorial (visual, spirit, smell, sound) characteristics, ecological and environmental processes, environmental policies and the legislative framework, evaluation of the proposed project, as well as public participation.

The environmental impact assessment deals with the following aspects: conservation status, site opportunities and constraints, ecological sensitivity, site development potential, community involvement, formulation/identification of environmental impacts, the significance of impacts, the mitigation of impacts, and an Environmental Management Programme (EMPr).

Aspects reflected in the Plan of Study in the Scoping report, as well as feedback received from Authorities, have been integrated into the EIR.

No aspects that could not be mitigated or integrated, both from an environmental and development perspective, have been found and the proposed development is, thus, recommended for EIA Authorisation.

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ANNEXURE A – EAP INFORMATION



design with
N A T U R E

ecologicAFRIKA

planning & design studio

environmental studies
landscape architecture
earth & eco architecture
golf & sports architecture
environmental engineering
enviro resource economics

PRACTICE PROFILE

ecologic AFRIKA is an environmental planning, landscape architectural, architectural, sports architectural and environmental engineering consultancy - based upon both large and small private practice training and experience - consisting of professionals with CAD, environmental, landscape/sports/architectural, ecological, horticultural, technical, and administrative support. ecologic AFRIKA is based in Centurion, South Africa.

PHILOSOPHY

ecologic AFRIKA designs with nature... using the site as primary design determinant, integrating site resources with development towards creating a balance between development and conservation ...

ecologic AFRIKA believes in guidance from the Upper Hand, towards adding value through our international and local training, education, exposure, and experience in integrated site master planning, landscape architecture, environmental studies, ecotourism and resort planning, project management, architecture and infrastructure, and golf course architecture. This value increase is further enhanced through our background in building construction, environmental engineering, turfgrass management, project management, and property development.

ecologic AFRIKA views each project as a unique entity, and optimise our involvement through continuing training and education, research and development, environmental integration, resource economics, functionalism and aesthetics, and innovation and flair.

SCOPE OF SERVICES

Input

- Integrated site master planning
- Environmental studies
- Landscape architecture
- Golf & sports architecture
- Environmental engineering
- Eco & ethnic architecture

Output

- Planning (conceptualisation, community involvement, emerging contractor screening, site evaluation, impact assessment, design concepts)
- Design (sketch plans, master plans, illustrations, costings, workshops, reports)
- Documentation (construction drawings, construction specifications, schedules of quantities, tender/quote documents, instruction manuals)
- Contract administration (construction, skills development, growing-in, retention)
- Development, maintenance, and management guidelines

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PO Box 8079, Centurion 0046, South Africa • tel +27(0)12 661 4863 • fax +27(0)12 661 5251
Christiaan J Roos • NCArch, NCEng, BSLArch (Texas A&M), ML (Pret), MDP Proj Mgmt (Unisa)
e-mail: ecologic@mweb.co.za • Proverbs 3:5&6 • web: www.ecologicafrika.co.za

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golf & sports architecture
environmental engineering
enviro resource economics

Profile - Christiaan J (Ian) Roos

Ian Roos obtained a Bachelor of Science degree in Landscape Architecture at Texas A&M University, USA and a Masters degree in Landscape Architecture at the University of Pretoria, SA. He also obtained the National Certificates in Architectural Draughting, Civil Engineering, Turfgrass Management, and Estate Agency at Technicons, and the Management Development Programme in Project Management at Unisa. Ian is a Professional member of the SA Council for the Landscape Architectural Profession (PrLArch) and the SA Council for the Architectural Profession (PrSArchT).

Personal involvement in projects, since 1977, includes:

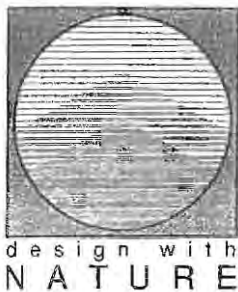
- Environmental planning and impact studies – Bokong Nature Reserve, ThabaNchu Waste Disposal, Zwartkop landfill site, Songimvelo Natural Resource Reserve, The Downs Nature Reserve, Cavaleros Industrial Park, various EIA Scoping and Basic Assessments in Gauteng, North West, Limpopo, KZN, Free State. Also environmental auditing and compliance monitoring
- Site master planning - Letubi Valley Golf Eco Estate in Mpumalanga, Bondev Park Residential Estate in Centurion, Tsehlanyane National Park in Lesotho
- Ecotourism and resort planning - Berg & Dal and Roodewal camps in Kruger Park, Fika Patso Dam tourism potential study, Liphofung Cave Cultural Heritage Centre in Lesotho, Fancourt Golf Resort, Brisbane hunting lodge in the Kalahari
- Landscape architecture – Hedgehog's Nest Country Lodge, Eldopark and Eldoglen residential estates parks, Fancourt golf resort & estate, Dainfern golf estate gatehouse and club complex, Midstream/Midfield/Midlands residential estates parks and streetscape, National University of Lesotho Library Plaza, Emdeni Library and Uncle Tom's Hall in Soweto
- Golf course and sports architecture - Dainfern Residential Golf Estate, QwaQwa Golf Course, Golfpark Bad Munder in Germany, Crown Colony Golf Estate in Texas, USA, Family Golf Centre, Alexandra and various Soweto soccer facilities, various tennis/ basketball/netball/squash courts, Emndeni and Eldoglen sports halls
- Community involvement – Community participation, emerging contractor screening, training and economic empowerment at Alexandra soccer complex, various Lesotho tourism development projects, and various Soweto sports development projects
- Project Management – Midstream Estate landscaping, Moletsane Sports Complex in Soweto, Alexandra Square 1 Soccer Complex, Family Golf Centre
- Architecture - Eldopark gatehouse, Mattanu Game Ranch lodge, Eldoglen sports facilities and clubhouse, Moletsane sports tavern, Brisbane hunting/safari lodge, Rustenburg lodge
- Infrastructure – Liphofung Cave power/sewer/water, Alexandra and Soweto soccer fields, Hillbrow and Soweto tennis/basketball/netball courts, Emndeni sports hall ...

Ian is married, with two daughters. Personal interests include the outdoor environment, ecological restoration, sports and recreation, arts and crafts, wildlife and conservation, and innovative evangelism

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ANNEXURE B – ADJACENT OWNER NOTIFICATIONS



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08 May 2014

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Property description _____

NOTICE OF PROPOSED ENVIRONMENTAL IMPACT SCOPING ASSESSMENT ON PARTS OF PORTIONS 68, 69, 112, 114, 115 & 116 OF ONDERSTEPOORT 266-JR, TSHWANE METRO

Notice is hereby given that ecologic AFRIKA planning & design studio, on behalf Abland (Pty) Ltd, is applying to undertake an EIA Scoping Assessment for change of landuse from Agriculture to mixed use township establishment on the above properties located both sides of Mopanie Road, east of Soshanguve , Tshwane Metro.

Please study, as an Interested & Affected Party, the attached Notice, Locality Plan and Proposed Development Plan. Further information is available from our offices.

Regards
ecologic AFRIKA

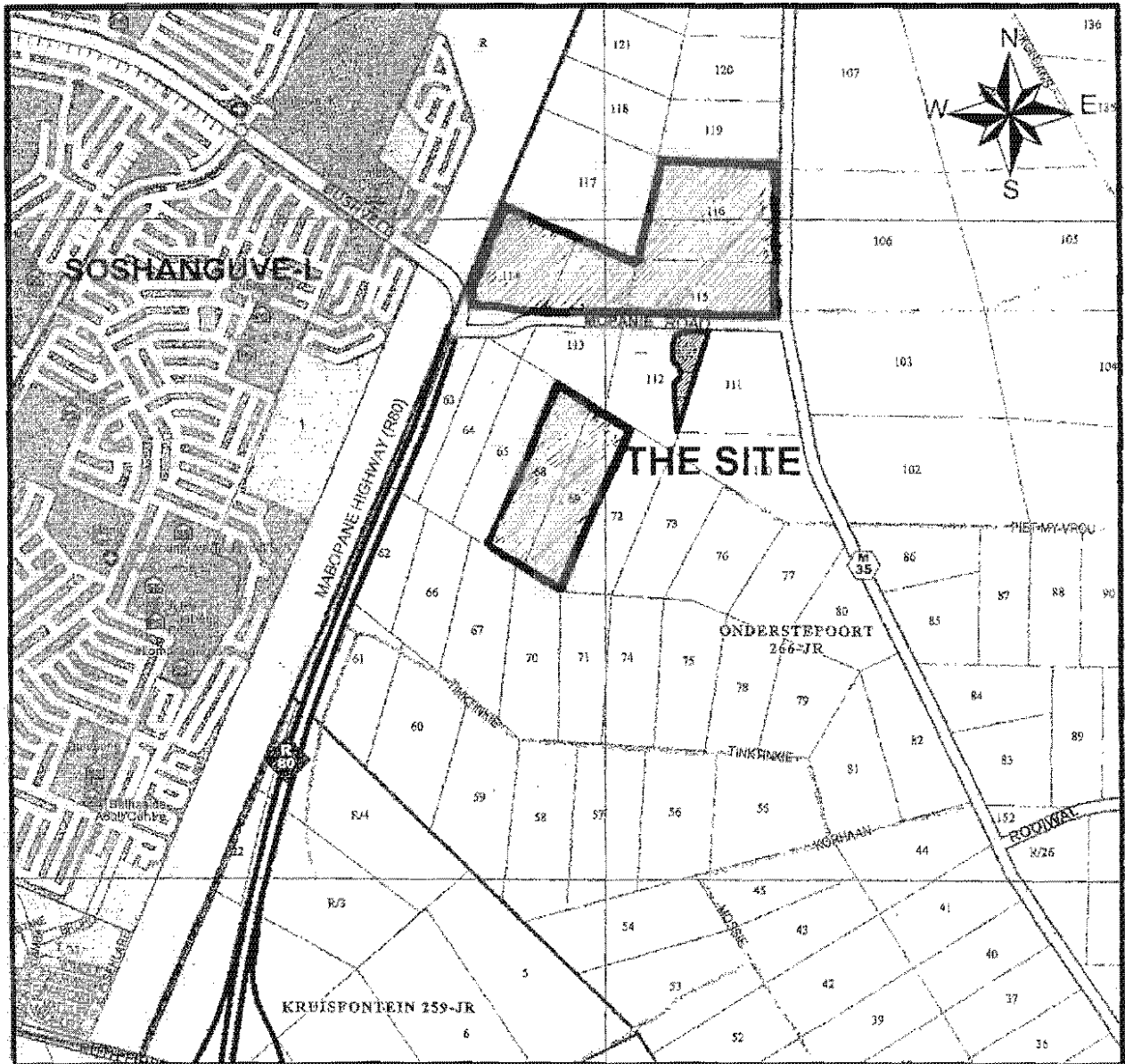
CJ Roos EAP
Cell 0836357315

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

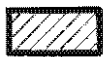
Notice is given in terms of Regulations published in Government Notice No R. 545, according to Chapter 5 of the National Environmental Management Act (Act 107 of 1998) of the application for an EIA Scoping Assessment, which will be submitted to Gauteng Province's Department of Agriculture & Rural Development, for the purpose of:

- Proposed mixed use township establishment (Onderstepoort X34 A, B, C & D)
- Property description: Parts of Portions 68, 69, 112, 114, 115 and 116 of the farm Onderstepoort 266-JR, Tshwane
- Property location: Both sides of Mopanie Road (link road between R80 Mabopane freeway and road M35), adjacent east of Soshanguve, Tshwane Metro
- Project reference: Gaut 002/13-14/E0343
- Proponent: Abland (Pty) Ltd
- Consultant: ecologic AFRIKA planning & design studio
PO Box 8079, CENTURION 0046
Tel 012-6614863
Fax 012-6615251
- Contact person: CJ Roos
Cell 0836357315
- Date of Notice: 08 May 2014

In order to ensure that you are identified as an interested and/or affected party please submit your name, association, contact information and interest in the matter to the contact person given above within 30 days of the date of this notice (by 08 June 2014 at 12h00 noon).



REFERENCE:



THE APPLICATION SITE

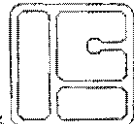
LOCALITY PLAN PROPOSED TOWNSHIP

SITUATED ON PART OF PORTION 112, 114, 116, 118, 119
THE FARM ONDERSTEEPOORT 266-JR

Plandev House
Highveld Office Park
Charles de Gaulle Crescent
Highveld
Centurion
7710, CENTURION, 0048
Tel: (012) 665-2330/1/2
Fax: (012) 665-2333
e-mail: plandev@africa.com

PLANDEV

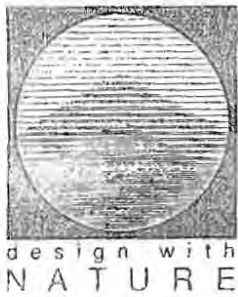
Stads- en Streekbeplanners
Town and Regional Planners



PLAN NO: D1887-LOCALITY PLAN

SCALE: 1 : 20 000

DATE: MARCH 2012



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08 May 2014

MEYERS LJE.....

PO BOX 154.....

HANRIGORNBOM 267.....

.....

Property description PTN 65 ONDERSTEPSOORT 266-JR

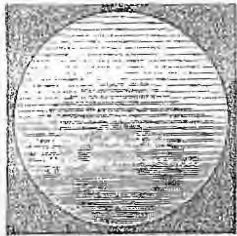
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Cell 0836357315



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J.C. M.S. MAROTOLS.....

P.O. BOX 382.....

SOSHANGUVE EAST.....

0152.....

Property description WARD COUNCILLOR - WARD 49

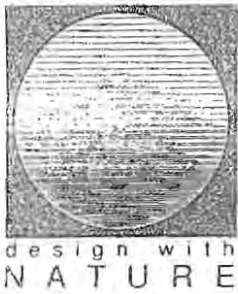
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CJ Roos EAP
Cell 0836357315



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TSHWANE METRO.....

PO BOX 1454.....

PRETORIA.....

0001.....

Property description LOCAL AUTHORITY

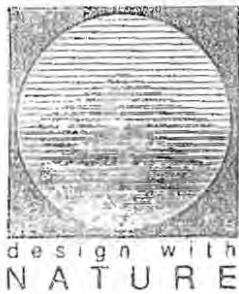
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STANDARD BANK OF SA.....

P.O. BOX 4759.....

RECEIVED.....

0001.....

Property description PTN 71 ONDERSTEEPOORT 266-JR

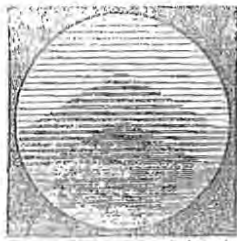
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Cell 0836357315



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08 May 2014

MILONTZO KS
PRIVATE BAG 113
PHUTHADITJHABA
9866

Property description PTN 70 ONDERSTEEPPOORT 266-JR

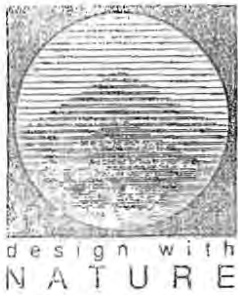
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SOSHANGUVE SS
23 MELT MARAIS ST
THABO TSHWANE
0187

Property description PTN 67 ONDERSTEPSPOORT 266-JR

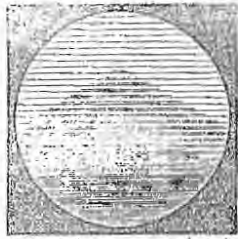
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GOSHUIKREN FAMILY TRUST.....

PTN 110.....

ONDERSTEPSOORT 266-JR.....

266.....

Property description PTN 110 ONDERSTEPSOORT 266-JR

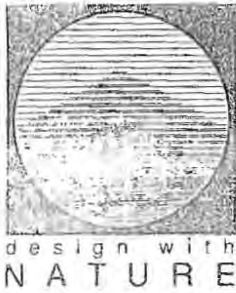
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FRASCHIA RD
PO BOX 13496
ONDERSTEEPPOORT
0110

Property description PTN 107 ONDERSTEEPPOORT 266-JR

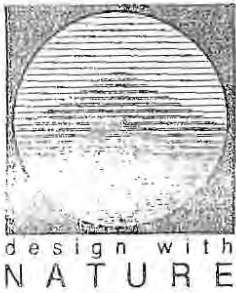
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HEYNIS A J
7017 PIET MY VROU ST
ONDERSTEEPOORT
SITE

Property description PTN T2 ONDERSTEEPOORT 266-JR

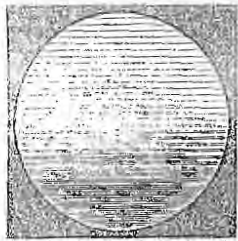
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PRaise TABERNACLE CHURCH

Po Box 6039

PRETORIA

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Property description PTN III ONDERSTEEPOORT 266-JR

NOTICE OF PROPOSED ENVIRONMENTAL IMPACT SCOPING ASSESSMENT ON PARTS OF PORTIONS 68, 69, 112, 114, 115 & 116 OF ONDERSTEEPOORT 266-JR, TSHWANE METRO

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SUIDWES-NYKERHEDE.....

PO BOX 74224.....

LYNNWOOD RIDGE.....

0090.....

Property description PTN 117 ONDERSTEEPPOORT 266-JR

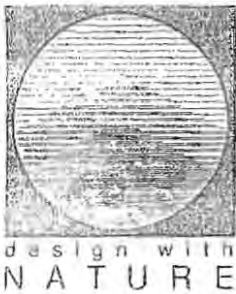
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MAKEMOLA PS.....

P.O. Box 911, 1980.....

ROSSLYN.....

0300.....

Property description PTN 118 ONDERSTEEPPOORT 266-JR

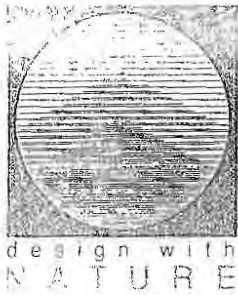
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CORRADO A

PO BOX 31216

TOTIUSDAL

0134

Property description PIN 119 ONDERSTEEPPOORT 266-JR

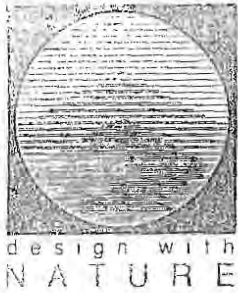
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SUNRAAL

PRIVATE PROJ X 17

LYNKWOOD RIDGE

0040

Property description MORBANE
FREEWAY, ROAD M.35, MOPANIE RD

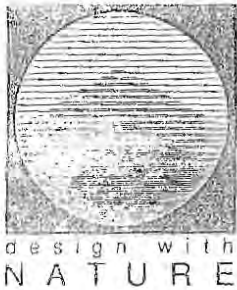
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ABLAND (PTY) LTD

PO BOX 67663

BRUNSTON

2021

Property description PTN 112 & 113 ONDERSTEEPPOORT 266-JR

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CJ Roos EAP
Cell 0836357315



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DEPT WATER AFFAIRS.....

PRIVATE BOX X 995.....

PRETORIA.....

0001.....

Property description SPRUIT SOUTH OF PROPERTIES

**NOTICE OF PROPOSED ENVIRONMENTAL IMPACT SCOPING
ASSESSMENT ON PARTS OF PORTIONS 68, 69, 112, 114, 115 & 116 OF
ONDERSTEPSPOORT 266-JR, TSHWANE METRO**

Notice is hereby given that ecologic AFRIKA planning & design studio, on behalf Abland (Pty) Ltd, is applying to undertake an EIA Scoping Assessment for change of landuse from Agriculture to mixed use township establishment on the above properties located both sides of Mopanie Road, east of Soshanguve , Tshwane Metro.

Please study, as an Interested & Affected Party, the attached Notice, Locality Plan and Proposed Development Plan. Further information is available from our offices.

Regards
ecologic AFRIKA

CJ Roos EAP
Cell 0836357315

List of REGISTERED LETTERS

Lys van GEREgistreerde Briewe

(with an insurance option/met 'n versekeringsopsie)

ABLAND SC
mixed use



Full tracking and tracing/Volledige volg en spoor

Name and address of sender:

Naam en adres van afsender: ECOLOGIC AFRICA
PO BOX 2079
CENTURION 0046

Enquiries/Navrae
Toll-free number
Tovry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-kliëntafskrif	
1	BEYERS LJE, PO BOX 154 HUNTERDORP BCCM 267, 0110					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 665 ZA CUSTOMER COPY 301028R	
2	CIR MS MARSDEN, PO BOX 382 SOSHANGWE EAST 0152					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 691 ZA CUSTOMER COPY 301028R	
3	TSHWANE METRO, PO BOX 1454 PRETORIA 0001					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 688 ZA CUSTOMER COPY 301028R	
4	STANDARD BANK OF SA, PO BOX 4159, PRETORIA 0001					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 714 ZA CUSTOMER COPY 301028R	
5	MILONDZO KS, P/BAG X 13 PHUTHADITJHABO 9866					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 705 ZA CUSTOMER COPY 301028R	
6	SEHOKA SS 23 MELT MARAIS ST THABO TSHWANE 0187					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 731 ZA CUSTOMER COPY 301028R	
7	OOSTHUIZEN FAMILIE TRUST, PLOT 110 ONDERSTEPORST 266 JR, 0002					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 728 ZA CUSTOMER COPY 301028R	
8	FRASCHIA RD, PO BOX 12496 ONDERSTEPORST 0110					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 759 ZA CUSTOMER COPY 301028R	
9	HEYN'S A J, 1017 PET. MY. VROU ST ONDERSTEPORST 0110					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 745 ZA CUSTOMER COPY 301028R	
10	FAISE TABERNACLE CHURCH PO BOX 6039, PRETORIA 0001					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 776 ZA CUSTOMER COPY 301028R	
Number of letters posted Getal briewe gapes		Total Totaal		R	R	R	R
TEN (10)		R 26					

Signature of client
Handtekening van kliënt

Signature of accepting officer
Handtekening van aanneembeampte



The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R2 000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

List of REGISTERED LETTERS

Lys van GEREGISTREERDE BRIEWE

(with an insurance option/met 'n versekeringsopsie)

ABELAND SC
mixed use



Post Office

Full tracking and tracing/Volledige volg en spoor

Name and address of sender:

Naam en adres van afsender: ECOLOGIC AFRIKA
P.O. BOX 8079
CENTURION 0046

Enquiries/Navrae

Toll-free number

Tovry nommer

0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-klëntafskrif
1	SLUIDES NYKERHEDE, P.O. BOX 74224, LYNNWOOD RIDGE 0040					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 762 ZA CUSTOMER COPY 301028R
2	MAGENOLD PS, P.O. BOX 911, 1980 ROSSLYN 0200					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 793 ZA CUSTOMER COPY 301028R
3	CORRADO A, P.O. BOX 31216 TETLUSDAL 0134					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 780 ZA CUSTOMER COPY 301028R
4	SANRAL, P/BAG X11 LYNNWOOD RIDGE 0040					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 816 ZA CUSTOMER COPY 301028R
5	ABELAND, P.O. BOX 67663 BRYANSTON 2021					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 802 ZA CUSTOMER COPY 301028R
6	DEPT WATER AFFAIRS, P/BAG X995, PRETORIA 0001					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 618 988 833 ZA CUSTOMER COPY 301028R
7						
8						
9						
10						

Number of letters posted

Getal briewe gepos

SIX (06)

Total
Totaal

R R R R

Signature of client

Handtekening van klient

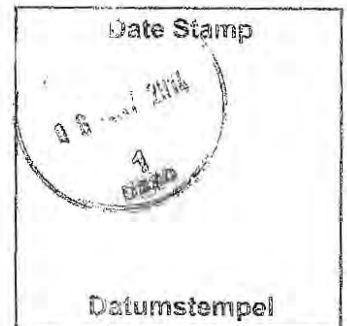
Signature of accepting officer

Handtekening van aanneembeampte

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Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

Date Stamp



Datumstempel

ANNEXURE C – SITE ADVERTISEMENT



Proof of site advertisement south of Mopanie Road



Proof of site advertisement north of Mopanie Road

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Notice is given in terms of Regulations published in Government Notice No R. 345, according to Chapter 5 of the National Environmental Management Act (Act 107 of 1998) of the application for an EIA Scoping Assessment, which will be submitted to Gauteng Province's Department of Agriculture & Rural Development, for the purpose of:

- Proposed mixed use township establishment (Onderstepoort X34 A, B, C & D)
- Property description: Parts of Portions 68, 69, 112, 114, 115 and 116 of the farm Onderstepoort 266-JR, Tshwane
- Property location: Both sides of Mopanic Road (Dijk road between R80 Mabopane freeway and road N55), adjacent east of Sasibanguve, Tshwane Metro
- Project reference: Grant 002/15-14/EP343
- Proponent: Abtand (Pty) Ltd
- Consultant: ecologic AFRICA planning & design studio
PO Box 8078, CENTURION 0046
Tel: 012-6614263
Fax: 012-6615251
- Contact person: CJ Roos
Call 083631 315
- Date of Notice: 08 May 2014

In order to ensure that you are identified as an interested and/or affected party please inform your name, association, contact information and interest in the matter to the contact person given above within 10 days of the date of this notice (by 08 June 2014) at 1200 hours

Detail of site advertisement

ANNEXURE D – NEWSPAPER ADVERTISEMENT

sifieds

430 For Sale Homes

Lew Geffen Sotheby's INTERNATIONAL REALTY

LAUDIUM

Asking Price: R1 700 000
Neg. from 1 300 000
Moving close to family, 4 Bedrooms, pool, 2 garages.
A must see!
Contact: Samir Jhina
079 812 9007
012 460-9261

Lew Geffen Sotheby's INTERNATIONAL REALTY

LAUDIUM

Asking Price: R1 499 000
Neg. from 1 200 000
4 Bed, 2 Bath, 2 garages. Immaculate Home with a large backyard.
Contact: Samir Jhina
079 812 9007
012 460-9261

Lew Geffen Sotheby's INTERNATIONAL REALTY

MENLO PARK

Asking Price: R2 135 000
Solid family home on a large erf. Close to Menlo schools, 3 bed, 2 bath, 3 garages!
Contact: Karin Petzer
082 922 4731
012 460-9261

Lew Geffen Sotheby's INTERNATIONAL REALTY

MENLO PARK DUET FOR SALE

Asking Price: R2 155 000
Charming cottage, close to major access routes, 3 Bed, 2 bath, pool, DG, + 1 Bed flatlet.
Contact: Karin Petzer
082 922 4731
012 460-9261

Lew Geffen Sotheby's INTERNATIONAL REALTY

560 Accommodation

LEGAL SERVICES

NO WIN NO PAY

EVICCTIONS

Done in 6 weeks, 1st notification in 2 days.

CONVEYANCERS

Experienced, efficient, Done in 3 weeks.

COLLECTIONS

Any amounts over R100,000 no deposit

Excellent value.

CALL NOW 0861 307 307

563 Board & Lodging

EATONHALL: Centrally situated. Rooms with full private facilities including telephone, 2 meals per day, rooms fully serviced.

Excellent value.

012-322-7623/4/5/6/7.

564 Furnished

ARCADIA (Guest apartments Self catering) Luxury 1, 2 or 3 bedroom apartments, good security, serviced. Monthly & Daily rates available. Zelda 082-964-6491

566 To Let Cluster Homes

SILVER LAKES 3 bed, 2 bath, in security estate, close to N4. R13 310pm. Contact 084 508 5454

567 To Let Flats

BRAAMFONTEIN BEREA / CITY (Johannesburg)

Bachelors and 1 Bedroom flats

Available for Immediate Occupation.

Call Clinton (011) 024-3170 (011) 024-9786

EDENVALE

569 To Let Homes

Immediately Available

SUIDEROORD 4 bedroom 3 bathroom with private garden.

R9000 pm inc I/w

Gary 082 456 2687

Theona 082 653 6045.

Lew Geffen Sotheby's INTERNATIONAL REALTY

WOODHILL

Asking: R28 000 pm
Neg. from: R26 000 pm
Neat as pin 3 bedroom house, plus study, solar heated pool, staff quarters, magical garden. Very Private.
Occupation: 1 June or July.
Contact: Ana 083 501 4440
012 460-9261

571 To Let Townhouses

Immediately Available

EASTLEIGH/EDENVALE

Spacious 2 bedroom unit available with private garden

R5500pm excl LW

0848401227.

EQUESTRIA spacious 2 bedroom, 2 bathroom, avail 1st June 2014. R8000pm. owner 082 700 8741

WELTEVRDEN PARK

120m² Free Standing Townhouse
3 Beds, 2 Baths
Designer kitch, Marble tops
Wooden Floors in the Lounge, Dining, Main Bed.
Think PINK in the ceiling.
Maxi door by Patio.
Double Lock-Up Garage.

R8 950pm
Garden, Service incl. Avail. End May
NO AGENTS!!!!
Close to Clearwater Mall
Pet Friendly
Dinesh
083-279-5943

618 Engineering

Vacancies in Cape Town

LASER MACHINE OPERATORS wanted for permanent positions. Bystronic Laser experience would be an advantage.

Top rates offered depending on experience.
Email CV to: onelaser71@gmail.com or Fax to +27 21 7030249

620 General

99% Will Not Respond!
R18,000 pm. 1% will phone! Sophie (012) 3455628/0827418522

LADIES NEEDED FOR MESSAGES

High earnings. No sex! Training provided. Pretoria East.
076 3885 620

PICTURE Framer/Fitter
req (011) 326-1749

630 Work Wanted (Unemployed)

DOMESTIC WORK: 5 Yrs exp. Grital Chili 081-828-0518

DOMESTIC: Monday & Wednesday. 4 Yrs exp. Emily 076-4818-549.

DOMESTIC: Sleep in: Hard worker. 8 Yrs exp. Angie 072-092-6502

MALAWIAN domestic worker looking for work. Part or full-time. Stay in/out. Cooks, good with kids. Very Honest. 061-033-5018

632 Part-time

BE on TV/ or A MODEL?
Casting THIS Fri & Sat R290. SMS Yr Name & Cell# to: 073 404-7360. **Platinum-Blue.com**

638 Sales

OPPORTUNITY

Computer Mania is looking for in store **SALES CONSULTANTS** with good IT knowledge and retail experience. Please email CV to **gautengcv@computermania.co.za.**

Outbound TELESALERS

Benodig Telebemarkers. 2jr Versekeringe onder AFR & Eng vlot lees, praat, & skryf. Rekenaar geleterd
E-pos CV aan admin@dantemartin.co.za of faks na 086 764 1674

Legals

700 Business Licences

NOTICE OF RESTORATION OF COMPANY / CLOSE CORPORATION

Please take note that FAROUK SHEIK intends making application to the Companies and Intellectual Property Commission for the restoration of DEALSON-LINE TWENTY THREE, REG. NO: 2000/052110/23, previously deregistered.

Any objection to the application must be lodged with the Companies and Intellectual Property Commission within 21 clear days from date of this advertisement. (9842811)

713 Sale in Execution

IN THE MAGISTRATE'S COURT FOR THE DISTRICT OF PRETORIA, HELD AT PRETORIA
Case No. 22648/2013
In the matter between **ONYX BODY CORPORATE** Execution Debtor
and **DINEO MOLOKOANE (ID: 720822 0797 980)** Execution Debtor

SALE IN EXECUTION

IN PURSUANCE of a Judgment in the Magistrates Court for the district of Pretoria, held at Pretoria, dated 14 May 2013 and a subsequent Writ of Execution, the goods attached hereto will be sold in execution by public auction to the highest bidder on 23 MAY 2014 at 10h00 through the office of The 8th Century East at TELFORD PLACE, UNIT 1 & 2, THEUNS STREET, HENNOPSPARK EXTENSION, CENTURION, GAUTENG. NAMELY:
1 x LG Fridge, 1 x 2 Coffee Tables, 1 x LG TV, 1 x 2 Bar Chairs, 1 x 2 Plea Lounge Suite, 1 x TV Cabinet.
TERMS: Strictly Cash. Voetstoots.
Dated at JOHANNESBURG on this 29th day of APRIL 2014
ROOSEBOOM ATTORNEYS FOR EXECUTION CREDITOR
151 Wilson Street Northcliff Ext 22 Johannesburg, Gauteng
PO BOX 731089 Fairland, 2030
Docex 9, Flora Clinic
Tel: (011) 678-2280
Fax: (011) 431-3144
Email: chris@rooslaw.co.za
REF: MAT/071/DEB947/0 C/O DOCEX PRETORIA
271 Madiba (Vermeulen) Street
Ground Floor, General Post Office Church Square, Pretoria (9839878)

713 Sale in Execution

IN THE MAGISTRATE'S COURT FOR THE DISTRICT OF PRETORIA, HELD AT PRETORIA
Case No. 22648/2013
In the matter between **ONYX BODY CORPORATE** Execution Debtor
and **DINEO MOLOKOANE (ID: 720822 0797 980)** Execution Debtor

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PO BOX 731089 Fairland, 2030
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PO BOX 731089 Fairland, 2030
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Tel: (011) 678-2280
Fax: (011) 431-3144
Email: chris@rooslaw.co.za
REF: MAT/071/DEB947/0 C/O DOCEX PRETORIA
271 Madiba (Vermeulen) Street
Ground Floor, General Post Office Church Square, Pretoria (9839878)

SERVICE SERVICE SERVICE

Advertise your great service in the classified.

One of our consultants are ready to help you. Free quotations Telephone **0860238377** (local call) or email

718 Town Planning

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Notice is given in terms of Regulations published in Government Notice R.545, according to Chapter 5 of the National Environmental Management Act (Act 107 of 1998) of the application for an EIA: Basic Assessment, which will be submitted to Gauteng Province's Department of Agriculture & Rural Development, for the purpose of:

- Proposed mixed use township establishment (Onderstepoort X34 A, B, C & D)
- Property description: Parts of Portions 68, 69, 112, 114, 115 & 116 of the farm Onderstepoort 266-JR, Tshwane Metro.
- Property location: Mopanie Road (link road between R80 Mabopane freeway and road M35), adjacent east of Soshanguve, Tshwane Metro.
- Project reference: Gaut 002/13-14/E0343
- Proponent: Ablend (PTY) Ltd.
- Consultant: Ecologic AFRICA planning & design studio, PO BOX 8079, Centurion 0046, Tel: (012) 6614863 Fax: (012) 6616251
- Contact person: CJ Roos Cell: 083 635 7315
- Date of Notice: 08 May 2014

In order to ensure that you are identified as an interested and/or affected party please submit your name, association, contact information and interest in the matter to the contact person given above within 30 days of the date of this notice (by 08 June 2014 at 12h00 noon). (9835212)

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Notice is given in terms of Regulations published in Government Notice R.544, according to Chapter 5 of the National Environmental Management Act (Act 107 of 1998) of the application for an EIA: Basic Assessment, which will be submitted to Gauteng Province's Department of Agriculture & Rural Development, for the purpose of:

- Proposed Business 2 Development (Shopping Mall)
- Property description: Parts of Portions 68, 69, 112, 113 & 115 of the farm Onderstepoort 266-JR, Tshwane Metro.
- Property location: Mopanie Road (link road between R80 Mabopane freeway and road M35), adjacent east of Soshanguve, Tshwane Metro.
- Project reference: Gaut 002/13-14/E0344
- Proponent: Ablend (PTY) Ltd.
- Consultant: Ecologic AFRICA planning & design studio, PO BOX 8079, Centurion 0046, Tel: (012) 6614863 Fax: (012) 6616251
- Contact person: CJ Roos Cell: 083 635 7315
- Date of Notice: 08 May 2014

In order to ensure that you are identified as an interested and/or affected party please submit your name, association, contact information and interest in

ANNEXURE E – IAP REGISTER AND FEEDBACK

No IAPs registered. No IAP register

ANNEXURE F – GEOTECHNICAL REPORT



VKE Centre, 230 Albertus Street, La Montagne, Pretoria 0184
 P O Box 72927, Lynnwood Ridge 0040, South Africa
 Tel (012) 481-3900
 Fax (012) 903-7040
 Email: vkepta@iafrica.com

VKE Report Indexing System

REPORT I.D.
PE056/97/04/1732

**ENGINEERING GEOLOGICAL
 INVESTIGATION FOR
 SUN CROSSING
 TOWNSHIP, SOSHANGUVE**

CLIENT
 Code: MIN Name: MINOR PROJECTS

TITLE
 ENGINEERING GEOLOGICAL INVESTIGATION FOR SUN CROSSING TOWNSHIP,
 SOSHANGUVE.

REPORT
 TO
 INFRACOM

TYPE OF WORK
 1st Category: 06 Description: TOWNSHIP(SOILS)
 2nd Category: Description:
 Other:

GEOGRAPHICAL REFERENCES

- 1: 2528CA08
- 2:
- 3:
- 4:

KEYWORDS

- 1:
- 2:
- 3:
- 4:

REPORT NO : PE056/97/04/1732

MARCH 1997

03/01/97 April 1, 1997

VKE Consulting Engineers (Pty) Ltd Reg No : 8807013/07

Civil • Structural • Traffic • Transportation • Geotechnical • Electrical • Mechanical • Urban and Regional Planning

Directors: J.H. Zook (Executive Chairman), D.J. Beater,
 D.W. Burger, G.L. Gully, T.W. Gwynne, C.P. Grootenboer,
 P.S. de Lange, A.C. Diedericks, D.W. du Plessis, D. Gerner,
 D. Hoggins, P.R. Joubert, D.J. Kalkbrenner, G.B. Koper,
 R.H. Kromhout, J.P. Maritz, T. Maritz, J.R. Moolenaar,
 P.A. Pienaar, A.J. Rouwenbach, H. van der Merwe, P.G. Smit,
 A. Tait, D.J. van der Merwe, D. van der Merwe

Associates: J.D. Bekker, J.A. Gubbler, A.J. Pappe, A.W. R. Prinsloo,
 G.J. Rood, D.G. van der Merwe, A.J. van der Merwe,
 M. van der Merwe, G.C. van der Merwe
 Consultants: J.C. van der Merwe, J.C. van der Merwe, L.A. de Gooijer, H. Gooijer,
 J.D. Pienaar, A.E. Steyn, W.J. Steyn, H.C. Steyn,
 S.L. Steyn, J.H. Steyn
 National Manager: V.F. Knox

Biko • Bloemfontein • Botswana • Cape Town • Durban • Johannesburg • Kimberley • Maseru
 Middelburg • Nelspruit • Phokeng • Pieterburg • Port Elizabeth • Pretoria • Richards Bay • Vanderburg • Welkom

03/01/97 April 1, 1997

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APPENDICES

- A : TEST PIT PROFILES
- B : SOIL AND ROCK DESCRIPTIVE TERMS
- C : DCP PLOTS
- D : LABORATORY TEST RESULTS

FIGURE 1 : TEST PIT POSITIONS

1. INTRODUCTION

This report presents the findings of an engineering geological investigation for township establishment purposes for a site in Soshanguve, north of Pretoria, Gauteng Province. The aim of the report is to identify potential geotechnical problems that might influence township development. It is beyond the scope of an investigation of this nature to give detailed foundation recommendations as the number of test pits and amount of testing has been limited (see Section 7) . The report complies with requirements for a Phase 2 investigation as set out in "Guidelines for engineering geological investigations for township establishment purposes" (Reference 1).

The investigation was carried out in March 1997.

2. SITE DESCRIPTION

The site is located at the crossing of Route PWV9 and Road K2-157, immediately east of Soshanguve and is situated on Portions 88, 89, 112, 113, 114, 115 and 116 of the farm Onderstepoort 268 JR. It covers an area of approximately 98 hectares, slopes south eastwards from a high point of 1318m in the western part to 1300m in the south east, with a cross fall of about 18m. Small, boulder-strewn "koppies", covered by indigenous trees are found scattered to the north of Road K2-157 and elsewhere the site is covered by grass and isolated trees. At the time of investigation, the site was unoccupied and only two old dwellings in ruins are present. There are no well-defined streams or drainage channels and runoff takes place mainly as sheetwash.

3. INVESTIGATION

The investigation was carried out using a Case 580H TLB to dig test pits to refusal or into a good founding medium. Thirty nine test pits were excavated and these were profiled by an engineering geologist using current practices and soil samples of representative layers were obtained for laboratory testing. Dynamic Cone Penetrometer (DCP) tests were performed in typical soil profiles next to test pits to assess soil consistency. Laboratory testing was carried out to determine soil constants (Atterberg Limits and grading).

Test pit profiles, profiling parameters, DCP plots (showing equivalent SPT values) and laboratory test results are included in Appendices A, B, C and D respectively. Test pit positions are shown on Figure 1.

4. SITE GEOLOGY AND SOILS

4.1 Geology

The entire site is underlain by granite of the Bushveld Igneous Complex which is a coarse grained, pinkish grey rock in outcrop but is invariably weathered to a very soft rock, highly weathered to decomposed granite beneath the soil cover, as seen in test pits. Outcrops occur as small "koppies" a few metres high and are often covered by large, rounded boulders.

4.2 Soils

Soils consist of hillwash sand and scattered, weakly cemented ferricrete.

A typical profile is as follows :

DEPTH	DESCRIPTION	ORIGIN
0 - 400mm	Loose, silty SAND	Hillwash
300 - 900mm	Very weakly to weakly cemented FERRICRETE	Pedogenic
900mm+	Weathered GRANITE	Bedrock

Note : Ferricrete is not everywhere present

The hillwash is a greyish or reddish brown, fine to medium grained, silty sand and is generally 300 to 500mm thick and covers the entire site apart from the few outcrop areas. In one area, centred on test pit SC2 it attained a maximum observed thickness of 1100mm. It classifies as A2-4 and has a PI of less than 5.

The ferricrete is a very weakly to weakly cemented, nodular, sandy material which is equivalent to a ferruginized, sandy gravel (ferricrete nodules) and is widespread but not continuous. It classifies as A1-b and has a PI of 6 to 8 (See laboratory test results in Appendix C for details).

5. SITE DRAINAGE

The investigation was carried out during a wet spell but no standing water was seen on the site. The soils are mostly granular and free draining. Seepage only occurred in two test pits, SC12 and 15, situated in the north eastern corner. The seepage was slow and occurred at 1.2m on the contact of the sand and an impervious ferricrete layer.

Pit latrine or similar sanitation systems are not feasible because of the thin soil cover and the presence of impermeable ferricrete over much of the site.

6. DEVELOPMENT ZONATION

6.1 Development zones and foundation conditions

The entire site is favourable for development and no significant geotechnical problems are present. Using the zonation scheme in Reference 1, the entire site classifies as Zone 1 in which conventional foundations may be used for normal single or double storey buildings. Foundations at nominal depth will mostly lie on hard ferricrete or weathered granite, which are suitable for foundation pressures up to 100kPa.

No areas requiring modified foundations (Zone 2) or areas not recommended for development (Zone 3) appear to be present in any size of significance apart from the small area centred on

test pit SC2. In this case the soil is very loose and about 1100mm thick in which settlement may take place even for single storey buildings. As the areas containing such soil appear to be uncommon and the soil generally thin, it is recommended that, where they are encountered, the base of the foundation trenches should be compacted with a vibratory roller. If the loose sand exceeds 1.5m thickness it should be removed and replaced in layers compacted to 98% of Modified AASHTO density at 1 to 2% above optimum moisture content. Conventional strip footings may then be placed at nominal depth. The extent of areas or pockets of deeper, loose sand cannot be delimited in an investigation of this nature. However, as only 1 test pit in 33 revealed such conditions it is considered unlikely that deeper sand areas are common.

6.2 Excavation

Excavation to 1m is possible by TLB over most of the site except for the boulder and outcrop "kopplies". Excavation depth was assessed by TLB refusal in the test pits and varied from 0.4 to 1.8m. The more prominent of the outcrop areas were mapped and are shown in Figure 1. These scattered areas of rock and boulders will require blasting and/or heavy equipment for removal. In places the surface soil contains occasional boulders up to 500mm size but these can be removed by a TLB.

The following table summarizes founding and excavation depths.

TABLE 1 : RECOMMENDED FOUNDING DEPTHS AND EXCAVATION DEPTHS FOR TLB

TEST PIT	RECOMMENDED FOUNDING DEPTH (m)	FOUNDING MATERIAL	EXCAVATION DEPTH BY TLB (m)
SC1	Nominal	Rock (granite)	1.0
SC2	1.1	Rock (granite)	1.8
SC3	Nominal	Rock (granite)	0.6
SC4	Nominal	Rock (granite)	0.6
SC5	Nominal	Rock (granite)	0.6
SC6	Nominal	Rock (granite)	0.8
SC7	Nominal	Rock (granite)	0.5
SC8	Nominal	Ferricrete	1.0
SC9	Nominal	Rock (granite)	0.4
SC10	Nominal	Ferricrete	1.2
SC11	Nominal	Rock (granite)	1.7
SC12	0.9	Ferricrete	1.5
SC13	Nominal	Rock (granite)	0.7
SC14	Nominal	Gravel	1.6
SC15	0.9	Ferricrete	1.4

TEST PIT	RECOMMENDED FOUNDING DEPTH (m)	FOUNDING MATERIAL	EXCAVATION DEPTH BY TLB (m)
SC16	Nominal	Gravel	1.0
SC17	Nominal	Ferricrete	1.0
SC18	Nominal	Ferricrete	0.6
SC19	Nominal	Rock (granite)	1.0
SC20	Nominal	Ferricrete	1.0
SC21	Nominal	Ferricrete	1.7
SC22	Nominal	Rock (granite)	0.8
SC23	Nominal	Rock (granite)	1.2
SC24	Nominal	Rock (granite)	0.9
SC25	Nominal	Ferricrete	1.8
SC26	Nominal	Ferricrete	1.4
SC27	Nominal	Ferricrete	1.9
SC28	Nominal	Rock (granite)	0.5
SC29	Nominal	Rock (granite)	0.4
SC30	Nominal	Rock (granite)	0.8
SC31	Nominal	Ferricrete	1.2
SC32	Nominal	Rock (granite)	0.8
SC33	Nominal	Rock (granite)	0.5
SC34	Nominal	Rock (granite)	1.0
SC35	Nominal	Rock (granite)	0.8
SC36	Nominal	Ferricrete	1.0
SC37	Nominal	Ferricrete	1.5
SC38	Nominal	Ferricrete	0.8
SC39	Nominal	Ferricrete	1.2

NOTE : Nominal indicates footings may be placed at nominal founding depths, usually 0.3 to 0.6m.

7. GENERAL REMARKS

It must be borne in mind that an investigation of this nature is aimed at delineating broad zones in which problems may occur. Consequently, certain generalisations have been made to avoid the necessity of investigating every stand individually. It is possible that conditions at variance with those identified may occur locally. In such cases investigation for individual structures may be necessary.

8. CONCLUSIONS

- 8.1 The entire site classifies as Zone 1 and may be developed using conventional foundations at nominal depths. Small areas of deeper, looser sand may locally occur in which removal and replacement of the same soil together with compaction is recommended (see Section 6).
- 8.2 Excavation to 1m is possible by TLB over most of the site except for the boulder and outcrop "koppies". These scattered areas of rock and boulders will require blasting and/or heavy equipment for removal. See Figure 1 for positions of the most prominent outcrops and Table 1 for TLB refusal depths at individual test pit positions.
- 8.3 No surface seepage or standing water was observed but seepage at about 1.2m occurred in a small area in the north east of the site centred on test pits SC12 and 15.



VKE ENGINEERS

9. REFERENCES

1. "Guidelines for engineering geological investigations for township development"
Compiled by the Directorate : Engineering Services of the Community Development Branch of
the Transvaal Provincial Administration and the Association of Engineering Geologists.

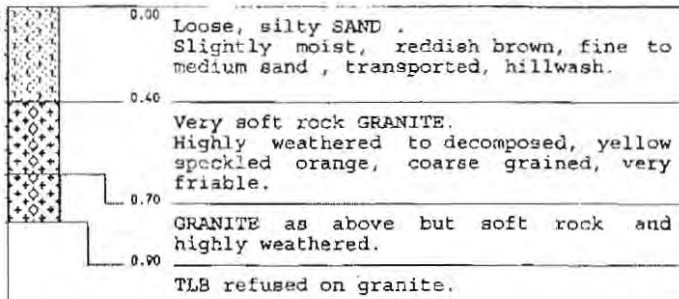
**APPENDIX A
TEST PIT PROFILES**



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC1
Sheet 1 of 1
JOB NUMBER: PR0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
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DATE : 01/04/97 15:42
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ELEVATION :
X-COORD :
Y-COORD :

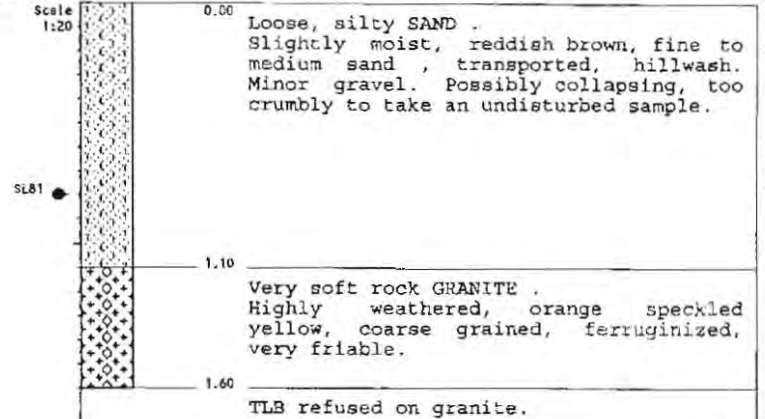
HOLE No: SC1



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC2
Sheet 1 of 1
JOB NUMBER: PR0560

Scale
1:20



NOTES:

- 1) No ground water seepage.
- 2) Disturbed sample SL81 at 0.8m.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
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DATE : 01/04/97 15:42
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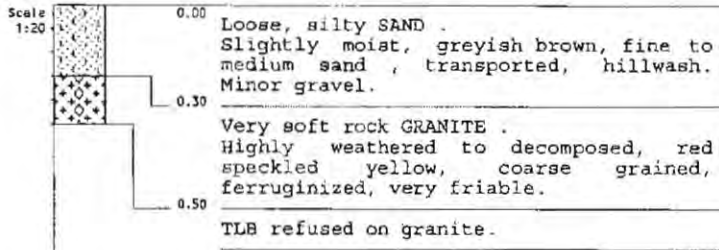
ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC2



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC3
Sheet 1 of 1
JOB NUMBER: PE0560



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

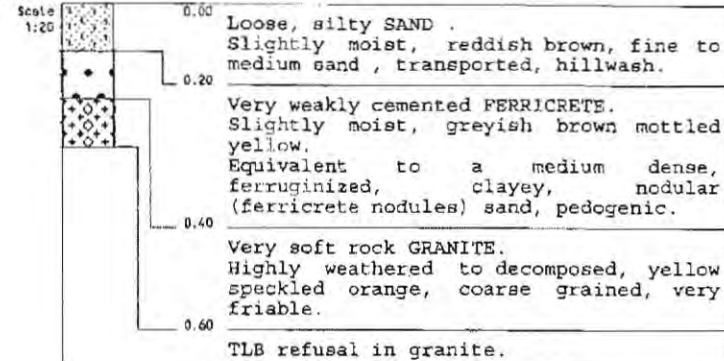
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Y-COORD :
HOLE No: SC3

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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC4
Sheet 1 of 1
JOB NUMBER: PE0560



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC4

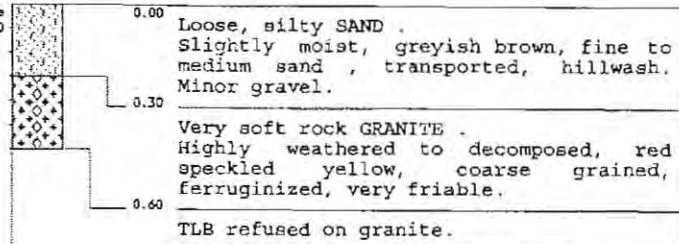
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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC5
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC5

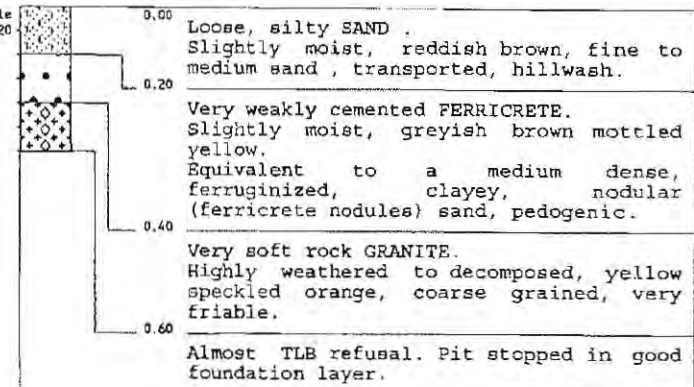
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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC6
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC6

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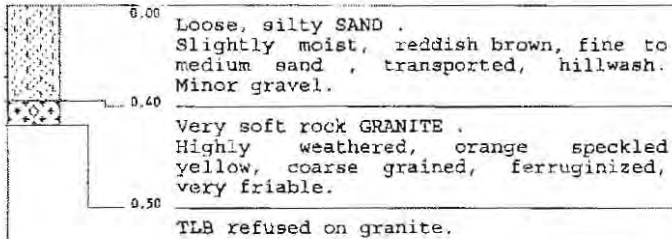


INFRACOM
SUN CROSSING TOWNSHIP

TEST PIT PROFILE

HOLE No: SC7
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC7

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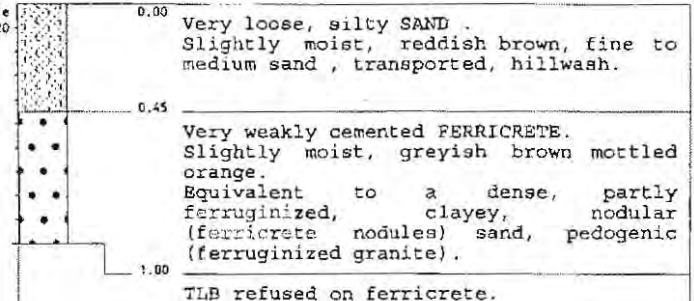


INFRACOM
SUN CROSSING TOWNSHIP

TEST PIT PROFILE

HOLE No: SC8
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC8

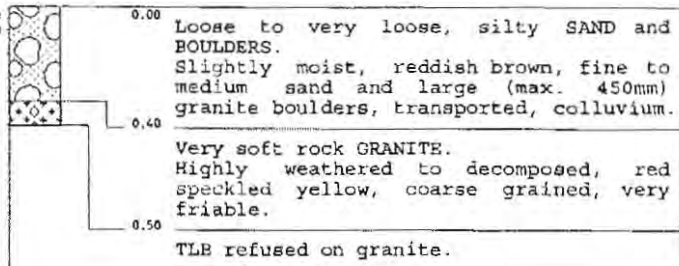
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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC9
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



0.00
Loose to very loose, silty SAND and BOULDERS.
Slightly moist, reddish brown, fine to medium sand and large (max. 450mm) granite boulders, transported, colluvium.

0.40
Very soft rock GRANITE.
Highly weathered to decomposed, red speckled yellow, coarse grained, very friable.

0.50
TLB refused on granite.

NOTES:
1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC9

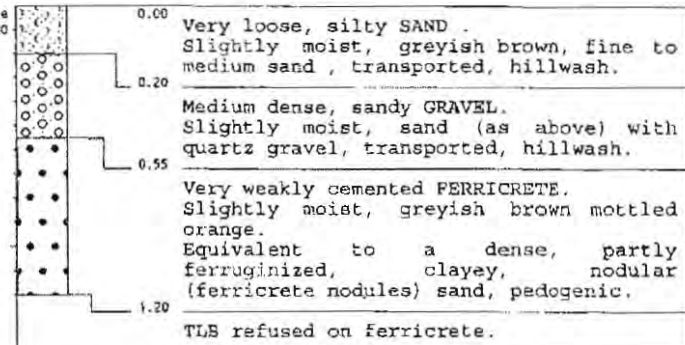
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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC10
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



0.00
Very loose, silty SAND .
Slightly moist, greyish brown, fine to medium sand , transported, hillwash.

0.20
Medium dense, sandy GRAVEL.
Slightly moist, sand (as above) with quartz gravel, transported, hillwash.

0.55
Very weakly cemented FERRICRETE.
Slightly moist, greyish brown mottled orange.

Equivalent to a dense, partly ferruginized, clayey, nodular (ferricrete nodules) sand, pedogenic.

1.20
TLB refused on ferricrete.

NOTES:
1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC10

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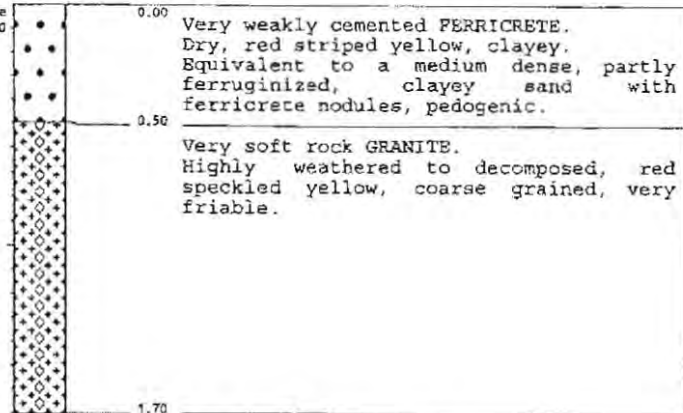


INFRACOM
SUN CROSSING TOWNSHIP

TEST PIT PROFILE

HOLE No: SC11
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



TLB refused on granite.

NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC11

TYPE SET BY :
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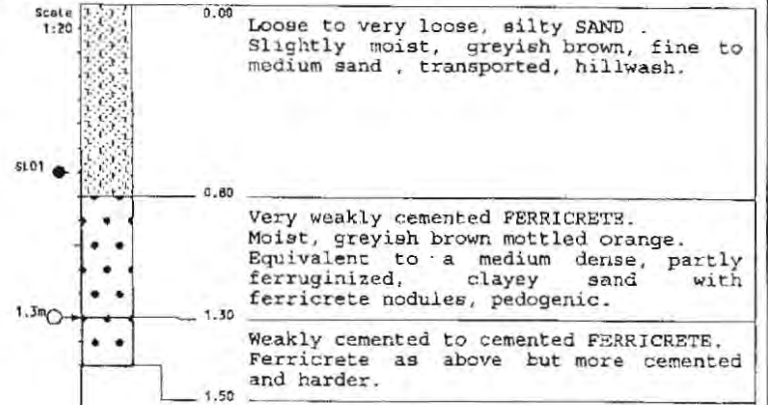


INFRACOM
SUN CROSSING TOWNSHIP

TEST PIT PROFILE

HOLE No: SC12
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) Slow ground water seepage at 1.3m.
- 2) DCP test at surface.
- 3) Disturbed sample SL01 at 0.7m

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC12

TYPE SET BY :
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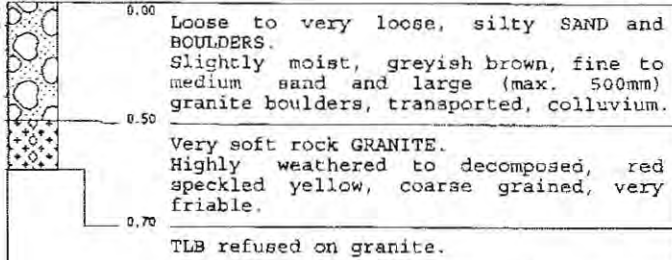
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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC13
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: SC13

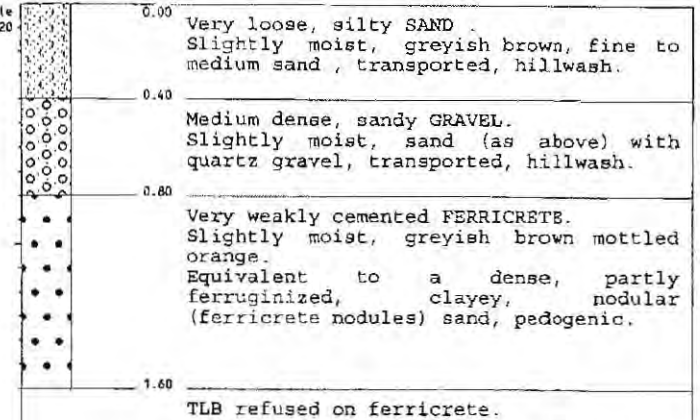
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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC14
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

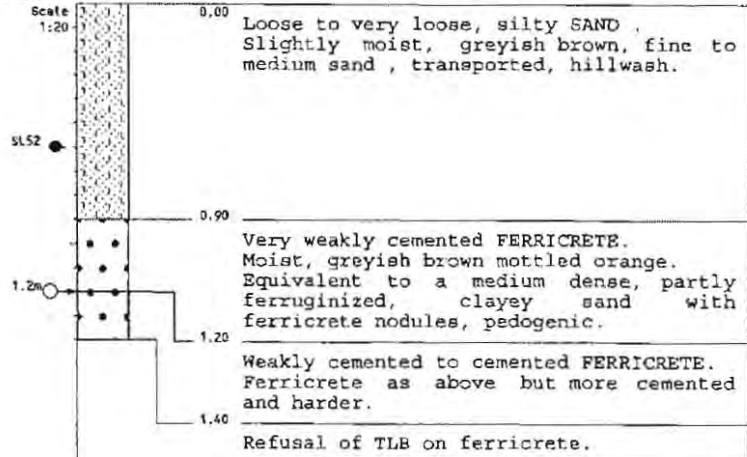
HOLE No: SC14

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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC15
Sheet 1 of 1
JOB NUMBER: PE0560



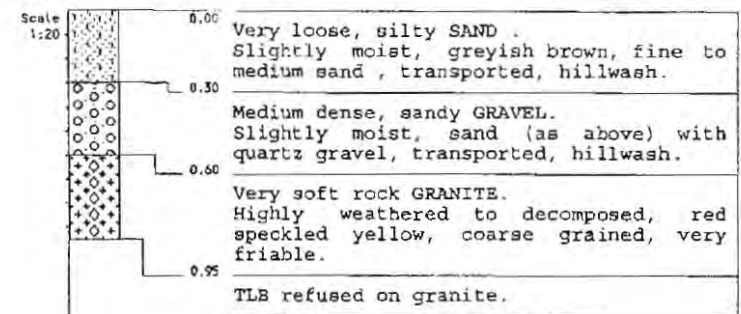
- NOTES:
- 1) Slow ground water seepage at 1.2m.
 - 2) DCP test at surface.
 - 3) Disturbed sample SLS2 at 0.6m

CONTRACTOR : SOILLAB INCLINATION : ELEVATION :
MACHINE : CASE 580H DIAM : X-COORD :
DRILLED BY : DATE : Y-COORD :
PROFILLED BY : Bduc DATE : 20/03/97
TYPE SET BY : DATE : 01/04/97 15:39 HOLE No: SC15
SETUP FILE : PROF-ENG.SET TEXT : c:\DOTPLOT\profiles\SUNPROF.TXT



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC16
Sheet 1 of 1
JOB NUMBER: PE0560



- NOTES:
- 1) No ground water seepage.

CONTRACTOR : SOILLAB INCLINATION : ELEVATION :
MACHINE : CASE 580H DIAM : X-COORD :
DRILLED BY : DATE : Y-COORD :
PROFILLED BY : Bduc DATE : 20/03/97
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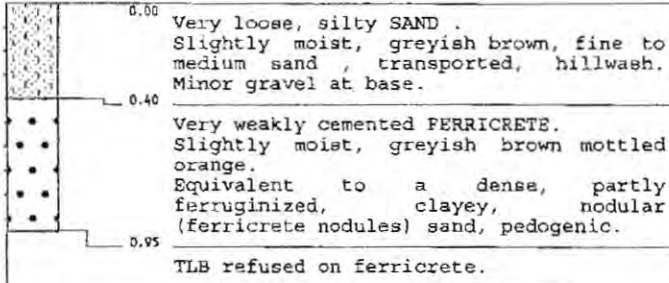


INFRACOM
SUN CROSSING TOWNSHIP

TEST PIT PROFILE

SOLE No: SC17
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

SOLE No: SC17

DATE : 01/04/97 15:40
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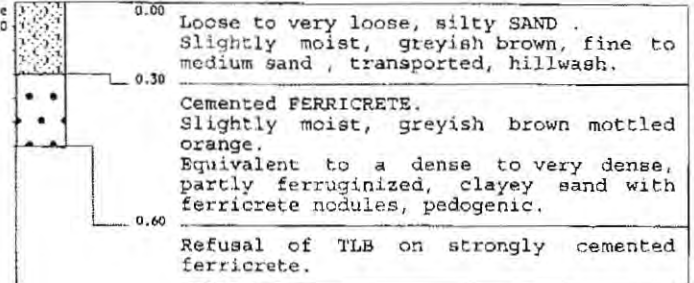


INFRACOM
SUN CROSSING TOWNSHIP

TEST PIT PROFILE

SOLE No: SC18
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

SOLE No: SC18

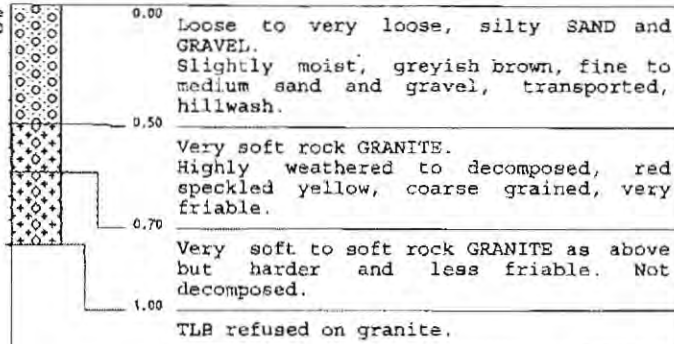
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INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC19
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97
DATE : 01/04/97 15:40
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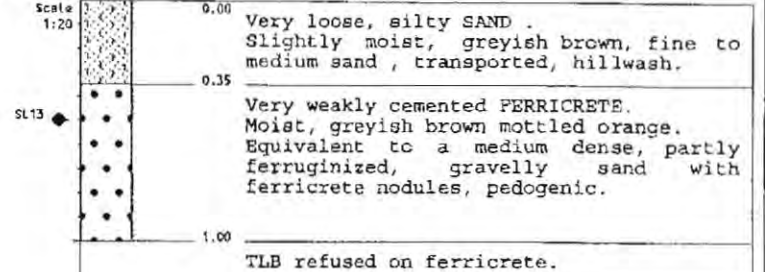
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC19



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC20
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.
- 2) DCP test at surface.
- 3) Disturbed sample SL13 at 0.5m

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

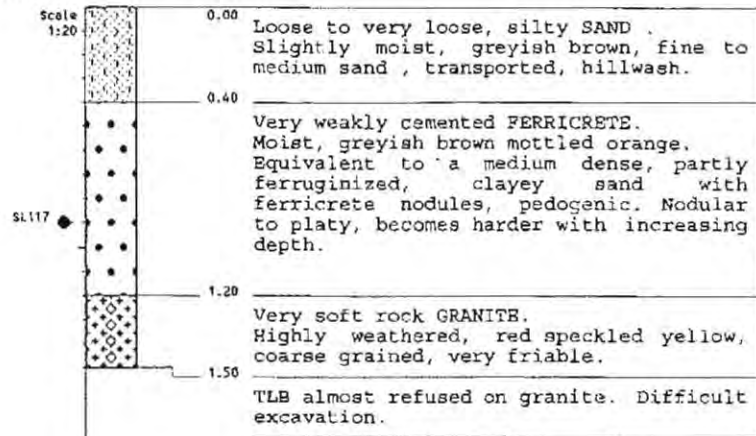
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ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC20



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC21
Sheet 1 of 1
JOB NUMBER: PE0560



NOTES:

- 1) No ground water seepage.
- 2) DCP test at surface.
- 3) Disturbed sample SL117 at 0.9m

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

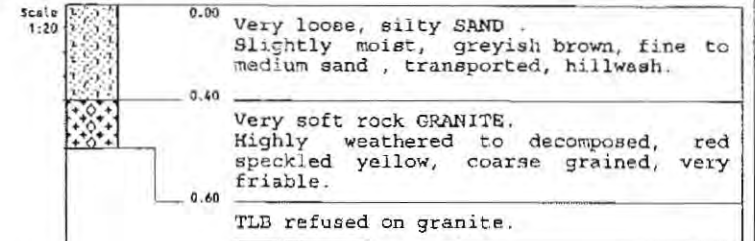
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DATE : 01/04/97 15:40
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ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC21



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC22
Sheet 1 of 1
JOB NUMBER: PE0560



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97
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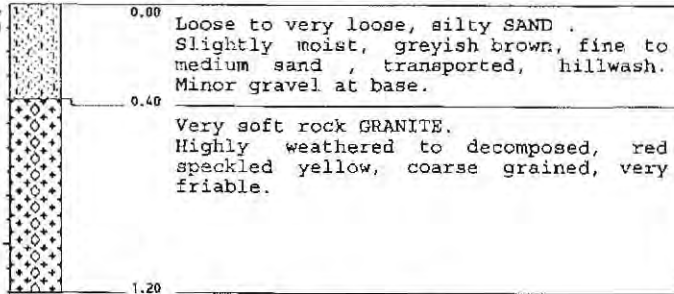
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC22



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC23
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



0.00 Loose to very loose, silty SAND .
Slightly moist, greyish brown, fine to medium sand , transported, hillwash. Minor gravel at base.

0.40 Very soft rock GRANITE.
Highly weathered to decomposed, red speckled yellow, coarse grained, very friable.

1.20 TLB refused on granite.

NOTES:
1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

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DIAM :
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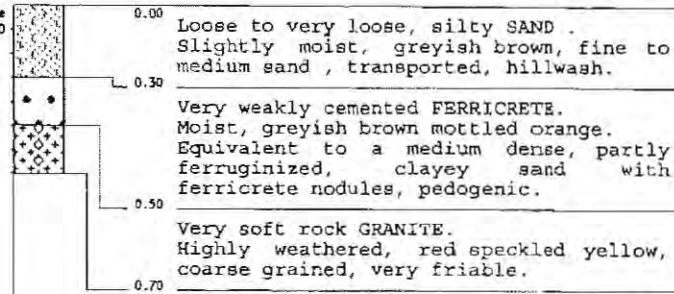
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X-COORD :
Y-COORD :
HOLE No: SC23



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC24
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



0.00 Loose to very loose, silty SAND .
Slightly moist, greyish brown, fine to medium sand , transported, hillwash.

0.30 Very weakly cemented FERRICRETE.
Moist, greyish brown mottled orange. Equivalent to a medium dense, partly ferruginized, clayey sand with ferricrete nodules, pedogenic.

0.50 Very soft rock GRANITE.
Highly weathered, red speckled yellow, coarse grained, very friable.

0.70 TLB almost refused on granite. Difficult excavation.

NOTES:
1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

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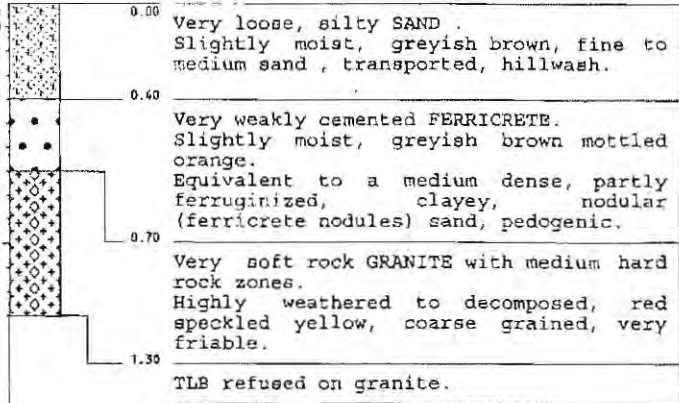
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X-COORD :
Y-COORD :
HOLE No: SC24



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC25
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
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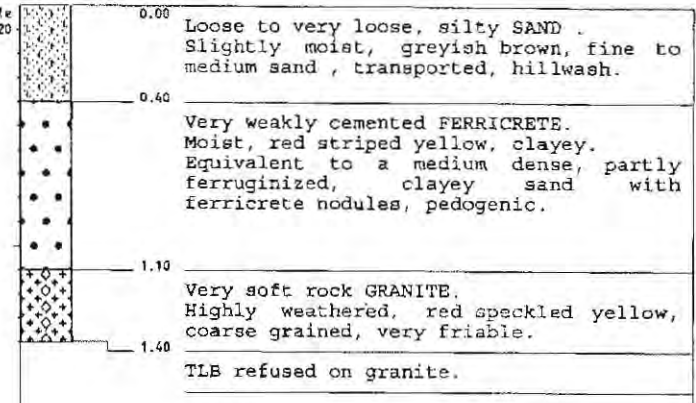
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X-COORD :
Y-COORD :
HOLE No: SC25



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC26
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
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DATE : 20/03/97
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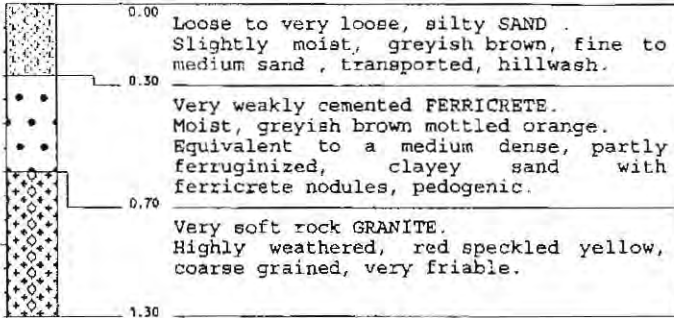
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC26



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC27
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



TLB refused on granite.

NOTES:
1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
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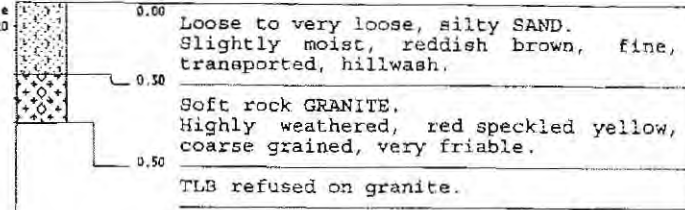
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC27



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC28
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:
1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
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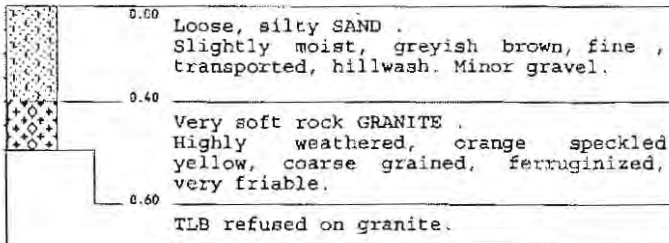
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC28



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC29
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97
DATE : 01/04/97 15:41
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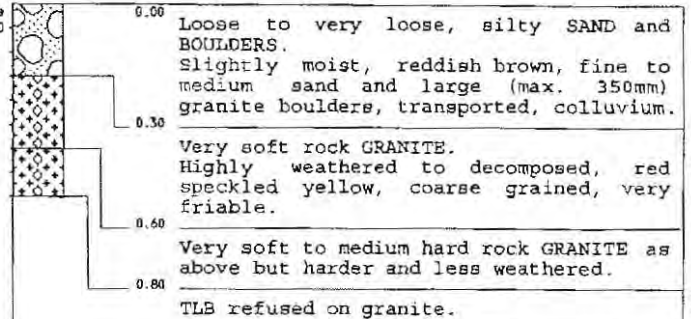
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC29



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC30
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

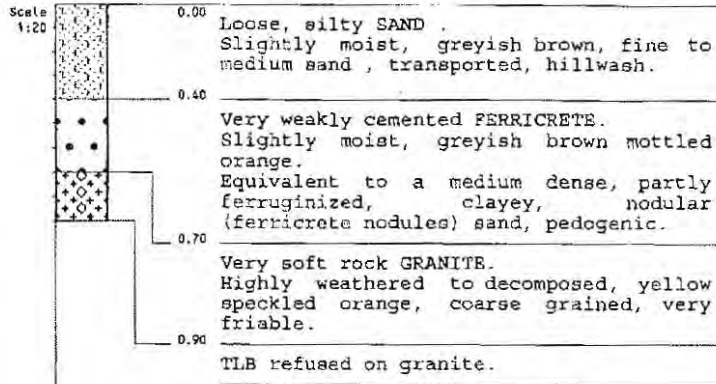
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DATE : 01/04/97 15:41
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ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC30



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC31
Sheet 1 of 1
JOB NUMBER: PE0560



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

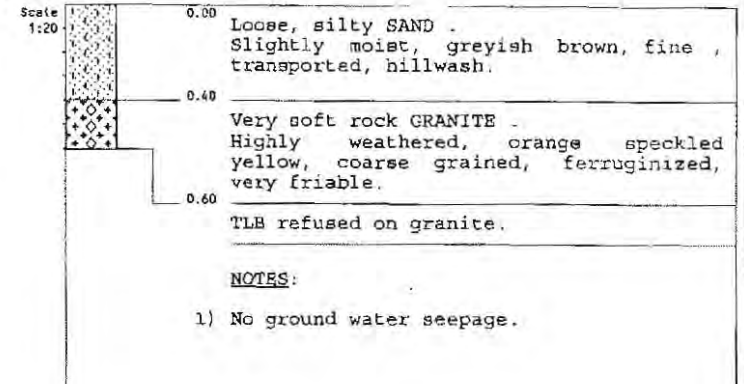
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TEXT : C:\DOTPLOT\profiles\SUNPROF.TXT

HOLE No: SC31



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC32
Sheet 1 of 1
JOB NUMBER: PE0560



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97

ELEVATION :
X-COORD :
Y-COORD :

DATE : 01/04/97 15:41
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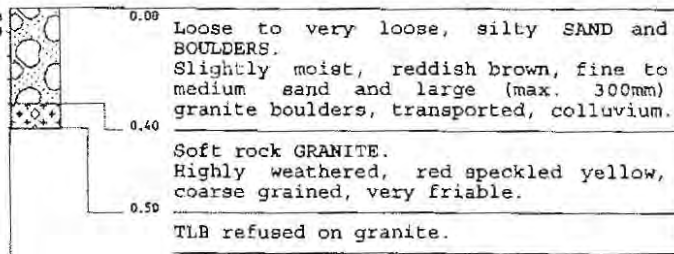
HOLE No: SC32



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC33
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97
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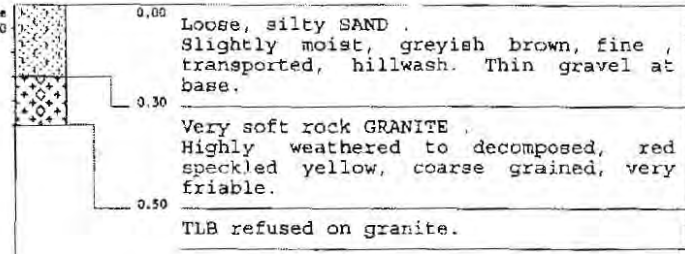
HOLE No: SC33



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC34
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97
DATE : 01/04/97 15:42
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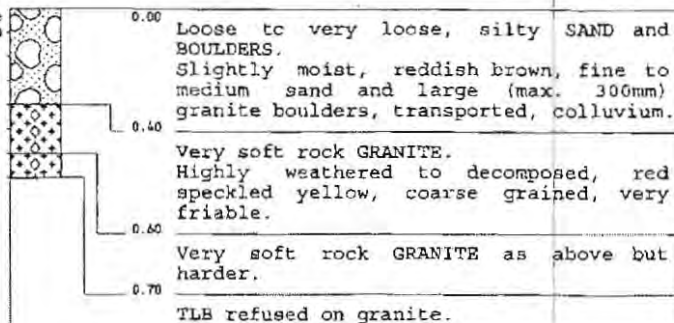
HOLE No: SC34



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC35
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97
DATE : 01/04/97 15:42
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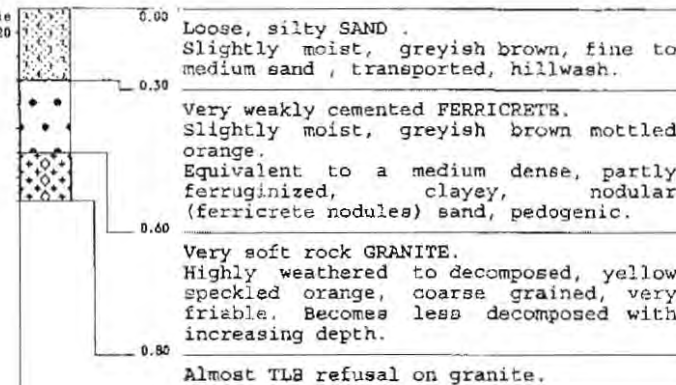
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC35



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC36
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILED BY : BduC
TYPE SET BY :
SETUP FILE : PROF-ENG.SET

INCLINATION :
DIAM :
DATE : 20/03/97
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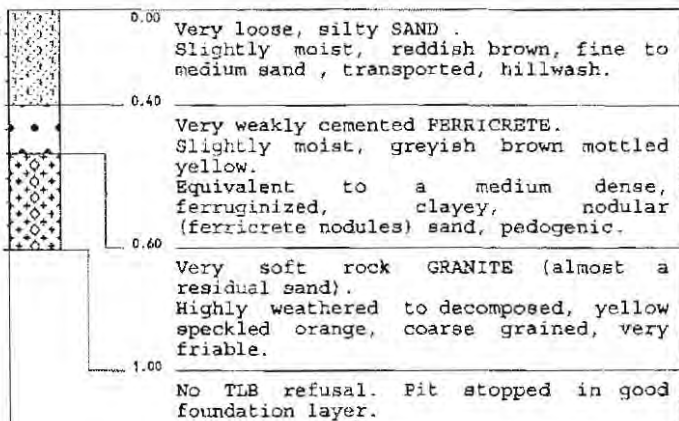
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC36



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC37
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

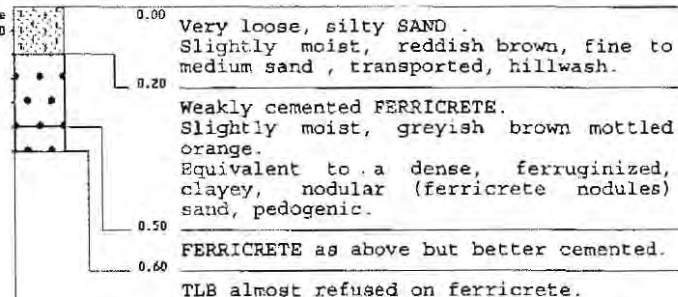
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MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
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DIAM :
DATE : 20/03/97
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC37
TYPE SET BY :
SETUP FILE : PROF-ENG.SET
DATE : 01/04/97 15:42
TEXT : C:\DOTPLOT\profiles\SUMPROF.TXT



INFRACOM
SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC38
Sheet 1 of 1
JOB NUMBER: PE0560

Scale
1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
MACHINE : CASE 580H
DRILLED BY :
PROFILLED BY : Bduc
INCLINATION :
DIAM :
DATE : 20/03/97
ELEVATION :
X-COORD :
Y-COORD :
HOLE No: SC38
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SETUP FILE : PROF-ENG.SET
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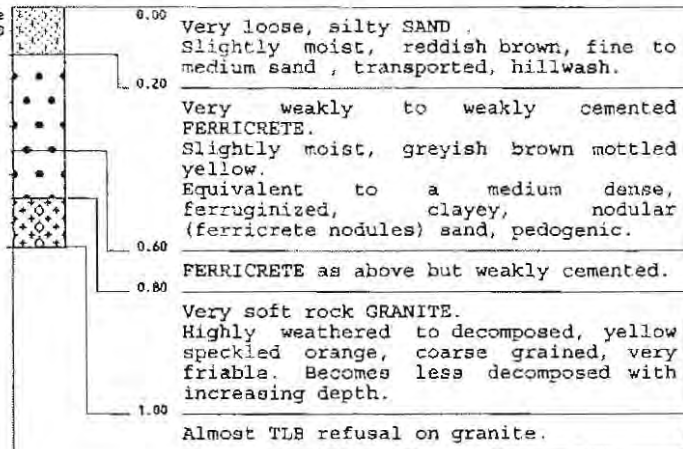


INFRACOM
 SUN CROSSING TOWNSHIP
TEST PIT PROFILE

HOLE No: SC39
 Sheet 1 of 1

JOB NUMBER: PE0560

Scale
 1:20



NOTES:

- 1) No ground water seepage.

CONTRACTOR : SOILLAB
 MACHINE : CASE 580H
 DRILLED BY :
 PROFILED BY : Bduc
 TYPE SET BY :
 SETUP FILE : PROF-ENG.SET

INCLINATION :
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 DATE : 01/04/97 15:42
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ELEVATION :
 X-COORD :
 Y-COORD :
 HOLE No: SC39

APPENDIX B
SOIL AND ROCK DESCRIPTIVE TERMS

1. SOIL DESCRIPTIVE TERMS

DESCRIPTIVE ORDER :

1. CONSISTENCY 2. SOIL TYPE 3. MOISTURE CONDITION 4. COLOUR 5. SOIL STRUCTURE 6. ORIGIN

1.(a) CONSISTENCY : GRANULAR SOILS

S P T "N"	GRAVELS & BANDS Generally free draining soils	TYPICAL DRY DENSITY (kg/m ³)
<4	VERY LOOSE Crumbles very easily when scraped with geological pick.	<1450
4-10	LOOSE Small resistance to penetration by sharp pick point.	1450-1600
10-30	MEDIUM DENSE Considerable resistance to penetration by sharp pick point.	1600-1750
30-50	DENSE Very high resistance to penetration by sharp pick point. Requires many blows of pick for excavation.	1750-1925
>50	VERY DENSE High resistance to repeated blows of geological pick. Requires power tools for excavation.	>1925

2. SOIL TYPE

SOIL TYPE	PARTICLE SIZE (mm)
CLAY	< 0.002
SILT	0.002 - 0.06
SAND	0.06 - 2
GRAVEL	2 - 60*
COBBLES	60 - 200**
BOULDERS	> 200*

* Specify ave/max sizes, hardness, shape and proportion

4. COLOUR

Described at natural moisture content, as seen in profile (unless otherwise specified).

SPECKLED	Very small patches of colour < 2 mm
MOTTLED	Irregular patches of colour 2 - 6 mm
BLOTTCHED	Large irregular patches 6 - 20 mm
BANDED	Approximately parallel bands of varying colour
STREAKED	Randomly orientated streaks of colour
STAINED	Local colour variations : associated with discontinuity surfaces

Described using bedding thickness criteria, (e.g. thickly banded, thinly streaked etc.)

1.(b) CONSISTENCY : COHESIVE SOILS

S P T "N"	SILTS & CLAYS and combinations with SANDS Generally slow draining soils	UCS (kPa)
<2	VERY SOFT Pick point easily pushed in 100mm. Easily moulded by fingers.	<50
2-4	SOFT Pick point easily pushed in 30-40mm. Moulded by fingers with some pressure. Easily penetrated by thumb.	60-125
4-8	FIRM Pick point penetrates up to 10mm. Very difficult to mould with fingers. Indented by thumb with effort. Spade just penetrates.	125-250
8-15	STIFF Slight indentation by pushing in pick point. Cannot be moulded by fingers. Penetrated by thumb nail. Pick necessary to excavate.	250-500
15-30	VERY STIFF Slight indentation by blow of pick point. Requires power tools for excavation.	500-1000

3. MOISTURE CONDITION

DRY	No water detectable.
SLIGHTLY MOIST	Water just discernable.
MOIST	Water easily discernable.
VERY MOIST	Water can be squeezed out.
WET	Generally below the water table.

5. SOIL STRUCTURE

INTACT	No structure present.
FISSURED	Presence of discontinuities, possibly cemented.
SLICKENSIDED	Very smooth glossy, often striated discontinuity planes.
SHATTERED	Presence of open fissures. Soil breaks into gravel size blocks.
MICRO-SHATTERED	Small scale shattering, very closely spaced open fissures. Soil breaks into sand size crumbs.
RESIDUAL STRUCTURES	Relict bedding; lamination, foliation, etc.

6. ORIGIN

TRANSPORTED	Alluvium, hillwash, talus, etc.
RESIDUAL	Weathered from parent rock e.g. residual granite
PEGOCRETES	Ferrocement, laterite, silcrete, calcrete, etc.

DEGREE OF CEMENTATION OF PEGOCRETES		UCS (MPa)
VERY WEAKLY CEMENTED	Some material can be crumbled between finger and thumb. Disintegrates under knife blade to a friable state.	0.1 - 0.5
WEAKLY CEMENTED	Cannot be crumbled between strong fingers. Some material can be crumbled by strong pressure between thumb and hard surface. Under light hammer blows disintegrates to friable state.	0.5 - 2
CEMENTED	Material crumbles under firm blows of sharp pick point. Grains can be dislodged with some difficulty by a knife blade.	2 - 5
STRONGLY CEMENTED	Firm blows of sharp pick point on hand-held specimen show 1-3mm indentations. Grains cannot be dislodged by knife blade.	5 - 10
IV. STRONGLY CEMENTED	Hand-held specimen can be broken by single firm blow of hammer head. Similar appearance to concrete.	10 - 25

REFERENCE : Guide to Soil Profiling for Civil Engineering Purposes (1993)



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Fax. (+27 12) 803-7943

D112(E) v0401 March 4, 1997

2. ROCK DESCRIPTIVE TERMS

DESCRIPTIVE ORDER : 1. HARDNESS 2. ROCK TYPE 3. WEATHERING 4. COLOUR 5. FRACTURE SPACING

6. DISCONTINUITY SURFACE DESCRIPTION 7. GRAIN SIZE 8. ROCK FORMATION NAME

1. ROCK HARDNESS

HARDNESS	DESCRIPTION	U.C.S. (MPa)
VERY SOFT ROCK	Material crumbles under firm blows of pick point. Can be pealed with a knife. SPT refusal. Too hard to cut trial size sample by hand.	1-3
SOFT ROCK	Firm blows with pick point : 2-4mm indents. Can just be scraped with a knife.	3-10
MEDIUM HARD ROCK	Firm blows of pick head will break hand-held specimen. Cannot be scraped or peeled with a knife.	10-25

HARDNESS	DESCRIPTION	U.C.S. (MPa)
HARD ROCK	Breaks with difficulty, rings when struck	25-7
VERY HARD ROCK	Point load or laboratory test results necessary to distinguish between categories	70-200
VERY VERY HARD ROCK		>200

2. ROCK TYPE

Quartzite, sandstone, granite, limestone, etc.

4. COLOUR

Described in the dry state unless otherwise indicated

3. WEATHERING

DEGREE OF WEATHERING	EXTENT OF DISCOLOURATION	FRACTURE CONDITION	SURFACE CHARACTERISTICS	ORIGINAL FABRIC	GRAIN BOUNDARY CONDITION
UNWEATHERED	None	Closed or stained	Unchanged	Preserved	Tight
SLIGHTLY WEATHERED	< 20% of fracture spacing on both sides of fracture	Discoloured, may contain thin filling	Partial discoloration. Often unweathered rock colour	Preserved	Tight
MODERATELY WEATHERED	> 20% of fracture spacing on both sides of fracture	Discoloured, may contain thick filling	Partial to complete discoloration. Not friable except poorly cemented rocks	Preserved	Partial opening
HIGHLY WEATHERED	Throughout	Friable, possibly pitted	Friable, possibly pitted	Malnly preserved	Partial separation. Not easily indented with knife. Does not slate
COMPLETELY WEATHERED	Throughout	Resembles a soil	Resembles a soil	Partially preserved	Complete separation. Easily indented with knife. Slakes

5. DISCONTINUITY SPACING

SEPARATION (mm)	SPACING (foliation, cleavage, bedding, etc.)	SPACING (fractures, joints, etc.)
< 5	very intensely	very highly
5 - 20	intensely	highly
20 - 60	very thinly	highly
60 - 200	thinly	highly
200 - 600	medium	moderately
600 - 2000	thickly	slightly
> 2000	very thickly	very slightly

6. DISCONTINUITY SURFACE DESCRIPTION :

6.1 JOINT FILLING

JOINT FILL TYPE	DEFINITION (wall separation specified in mm)
CLEAN	No fracture filling
STAINED	Colouration of rock only. No recognisable filling material.
FILLED	Fracture filled with solids (thickness filling material)

6.2 DISCONTINUITY ORIENTATION

Discontinuity inclinations (i.e. of joints, bedding, faults, etc.) are measured with respect to the horizontal i.e. a vertical joint dips at 90°. In orientated core the fracture inclinations are wrt the core axis.

6.3 ROUGHNESS OF DISCONTINUITY PLANES

CLASSIFICATION	DESCRIPTION
SMOOTH	Appears smooth and is essentially smooth to the touch. May be slickensided*
SLIGHTLY ROUGH	Asperities on the fracture surface are visible and can be distinctly felt
MEDIUM ROUGH	Asperities are clearly visible and fracture surface feels abrasive
ROUGH	Large angular asperities can be seen. Some ridge and high side angle steps evident
VERY ROUGH	Near vertical steps and ridges occur on the fracture surface

* Where slickensides occur the direction of the slickensides should be recorded.

7. GRAIN SIZE

CLASSIFICATION	SIZE (mm)	RECOGNITION
VERY FINE GRAINED	< 0.2	Individual grains cannot be seen with a hand lens
FINE GRAINED	0.2 - 0.6	Just visible as individual grains under hand lens
MEDIUM GRAINED	0.6 - 2	Grains clearly visible under hand lens, just visible to the naked eye
COARSE GRAINED	2 - 6	Grains clearly visible to the naked eye
VERY COARSE GRAINED	> 6	Grains measurable

8. ROCK FORMATION

Brinkon Formation, Halfway House Granite Dome etc.

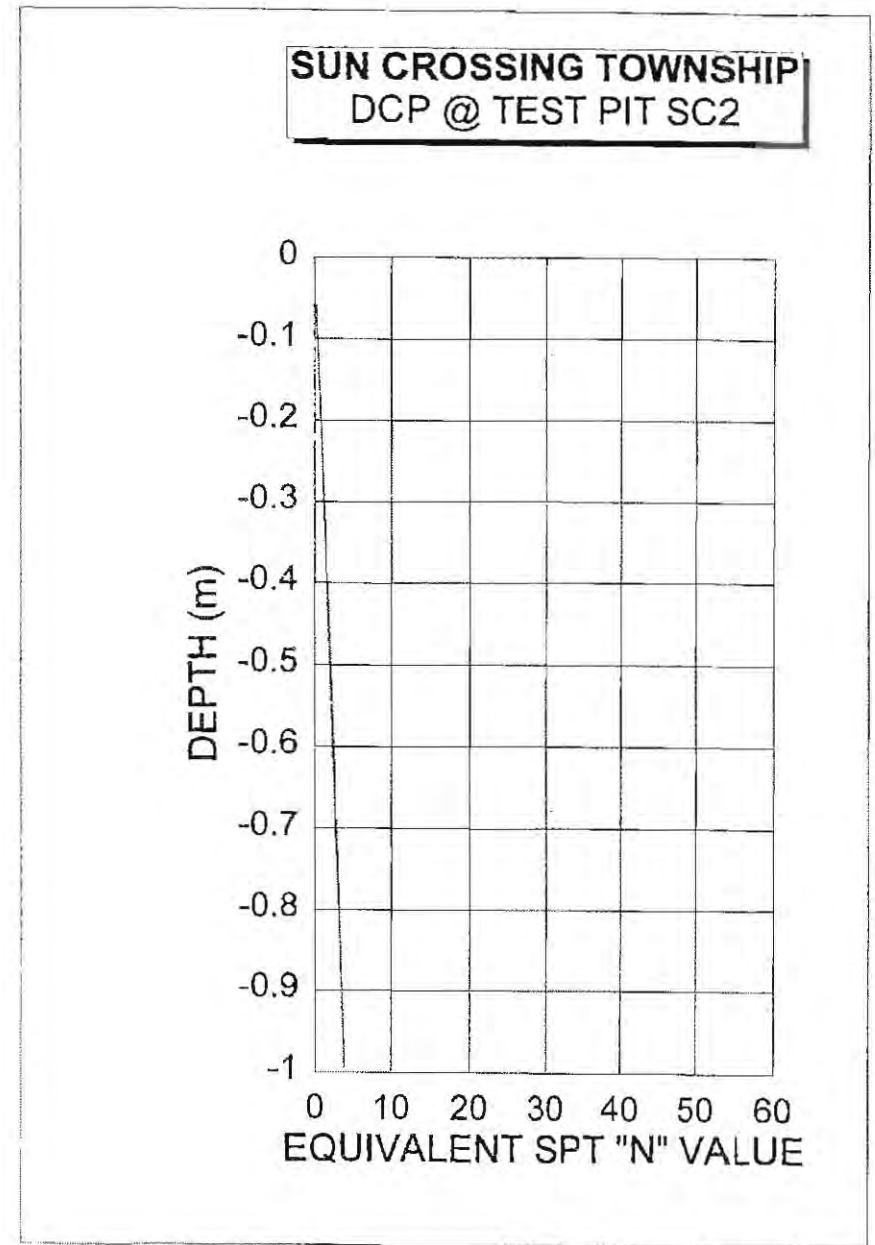
REFERENCE : Guide to Core Logging for Civil Engineering Purposes (1993)



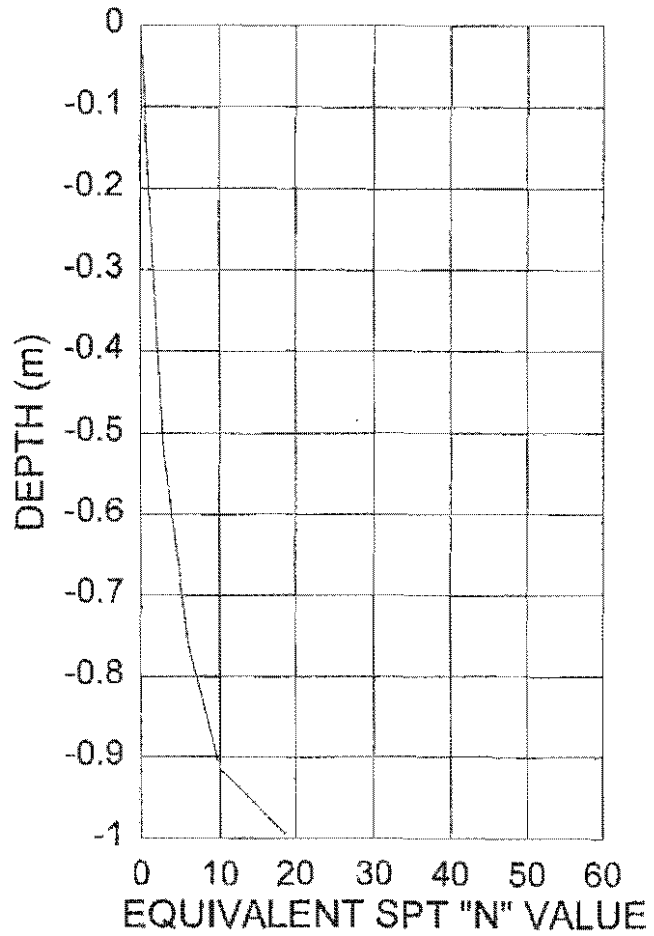
Tel. (+27 12) 481-3800
Fax. (+27 12) 803-7943

D112(E) v0401 March 4, 1997

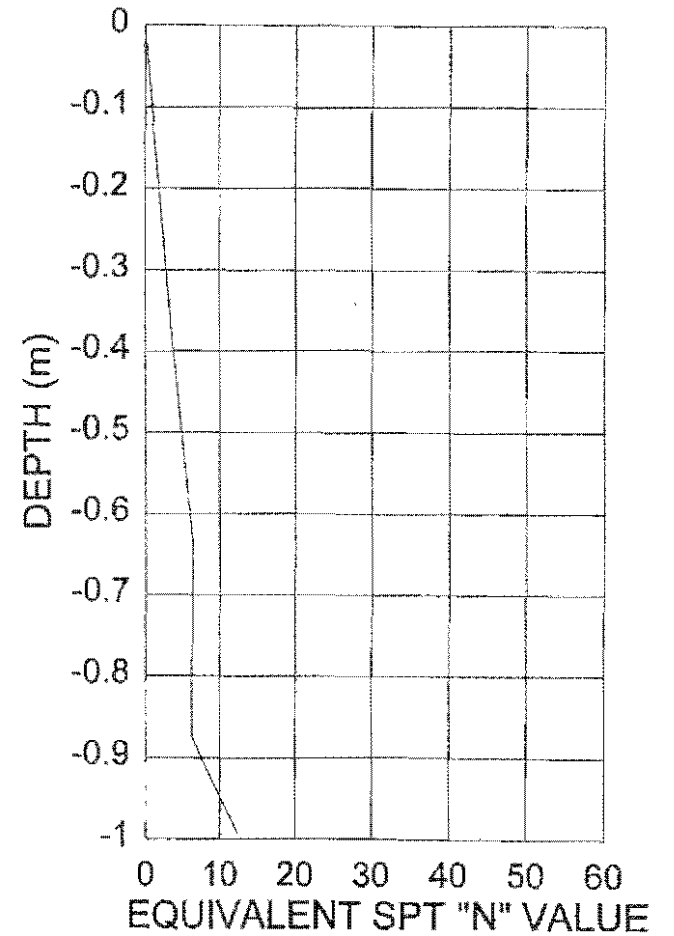
APPENDIX C
DCP PLOTS



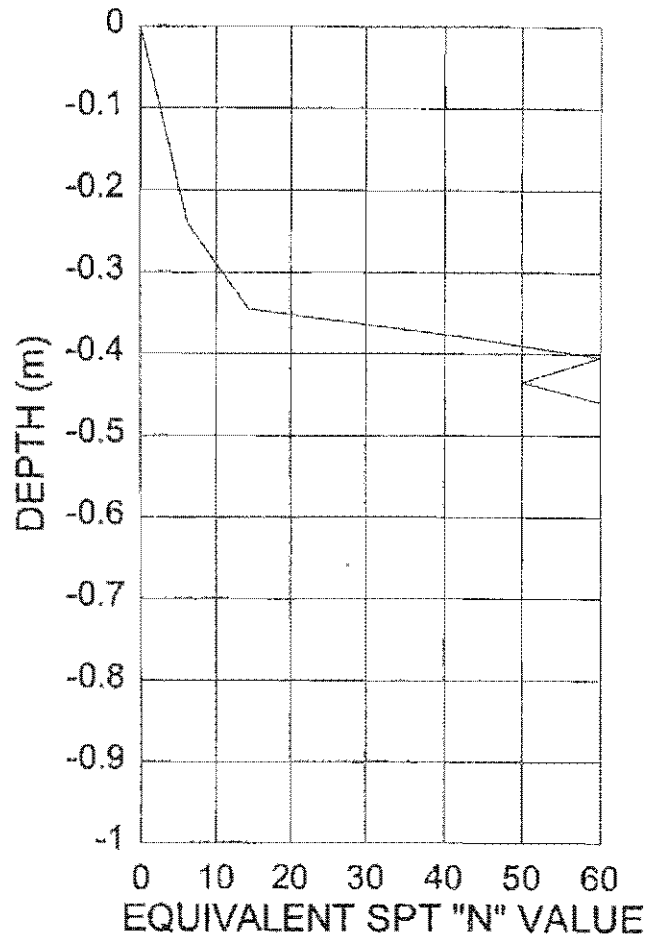
SUN CROSSING TOWNSHIP
DCP @ TEST PIT SC12



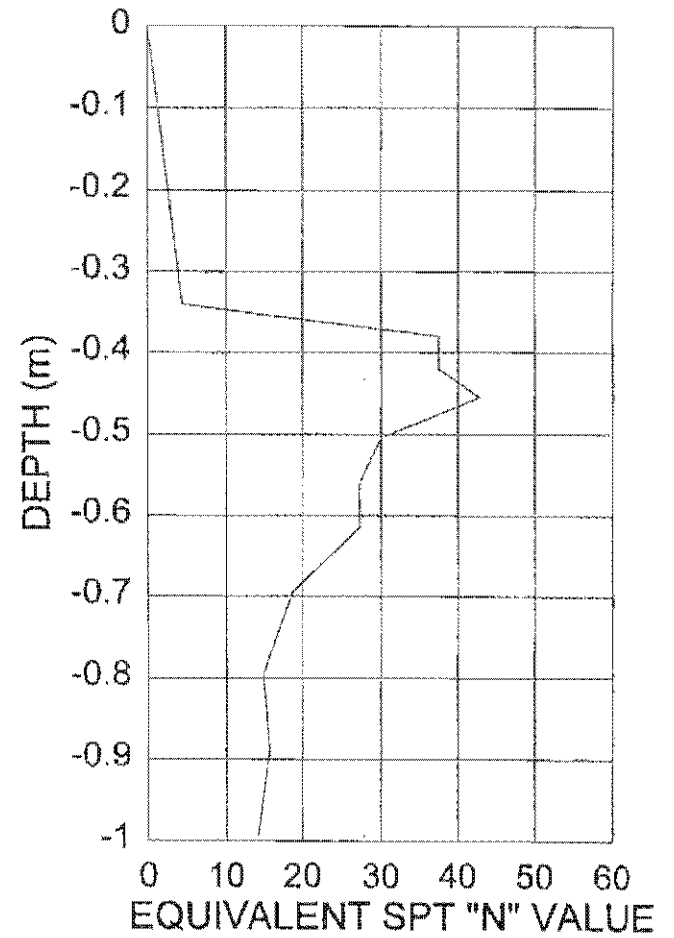
SUN CROSSING TOWNSHIP
DCP @ TEST PIT SC15



SUN CROSSING TOWNSHIP
DCP @ TEST PIT SC20



SUN CROSSING TOWNSHIP
DCP @ TEST PIT SC21



**APPENDIX D
LABORATORY TEST RESULTS**

PARTICLE SIZE ANALYSIS

Sample / Hole No	3926	3937
Depth (m)	0-1.1	0-0.9
Position	SC 2	SC 12

PROJECT : SUN CROSSING TOWNSHIP
DATE : 1997-04-01

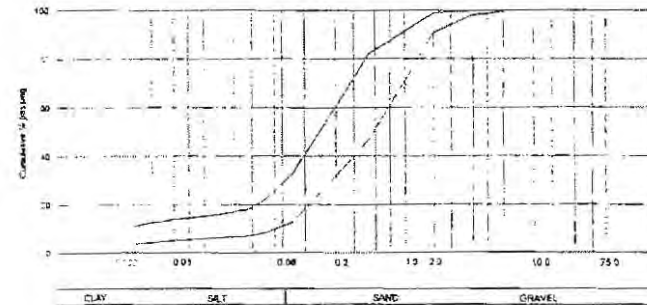
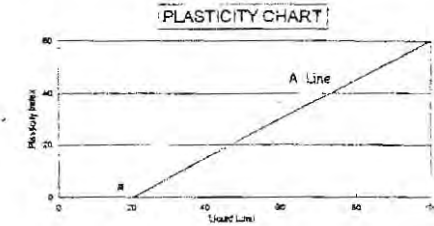
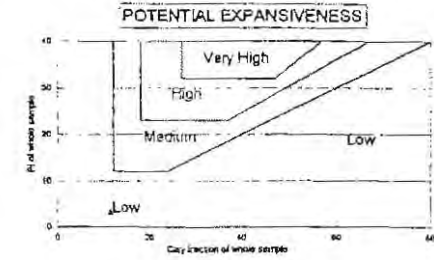
Material Description	PALE RED FERRICRETE GRAVELLY SAND	LIGHT BROWN SILTY SAND
----------------------	-----------------------------------	------------------------

Mixture (%)		
SCREEN ANALYSIS (% PASSING)		
63.0	100	100
35.0	100	100
37.5	100	100
28.5	100	100
15.0	100	100
13.2	100	100
4.75	99	100
2.00	91	99
0.425	47	82
0.075	13	33

HYDROMETER ANALYSIS		
0.540	6	22
0.027	7	18
0.013	6	16
0.005	5	14
0.002	4	11

% Clay	0	11
% Silt	7	17
% Sand	80	71
% Gravel	5	1

ATTERBERG LIMITS		
Liquid Limit		17
Plasticity Index	SP	3
Linear Shrinkage	0.5	1.5
Shrinkage Ratio	1.49	0.86
Classification	A-1(0)	A-2(0)



279-1.WK4.db

SOILLAB (PTY) LTD
Reg No 71/00112/07

230 Albertus Street
La Montagne
Tel (012) 481-3999

P O Box 72928
Lynnwood Ridge 0040
Fax (012) 481-3812

PARTICLE SIZE ANALYSIS

Sample / Hole No 3938 3939
 Depth (m) 0.00 0.33-1.0
 Position SC 15 SC 20

PROJECT SUN CROSSING TOWNSHIP
 DATE 1997-04-01

Material Description LIGHT BROWN/DARK RED W/GRANITE
 SILTY SAND GRAVELLY SAND

Moisture (%)

SCREEN ANALYSIS (% PASSING)	SILTY SAND	GRAVELLY SAND
63.0	100	100
53.0	100	100
37.5	100	100
28.5	100	100
19.0	100	100
13.2	100	99
4.75	98	89
2.00	97	58
0.425	77	35
0.075	33	22

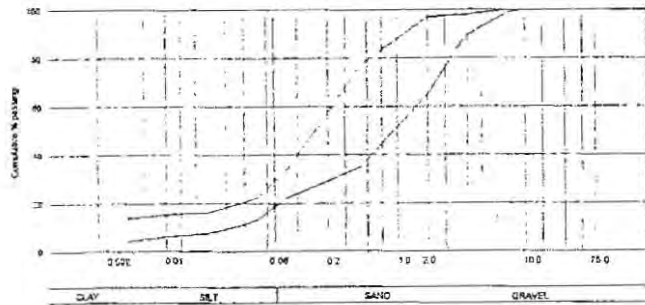
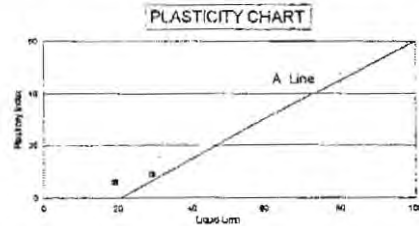
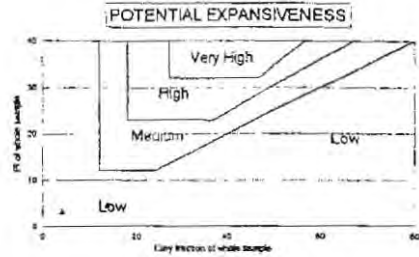
HYDROMETER ANALYSIS

0.040	22	13
0.027	20	11
0.015	16	8
0.005	15	6
0.002	14	4

% Clay	14	4
% Silt	15	14
% Sand	69	82
% Gravel	2	35

ATTERBERG LIMITS

Liquid Limit	19	29
Plasticity Index	6	9
Linear Shrinkage	3.0	4.5
Grading Modulus	0.93	1.79
Classification	A-7(4)	A-2(4)



270-2.WK4.db

PARTICLE SIZE ANALYSIS

Sample / Hole No 3940
 Depth (m) 0.35-1.15
 Position SC 21

PROJECT SUN CROSSING TOWNSHIP
 DATE 1997-04-01

Material Description PALE RED FERRICRETE
 SANDY GRAVEL

Moisture (%)

SCREEN ANALYSIS (% PASSING)	SANDY GRAVEL
63.0	100
53.0	100
37.5	97
26.5	91
19.0	82
13.2	73
4.75	47
2.00	41
0.425	30
0.075	13

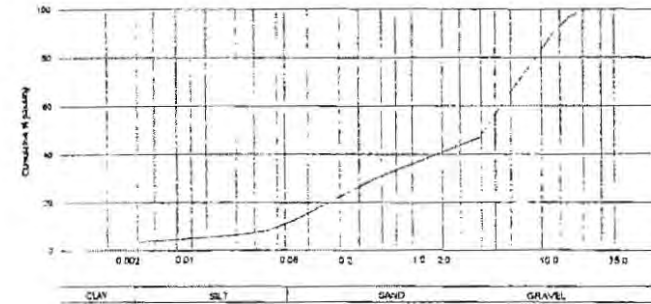
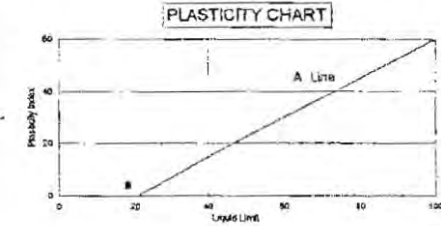
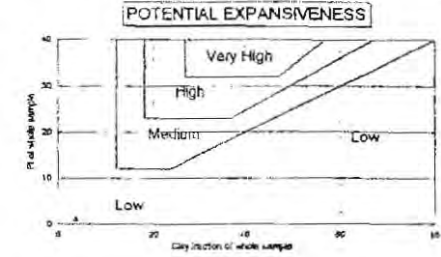
HYDROMETER ANALYSIS

0.040	8
0.027	7
0.015	6
0.005	5
0.002	4

% Clay	4
% Silt	7
% Sand	30
% Gravel	59

ATTERBERG LIMITS

Liquid Limit	18
Plasticity Index	4
Linear Shrinkage	1.5
Grading Modulus	2.16
Classification	A-1-B(1)



270-2.WK4.db

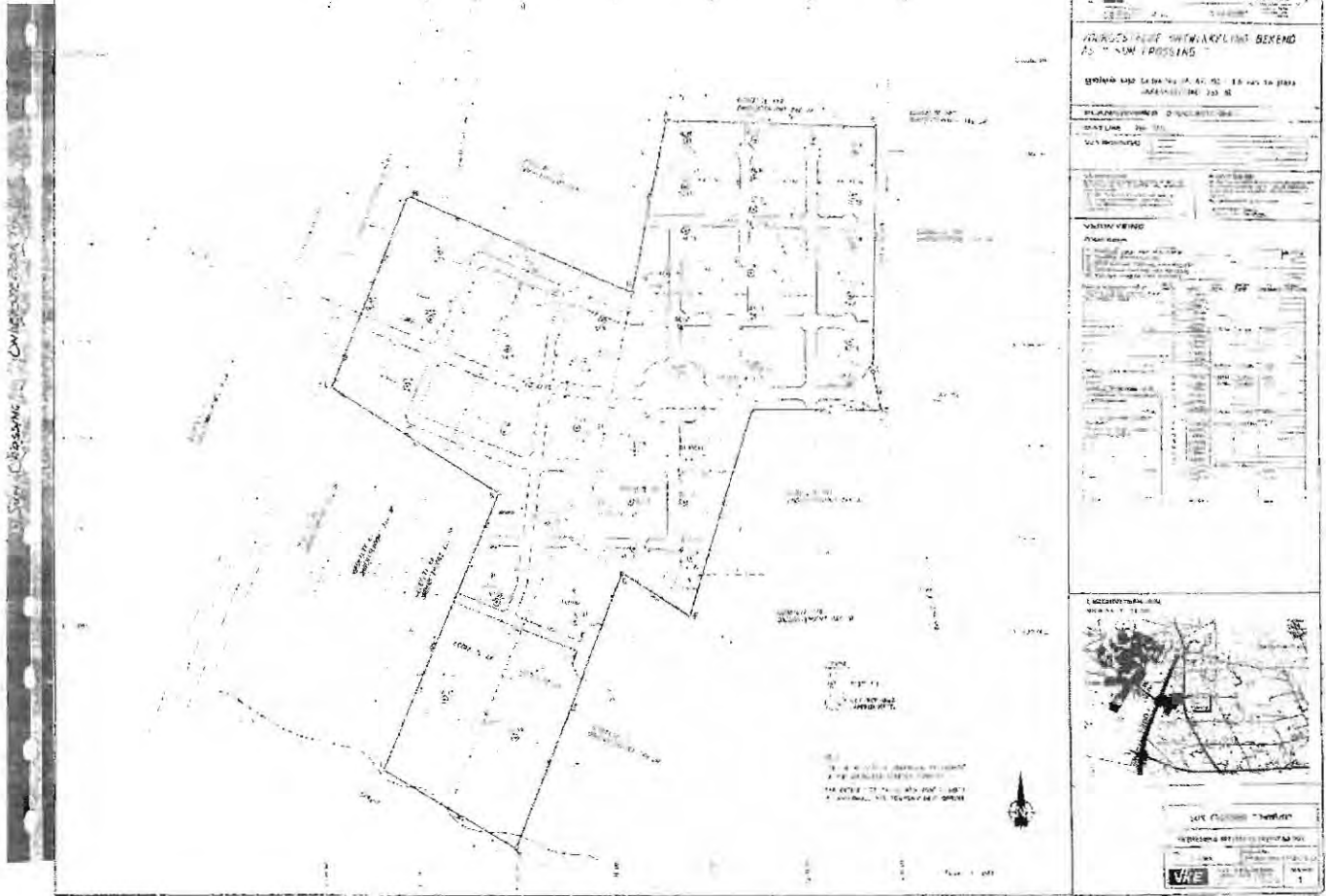


FIGURE 1
TEST PIT POSITIONS



VOORGEVELDE ONTWIKKELING BEKEND AS "SUN CROSSING"

gebied op Grondstuk 18, 19, 22, 23 van de plan
 ONDESTEDECF 286, 29

BLADNUMMER: D/ONDESTEDECF/286/1

DATUM: 2018

VERWIJZING: 1

VERWIJZING: 1

NO.	NAAM	ADRES	TELEFONUMMER	OPMERKINGEN
1	VERWIJZING			
2	VERWIJZING			
3	VERWIJZING			
4	VERWIJZING			
5	VERWIJZING			
6	VERWIJZING			
7	VERWIJZING			
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99	VERWIJZING			
100	VERWIJZING			



ELIJAH CROSSING TOWNSHIP
 ENGINEER: JAMES W. ROSSIGNOL
 DATE: 11/15/18
 SCALE: AS SHOWN
 PROJECT: SUN CROSSING



SUN CROSSING
 ONDESTEDECF

ANNEXURE G – WETLAND ASSESSMENT REPORT



Client:
Ecologic AFRICA
 Project:
**Wetland Assessment for the
 proposed Soshanguve
 development**

Date:
 2014/06/12

Revision:
 01

 <p style="color: white; font-weight: bold;">SPEC-CC</p> <p style="color: white;">Spatial Ecological Consulting</p>	<p>André Gribler B.Sc. (Hons) DP Pr. No. Nat 400009/09 Ine Venter M.Sc. DP Pr. No. Nat 400048/08</p>
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- Addendum B – PES calculation for the northern wetland unit
- Addendum C – EIS calculation for the southern wetland
- Addendum D – EIS calculation for the northern wetland

List of Specialists

Aspect Investigated	Specialist	Qualifications & SACNASP	Date of field survey
Wetland Assessment	Ina Venter (CE) Pr.Sci.Nat.	M.Sc. (Botany) Botanical Science: 400048/08	15 May 2014
Wetland Assessment Review	Andre Grobler Pr.Sci.Nat.	B.Sc. Hons (Botany) Ecological Science: 400009/09	
Wetland Assessment Review	Jessica Grobler Pr.Sci.Nat.	M.Sc. (Botany) Botanical & Ecological Science: 400096/09	

1 Introduction

Spatial Ecological Consulting CC (SPEC) was approached by ecologic AFRICA to conduct a wetland assessment for the proposed Soshanguve development.

2 Legislative and policy framework

2.1 Constitution of South Africa (Act 108 of 1996)

The Constitution of South Africa (Act No. 108 of 1996) place a duty on the State and the citizens to protect the environment. Section 24 provides that:

"Everyone has the right –

(b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that

- i) prevent pollution and ecological degradation;*
- ii) promote conservation; and*
- iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".*

2.2 National Environmental Management Act (Act 107 of 1998)

Section 2 of the National Environmental Management Act (NEMA) (Act no. 107 of 1998) lists the principles of the Act and includes the protection of sensitive and stressed ecosystems. The regulations for Environmental Impact Assessments (EIAs) are included under this act and are listed in regulations 543 to 547 of 18 June 2010.

2.3 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) addresses amongst others:

- Biodiversity planning and monitoring;
- Protection of threatened or protected ecosystems;
- Protection of threatened or protected species;
- The control of alien species, invasive species and genetically modified organisms.

Species that are classified as threatened and/or protected are listed in Government Gazette 151 of February 2007 and the regulations are included in Government Gazette 152 of February 2007, with the most recent amendment in Government Notice 576 of July 2011.

Threatened ecosystems in need of protection are listed Government Notice 1002 of December 2011.

2.4 Conservation of Agricultural Resources Act (Act 43 of 1983)

The Conservation of Agricultural Resources Act includes control measures that apply to (Section 6):

- The cultivation of virgin soil;

- The protection and utilisation of vegetation;
- The grazing capacity of the veld;
- Control of weeds and invasive plants;
- The restoration and reclamation of eroded land and other disturbances to the land;
- The protection and restoration of wetlands.

2.5 The National Water Act (Act 36 of 1998)

The National Water Act mandates the Minister of Water Affairs and Forestry to ensure that water is *protected, used, developed, conserved, managed and controlled* in a sustainable and equitable manner for the benefit of all persons.

The Minister of Water Affairs and Forestry, supported by the Department of Water Affairs, acts as the public trustee of the nation's water resources. In doing so the Water Act must ensure that the nations' water resources are protected, used, developed, managed and controlled in a way that takes into account-

- meeting basic human needs both present and future;
- promoting equitable access and beneficial use
- facilitating social and economic development;
- protecting ecosystems and biodiversity; and
- reducing and preventing pollution and degradation.

This practically implies that there has to be enough water to meet the Ecological Reserve, this is the amount and quality of water that will maintain basic human needs and ecosystem services at a level that will be sustainable.

3 Location and study area description

3.1 Location

The site is located to the east of Soshanguve on a portion of the Farm Onderstepoort 266 JR. The M39 passes through the site and the M35 is located on the north-eastern boundary of the site. The R80 is located to the west of the site.

3.2 Ecological resources

The northern portion of the site is located in quaternary catchment A23J and the southern portion is located in quaternary catchment A23E.

The wetland on the northern portion of the site is in the headwaters of the Soutpanspruit stream, which flows into the Kutswane River. This river flows into the Moretele River. The wetland on the southern portion of the site is a tributary of Metsi Metsuane stream, which flows into the Kaalplaasspruit and from there into the Apies River.

The site is located in the Central Sandy Bushveld vegetation type, which is classified as vulnerable.

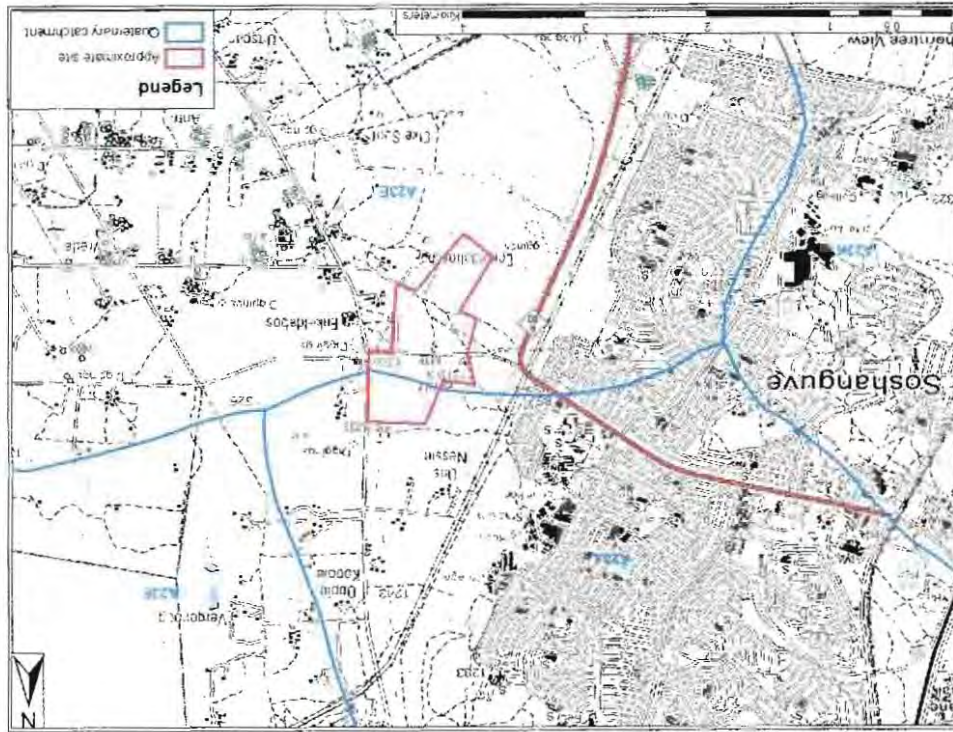


Figure 17. Aerial view of the site used for the delineation of the wetland catchment.

4 Methods

The site visit was conducted on 15 May 2014. Indicators of wetland conditions in the soil and vegetation were noted.

4.1 Desktop Assessment and Wetland Delineation

Aerial photographs of the site were scrutinised prior to the site visit for an indication of the wetland boundaries. Wetlands outside were delineated based only on the aerial photographs of the site, but the wetland boundaries on site were verified in the field.

The wetlands on site were delineated using the Department of Water Affairs (DWA) guidelines for wetland and riparian delineation (DWA 2005). The indicators used in the delineation of the wetland include the soil, vegetation and topography of the site.

4.2 Wetland Health

In order to assess the health of the wetland at present the tool Wet-Health was used. This tool was developed for use by experienced wetland scientists. The Level 1 Wet-Health assessment was used on site. The Present Ecological State (PES) is used to define the health of a wetland (Table 1) and is determined for the hydrology, geomorphology and vegetation of the wetland. A combined score for the wetland can be obtained, but this is not recommended (Macfarlane et al, 2009).

Table 1. Present Ecological State used to define the health of wetlands (PES) (Macfarlane 2009).

Description	Combined impact score	PES Category
Unmodified, natural.	0-0.9	A
Largely natural with few modifications. A slight change in ecosystem processes is discernable and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2-3.9	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable	6-7.9	E
Wetlands have reached a critical state and the ecosystem processes have been irreversibly compromised with an almost complete loss of natural habitat and biota	8-11.1	F

4.3 Ecological Importance and Sensitivity (EIS)

The EIS were calculated using the new draft DWA guidelines and model, as developed by Mark Rountree, but not yet published. Information was used from the SIBIS and VEGMAP products. A mean score between 0 and 4 is obtained, with 0 as the lowest and 4 as the highest score. No classification of the scores is given; the score is a linear score. These draft guidelines and model, was prescribed by the DWA, and is merely a more complete iteration of the previous Kleyhans model.

5 Results



Figure 2. Approximate wetland areas on site.

5.1 Southern wetland unit

5.1.1 Hydrogeomorphic and general description of wetland

This wetland unit is a channelled valley bottom wetland with large seepage zones to the sides. The seepage zones have a very shallow soil depth and a shallow perched water table. The channel is deeply eroded with several frontal and lateral headcuts.

5.1.2 Wetland delineation

5.1.2.1 Vegetation

The vegetation observed in the wetland areas include several wetland species, as well as several species that may occur in both wetland and terrestrial areas. The vegetation gives a very clear indication of the wetland boundaries on site. The transition from wetland to terrestrial vegetation is sharp and clear.



Figure 3. Seepage area with shallow perched water table.



Figure 4. Photograph illustrating the extent of the channelised valley bottom.

Table 2. Species recorded in the wetland sites.

Species	Alien	Wetland sp	North	South seepage	South temporary	South permanent
<i>Andropogon huillensis</i>		Y		x		
<i>Bulbostylis species</i>		Y	x			
<i>Commelina species</i>			x			
<i>Cymbopogon species</i>			x			
<i>Cynodon dactylon</i>			x		x	
<i>Cyperus congestus</i>		Y				x
<i>Cyperus eragrostis</i>		Y				x
<i>Cyperus longus</i>		Y				x
<i>Cyperus sexangularis</i>		Y				x
<i>Cyperus species</i>		Y	x	x	x	x
<i>Eragrostis gummiflua</i>		Y	x	x	x	
<i>Eragrostis plana</i>		Y			x	x
<i>Eragrostis racemosa</i>				x		
<i>Eucalyptus species</i>	Y				x	x
<i>Felicia muricata</i>			x			
<i>Fimbristylis complanata</i>		Y	x	x	x	x
<i>Fuirena species</i>		Y	x	x	x	
<i>Habenaria species</i>			x		x	
<i>Helichrysum nudifolium</i>		Y	x	x		

<i>Helichrysum species</i>				x		
<i>Heteropogon contortis</i>					x	
<i>Hyperthelia hirta</i>				x		
<i>Hypericum species</i>				x		
<i>Hypoxis species</i>				x	x	x
<i>Jacaranda mimosifolia</i>	Y			x		
<i>Juncus species</i>		Y		x		
<i>Kyllinga elagior</i>		Y				x
<i>Kyllinga species</i>		Y				x
<i>Ledebouria ovatifolia</i>				x		
<i>Melia azedarach</i>	Y			x		
<i>Monocymbium sericiforme</i>					x	x
<i>Oenothera rosea</i>	Y			x		
<i>Oxalis species</i>		Y		x		x
<i>Paspalum dilatatum</i>	Y			x	x	x
<i>Pennisetum clandestinum</i>	Y					x
<i>Perotis patens</i>				x		
<i>Persicaria species</i>		Y		x		
<i>Pogonarthria squarrosa</i>				x	x	
<i>Populus alba</i>	Y					x
<i>Pseudognaphalium luteo-alba</i>	Y			x		
<i>Schizachyrium jeffersy</i>				x	x	
<i>Schaenoplectus mauriculato</i>		Y				x
<i>Senecio cf inornatus</i>		Y		x		
<i>Senecio erubescens</i>						x
<i>Senecio species</i>					x	
<i>Seriphium plumosum</i>				x	x	
<i>Setaria sphacelata</i>		Y		x		
<i>Sporobolus africana</i>		Y		x		x
<i>Themeda triandra</i>					x	
<i>Trachypogon spicatus</i>				x		
<i>Typha capensis</i>		Y				x
<i>Verbena bonariense</i>	Y	Y		x		x

3.1.2.1. Topography

The wetland is located in a lower-lying area of the landscape, where valley bottom wetlands are expected. The seepage areas are also located on shallow soil on the slopes. The wetland boundaries therefore fit in well in the landscape.

3.1.2.2. Soil

The soil is a yellowish-brown sandy soil with red mottles. The depth of the soil varies from 5cm to more than 60cm. The soil is a good indicator of wetland conditions.

5.1.3 Present Ecological State

The Present Ecological State (PES) is calculated for the hydrology, geomorphology and vegetation of the wetland individually.

Hydrological – The PES class of the hydrology is C, which is moderately modified. The flood peaks are likely to be increased by the development upstream of the site. The channel competency of the wetland has also been increased by erosion. The system, however receives water from the seepages to the sides as well, which decreases the impacts.



Figure 1. Excavation in the northern seepage portion of the southern wetland.

Geomorphology – The geomorphology PES class of the wetland is C, which is moderately modified. The wetland is eroding with some large frontal and lateral headcuts present in the main channel of the wetland. There are two excavations in the seepage zone of the wetland collecting water.

Vegetation – The PES class is B for the vegetation component. This indicates that the vegetation is largely natural. Some dumps of invasive trees are present in the wetland and some of the vegetation is destroyed by the erosion and excavation activities in the wetland.



Figure 2. Large headcut in the southern wetland channel.

5.1.4 Ecological Importance and Sensitivity

The EIS is a broader index, and is used to gauge the value of larger systems. The wetland has an Ecological Importance and Sensitivity (EIS) score of 1.8. This is a value between 0 and 4, with 0 being very low and 4 very high. A value of four would be a wetland that is valuable on a National or international scale that is in excellent condition. This EIS score of the wetland is therefore moderate and it means the wetland is important on a local catchment scale. This score is affected by the location of the wetland in a Vulnerable vegetation type and on private land. The wetland is also in a fairly good condition for the region.

The hydro-functional importance score is 1.3, which is low to moderate and the direct human benefits score is 0.3 which is very low.

Table 3. Wetland importance and sensitivity scoring summary.

	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.8	3.8
HYDRO-FUNCTIONAL IMPORTANCE	1.3	3.5
DIRECT HUMAN BENEFITS	0.3	4.0

5.2 Northern wetland unit

5.2.1 Hydrogeomorphic and general description of wetland

The wetland is in the headwater of the Soutpanspruit stream. In this portion it is still considered to be a seepage wetland. The south-western portion of the system has a shallow perched water table. The water enters this zone from the adjacent rocky outcrop.

5.2.2 Wetland delineation

5.2.2.1 Vegetation

The south-western portion of the wetland is mostly dominated by *Trachypogon spicatus* which is not a wetland species, and *Seriphium plumosum* but several other wetland species are present, including species such as *Eragrostis gummiiflua* and several sedges. It is unclear why *Trachypogon spicatus* is present in the wetland area and the vegetation is therefore not considered to be a good indicator of the wetland boundaries. The rest of the wetland contains a number of wetland species.



Figure 7: *Trachypogon spicatus* and *Seriphium plumosum* dominance in the shallow perched water table portion of the wetland.

5.2.2.2 Topography

The wetland is located in a lower-lying area, at the headwaters of the Soutpanspruit stream. This is where a wetland is expected to be present.

5.2.2.3 Soil

The soil is a grey-brown sand with red mottles. In the south-western portion of the wetland, the rock is very shallow, around 3 to 10cm in depth. A shallow perched water table is therefore present in this area. The soil in the rest of the wetland area is mostly 50cm or more in depth.



Figure 8: Soil profile in the grey-brown soil unit.

5.3 Present Ecological State

The Present Ecological State (PES) is calculated for the hydrology, geomorphology and vegetation of the wetland individually.

Hydrological – The hydrology of the wetland is in PES class B, which is largely natural. The wetland is at the headwaters of a stream, in an area that is mostly without development, except for the road passing through the wetland. The flood peaks are therefore slightly increased, but it is unlikely that there is an increase or reduction in flows. An artificial channel is present in the wetland adjacent to the road to accommodate storm water.

Geomorphology – The PES class of the geomorphology is A, which is natural. A small artificial depression and storm water channel is present in the wetland. A large road also passes through the wetland with associated infill. This impact is not sufficiently addressed in the Wet-Health assessment. The geomorphology PES of the wetland should rather be considered to be in class B or C.



Figure 9: Sedge stems and artificial depression in the wetland.

Vegetation – The PES class of the wetland is C, which is moderately modified. Portions of the vegetation have been destroyed by the road and artificial channel. It also appears that a small portion may have been ploughed in the past.

5.2.9 Ecological Importance and Sensitivity

The EIS is a broader Index, and is used to gauge the value of larger systems. The wetland has an Ecological Importance and Sensitivity (EIS) score of 1.3. This is a value between 0 and 4, with 0 being very low and 4 very high. The score is therefore low to moderate and it means the wetland is important on a local catchment scale, the value is increased by the location of the wetland in a Vulnerable vegetation type and reduced because it is un-protected as it is on private land.

The hydro-functional importance score is 1.1, which is low to moderate and the direct human benefits score is 0.3 which is very low.

Table 8: Wetland Importance and Sensitivity scoring summary.

	Importance	Confidence
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.3	3.8
HYDRO-FUNCTIONAL IMPORTANCE	1.1	3.5
DIRECT HUMAN BENEFITS	0.2	4.0

5.3 Conservation Importance

All wetlands are considered to be of conservation importance by the Gauteng Department of Agriculture and Rural Development (GDARD) and is protected by law. The wetlands on site can therefore be considered to be of high conservation importance.

5.4 Buffers

A buffer is an area of land (next to a sensitive feature or ecosystem) designated as such and used to 'dilute' impacts from adjacent developments and activities in order to protect or preserve the sensitive feature or ecosystem. The size of the buffer zone is determined by the extent and magnitude of the impact from the adjacent activities or development and the sensitivity of the feature to be protected. Different buffer zones have been proposed for the protection of wetlands and rivers in South Africa, mostly ranging between 30m and 100m.

The Gauteng Department of Agriculture and Rural Development (GDARD) require a 30m buffer around wetlands and a 32m buffer around riparian areas inside the urban edge. A 30m buffer is therefore applicable to the wetland on site (GDARD 2012). If this is outside the urban edge a 50m buffer will apply.

A 30m buffer will suffice in this case, provided direct impacts on the wetland are avoided by incorporating the mitigation measures contained herein.

6 Sensitivity and conservation importance

The sensitivity map of the site was compiled according to the following categories:

- a) **No-Go:** These areas are of such value that no development should take place in this system. Wetlands are included herein for the range of impacts expected by the proposed development.

The entire wetland area is designated as having high conservation importance and sensitivity, as well as the buffer zone.

7 Impacts and Recommendations

No site plan was provided for the assessment. The recommendations included below are therefore general recommendations for the site and not specific to any development plan.

7.1 Site plan:

- No development may take place inside the wetland areas or their buffer areas.
- The wetland areas and its buffer zones must be incorporated into an open space system with an applicable management plan.
- The new development will increase the hard surfaces and remove vegetation and habitat, with the corresponding surface flow changes, the resulting impact will be net negative.
- In order to mitigate the above impacts as far as possible, the following needs to be done:
 - o Drainage from the hard surfaces must be diffuse and the outflows must be protected from erosion.

- o Impermeable surfaces should be minimised and permeable paving used wherever possible.
- o The areas that are not used for development should not be disturbed.
- o Energy dissipaters must be in place to lower the risk of erosion.

7.2 Storm water

- Storm water generated as a result of the development may not be focused on a specific area and directly released into the wetland on site. It has to flow off the developed area dispersed over a large area or the flow must be attenuated in another way, designed by the engineers, to not cause erosion at that specific location.
- A comprehensive storm water management plan must be compiled, indicating the management of all surface runoff generated on site as a result of the development (construction and operational phases). The plan must include the sediment and erosion control structures, as well as the “end of pipe” practices that will be applied on site.
- Maximise vegetated borders adjacent to the roads, and do not clear and flatten all the vegetation on the site, rather just the roads, and then the building foundations.
- Vegetated swales are required for storm water adjacent to all roads.
- A resident education program that explains the importance of vegetation in the township must be launched. The soil is mostly rocky and very shallow which will decrease the likelihood that subsistence farming and other gardening activities will be successful.
- The plan must indicate how the natural release and retention of surface runoff will be simulated to prevent degradation of the wetland. These measures must cater for the 2 year rainfall event. Larger events will be captured in the engineered drainage system.
- Special care must be taken during construction to ensure that sediment rich storm water does not enter the wetland and riparian areas.
- Mechanisms must be in place during the construction and operational phases to prevent erosion and to dissipate water energy.

7.3 Construction phase:

- No activity such as temporary housing and temporary ablution facilities may take place within the wetland or riparian buffer areas.
- The no-go areas must be fenced and clearly indicated as such.
- Any spillages of hazardous materials must be cleaned immediately and reported.
- Erosion and sediment control measures must be in place at all times.

7.4 Pollution

- All effluent from the site must be disposed of in a sufficient municipal system or alternative system. If the municipal system is used, sufficient capacity must be available.
- Any oil leaks on the construction vehicles must be fixed as soon as possible. Drip trays must be available and used on site.
- All hazardous materials, including oil and fuel, must be stored in a bunded area and measures taken to ensure that the soil are not polluted.

7.5 Buffer zone:

- According to the guideline for biodiversity assessments (GDARD 2007) a 30 m buffer zone is required around all wetlands within the urban edge.
- No aspect of the development will be allowed to occur within the buffer zone, including parking, stormwater attenuation and temporary and permanent structures.
- The only activities allowed in the buffer zone are low impact activities such as hiking and birding.
- Cattle currently graze on the property. The area for this will be reduced, increasing pressure on the wetland area. Focused grazing in the valley bottom section will likely impact heavily on the wetland and increase erosion.

7.6 Invasive species:

- Several species listed as alien invasive species are present on site.
- Under the Conservation of Agricultural Resources Act landowners are responsible for the invasive species on their properties.
- No invasive species may be present within 20m of a wetland and must be removed.
- Removal must take place in an appropriate manner, which includes:
 - o Avoid disturbance to the soil.
 - o Use only herbicides that are registered for use near water.
 - o First clear alien vegetation that occurs singly, and then move on to gradually reduce the size of clumps of alien vegetation.
 - o Do not clear all invasive species at once, since this will lead to large areas bare of vegetation and will lead to erosion and a large sediment load in the water. Aliens must be removed gradually over a long period and the trees replaced with indigenous trees.
 - o Follow-up work maintenance of cleared areas will be needed, so include this in the landscape maintenance contractor's contract.
 - o Do not damage any of the indigenous species on site.
- It is not a requirement that non-invasive alien species be removed.

7.7 Erosion control measures

Ensure that all erosion control measures are in good repair and working condition. Erosion control measures may take the following form:

- Sheet erosion: smooth the eroding area and install either high density jute matting or thick woven choir/coconut husk matting on the surface, it must be installed according to manufacturers guidelines, if these are absent the following applies:
 - o Peg spacing less than 50cm or better
 - o The matting must be flat on the surface of the soil, not raised above it at all.
 - o Overlaps in the matting must be between 30-50cm
 - o Jute matting applies only to slopes below 5% or very short slope lengths
 - o Thick choir matting applies only to slopes below 10% or very short slope lengths

- o The upslope edge of the matting must be buried under soil and folded over to protect the cover layer.
- Rill erosion: Same as above.
 - o Rill erosion is often associated with steeper slopes and choir matting is often the preferred cover.
 - o If the area is small and smoothing the rills impractical, the rills may be packed with the stored grass, this must be pegged and covered with jute or choir matting.
- Gullies or small head cuts.
 - o Use stored grass to line the gully with a 50mm dense layer of organic material.
 - o Pack the rock so that the rock interlocks and forms a dense layer to just below the surrounding soil surface.
- Stabilised outflows in lieu of formal permanent storm water outlets.
 - o Create a very smooth storm water outlet with as flat a slope as possible that does not encroach on the wetland.
 - o Use stored grass to line the storm water outflow with a 20mm dense layer of organic material.
 - o Cover with dense choir matting.
 - o Install pegs every 300mm
 - o Overlap adjacent mats with 500mm
 - o Large stones may be used between the pegs.
 - o Install sediment traps at the bottom of the outflow.
- Large head cuts are extremely unlikely on the site, due to the slopes and soil type. A large head cut will need a dedicated design to stabilise.

7.8 Sedimentation

The ED must investigate the downstream / lower lying areas for signs of sedimentation. Sedimentation will normally occur when erosion is taking place on site and sufficient sediment traps are not present. Sediment traps must be in good repair and should not be filled with sediment. Remove accumulated sediment from sediment traps after all rainfall events.

Sediment traps can be done in the following ways:

- Geotextile walls strung between wooden poles.
 - o The geotextile must be installed vertically and firmly attached to deeply hammered 50mm gumpoles.

- o The bottom edge must be buried under a layer of soil, upslope of the vertical wall.
- o The wall may be curved or straight to capture sediment as best possible.
- Haybales may be placed to capture sediment in higher flow conditions, or to receive the first sediment and slow down flow for geotextile wall traps.
 - o Haybales must be pegged down and set into the soil

8 Conclusion

Wetland areas are present along the southern border of the site and in the north-eastern corner of the site. Shallow perched water tables are present in the seepage zones of both of these wetlands. Several recommendations are included in this report to limit the potential impact of the development on the wetlands. These recommendations must be adhered to.

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Appendix A – Requirements for the wetland wetland map

PAGE 2: HGM UNIT 1

STEP 2: ASSESS HYDROLOGICAL HEALTH OF THE WETLAND

STEP 2A: EVALUATE CHANGES TO WATER INPUT CHARACTERISTICS FROM THE CATCHMENT

Nature of Alteration	Intensity rating guidelines	Alteration Class Score	Land-use factors contributing to impacts, and any additional notes
Reduction in flows (water inputs)	Table 5.1	0	
Increase in flows (water inputs)	Table 5.1	2	
Combined Impact Score		2	
Change in flood patterns (peaks)	Table 5.2	3	
Magnitude of Impact Score	Table 5.3	1.0	Note: Separate tables are provided for combining the scores for (a) floodplain and channelled valley bottom wetlands and (b) other HGM settings.

STEP 2B: EVALUATE CHANGES TO WATER DISTRIBUTION & RETENTION PATTERNS WITHIN THE WETLAND

	Intensity rating guidelines	Extent (%) ¹	Intensity (0 - 10)	Magnitude ²	Land-use factors contributing to impacts, and any additional notes
Gullies and artificial drainage channels	Table 5.5	10	5	0.5	
Modifications to existing channels	Table 5.6	60	5	3	
Reduced roughness	Table 5.7	20	1	0.2	
Impeding features (e.g. dams) – upstream effects	Table 5.8	0		0	
Impeding features – downstream effects	Table 5.9	0		0	
Increased on-site water use	Table 5.10	0		0	
Deposition/infilling or excavation	Table 5.11	5	2	0.1	
Combined Impact Score ³				3.8	

¹ Extent refers to the extent of the HGM unit affected by the modification expressed as a percentage of the total area of the HGM unit.

² Magnitude = Extent / 100 x Intensity

³ Calculated as the sum of magnitude scores across all modifications.

STEP 2C: DETERMINE THE OVERALL HYDROLOGICAL IMPACT SCORE OF THE HGM UNIT BASED ON INTEGRATING THE ASSESSMENTS FROM STEPS 2A AND 2B

Changes to water distribution & retention patterns	Table Reference	3.8	Any additional notes
Changes to Water Input characteristics		1.0	
Combined Hydrology Impact Score	Table 5.12	3.5	

STEP 2D: DETERMINE THE OVERALL PRESENT HYDROLOGICAL STATE OF THE WETLAND BASED ON INTEGRATING SCORES FROM INDIVIDUAL HGM UNITS

See summary page Table 5.28 - Integrates hydrological impact scores from each HGM unit

STEP 2E: ASSESS THE ANTICIPATED TRAJECTORY OF CHANGE OF THE WETLAND HYDROLOGY

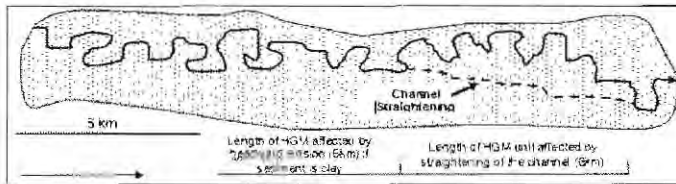
HGM Trajectory of Change score	Table 5.27	0

STEP 3: ASSESS GEOMORPHOLOGICAL HEALTH OF THE WETLAND

STEP 3A: DETERMINE THE PRESENT GEOMORPHIC STATE OF INDIVIDUAL HGM UNITS

Impact type	Applicability to HGM type	Extent rating guidelines	Extent (%) ¹	Intensity rating guidelines	Intensity (0 - 10)	Magnitude ²	Land-use factors contributing to impacts, and any additional notes
Diagnostic component							
(1) Upstream dams	Floodplain	See below ³	0	Table 5.14		0.0	
(2) Stream diversion/shortening	Floodplain, Channeled VB	See below ⁴	0	Table 5.15		0.0	
(3) Infilling	Floodplain, Channeled VB	See below ⁵	0	See below ⁵		0.0	
(4) Increased runoff	Non-floodplain HGMs	Table 5.16	100	Table 5.16	2	2.0	
Indicator-based component							
(5) Erosional features	All non-floodplain HGMs	Table 5.17	45	Table 5.18	5	2.7	
(6) Depositional features	All non-floodplain HGMs	Table 5.19	5	Table 5.20	1	0.1	
(6) Loss of organic matter	All non-floodplain HGMs with peat	see below ⁶	0	Table 5.21		0.0	
Combined Impact Score based on a sum of all magnitude scores⁷						2.4	

¹ Extent refers to the extent of the HGM unit affected by the modification, expressed as a percentage of the total area of the HGM unit.
² Magnitude = Extent (%) / 100 x Intensity.
³ Extent is determined based upon the area of the HGM unit that is flooded (in the case of a dam in the HGM unit) and the area of the HGM unit area downstream of the dam (for a dam upstream of the HGM unit, this will be 100% of the HGM unit).
⁴ Extent of area affected by stream straightening is expressed by measuring the length of the wetland affected by stream straightening and expressing this as a percentage of the overall length of the HGM unit. Extent of the wetland affected by stream diversions is determined based upon a distance upstream of the point of diversion along the channel of 20 km if the sediment is sandy and 5 km if it is clayey (or to the upstream end of the HGM unit if this is less than the specified distance). The specified distances are given based on the fact that headward erosion in the stream channel advances much more readily through sand than through clay. Assume that in the example given below the sediment was clayey, then the length of wetland affected by diversion and straightening would be 5 + 5 km, which, expressed as a proportion of the total length of the wetland, would be 11/17 km= 65%.
⁵ Extent of area affected by infilling is based on the following guideline: for a small stream (i.e., 1st to 2nd order stream), filled area + 1 km upstream and downstream, and for a large stream (i.e., > 3rd order) 2 km upstream and downstream. Intensity of impact is based on the extent to which flow is blocked by embankments given as a percentage of the HGM width, divided by 10 to give a score ranging from 0 to 10. For example, if embankments block flow across 1.4 km of an HGM unit that is 2 km wide (70% of width) then intensity of impact is 70/10=7.
⁶ Extent of the area affected by organic matter reduction is based on the extent of peat subject to desiccation, ground fires or extraction, expressed as a percentage of the HGM unit.
⁷ If no information on on-site indicators are available, this score is simply calculated as a sum of scores from the diagnostic assessment. Where information on both diagnostic & indicator assessments is available, the combined score is calculated by averaging the combined scores from each of these components.



STEP 3B: DETERMINE THE OVERALL PRESENT GEOMORPHIC STATE OF THE WETLAND BASED ON INTEGRATING SCORES FROM INDIVIDUAL HGM UNITS

See summary page Table 5.28 - integrates geomorphic impact scores from each HGM unit

STEP 3C: ASSESS THE ANTICIPATED TRAJECTORY OF CHANGE OF THE WETLAND GEOMORPHOLOGY

HGM Trajectory of Change score	Table 5.27	0
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STEP 4: ASSESS VEGETATION HEALTH OF THE WETLAND

STEP 4A: FAMILIARIZATION WITH THE GENERAL STRUCTURE AND COMPOSITION OF WETLAND VEGETATION IN THE AREA

STEP 4B: IDENTIFY AND ESTIMATE THE EXTENT OF DISTURBANCE CLASSES

See Column 2 in Table below

STEP 4C: ASSESS THE CHANGES TO VEGETATION COMPOSITION IN EACH CLASS, AND INTEGRATE THESE FOR THE OVERALL WETLAND

Disturbance Class	Extent (%)	Table references	Intensity (0 - 10) ¹	Magnitudes ²	Additional Notes
Infrastructure	0	Table 5.22 (Descriptions) & Table 5.23 (Typical Intensity Scores)		0.0	
Deep flooding by dams	0			0.0	
Shallow flooding by dams	0			0.0	
Crop lands	0			0.0	
Commercial plantations	0			0.0	
Annual pastures	0			0.0	
Perennial pastures	0			0.0	
Dense Alien vegetation patches	5			0.4	
Sports fields	0			0.0	
Gardens	0			0.0	
Areas of sediment deposition/ infilling & excavation	5			0.4	
Eroded areas	15			1.1	
Old / abandoned lands (Recent)	0			0.0	
Old / abandoned lands (Old)	0			0.0	
Seepage below dams	0			0.0	
Untransformed areas	50			0.0	
Overall weighted Impact score³				1.8	

¹ Default scores are provided which should be adjusted based on field investigations or local knowledge

² Magnitude of impact score is calculated as extent / 100 x intensity of impact.

³ The overall magnitude of impact score for the HGM unit is the sum of magnitude cores for each disturbance class

STEP 4D: DETERMINE THE PRESENT OVERALL VEGETATION STATE OF THE WETLAND BASED ON INTEGRATING SCORES FROM INDIVIDUAL HGM UNITS

See summary page Table 5.28 - Integrates vegetation impact scores from each HGM unit

STEP 4E: ASSESS THE ANTICIPATED TRAJECTORY OF CHANGE OF THE WETLAND VEGETATION

HGM Trajectory of Change score	Table 5.27	0
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PAGE 2: HGM UNIT 1

STEP 2: ASSESS HYDROLOGICAL HEALTH OF THE WETLAND

STEP 2A: EVALUATE CHANGES TO WATER INPUT CHARACTERISTICS FROM THE CATCHMENT

Nature of Alteration	Intensity rating guidelines	Alteration Class Score	Land-use factors contributing to impacts, and any additional notes
Reduction in flows (water inputs)	Table 5.1	0	
Increase in flows (water inputs)	Table 5.1	0	
Combined Impact Score		0	
Change in flood patterns (peaks)	Table 5.2	2	
Magnitude of impact Score	Table 5.3	0.0	Note: Separate tables are provided for combining the scores for (a) floodplain and channelled valley bottom wetlands and (b) other HGM settings.

STEP 2B: EVALUATE CHANGES TO WATER DISTRIBUTION & RETENTION PATTERNS WITHIN THE WETLAND

	Intensity rating guidelines	Extent (%) ¹	Intensity (0-10)	Magnitude ²	Land-use factors contributing to impacts, and any additional notes
Gullies and artificial drainage channels	Table 5.5	20	4	0.8	
Modifications to existing channels	Table 5.6	0	0	0	
Reduced roughness	Table 5.7	20	1	0.2	
Impeding features (e.g. dams) – upstream effects	Table 5.8	0	0	0	
Impeding features – downstream effects	Table 5.9	0	0	0	
Increased on-site water use	Table 5.10	0	0	0	
Deposition/infilling or excavation	Table 5.11	20	2	0.4	
Combined impact Score³				1.4	

¹ Extent refers to the extent of the HGM unit affected by the modification expressed as a percentage of the total area of the HGM unit

² Magnitude = Extent / 100 x Intensity

³ Calculated as the sum of magnitude scores across all modifications

STEP 2C: DETERMINE THE OVERALL HYDROLOGICAL IMPACT SCORE OF THE HGM UNIT BASED ON INTEGRATING THE ASSESSMENTS FROM STEPS 2A AND 2B

	Table Reference	Score	Any additional notes
Changes to water distribution & retention patterns		1.4	
Changes to Water Input characteristics		0.5	
Combined Hydrology Impact Score	Table 5.12	1.9	

STEP 2D: DETERMINE THE OVERALL PRESENT HYDROLOGICAL STATE OF THE WETLAND BASED ON INTEGRATING SCORES FROM INDIVIDUAL HGM UNITS

See summary page Table 6.28 - integrates hydrological impact scores from each HGM unit

STEP 2E: ASSESS THE ANTICIPATED TRAJECTORY OF CHANGE OF THE WETLAND HYDROLOGY

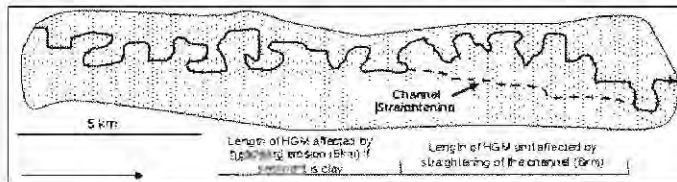
HGM Trajectory of Change score	Table 5.27	Score
		0

STEP 3: ASSESS GEOMORPHOLOGICAL HEALTH OF THE WETLAND

STEP 3A: DETERMINE THE PRESENT GEOMORPHIC STATE OF INDIVIDUAL HGM UNITS

Impact type	Applicability to HGM type	Extent rating guidelines	Extent (%) ¹	Intensity rating guidelines	Intensity (0 - 10)	Magnitude ²	Land-use factors contributing to impacts, and any additional notes
Diagnostic component							
(1) Upstream dams	Floodplain	See below ³		Table 5.14		0.0	
(2) Stream diversion/shortening	Floodplain, Channelled VB	See below ³		Table 5.15		0.0	
(3) Infilling	Floodplain, Channelled VB	See below ⁵		See below ⁵		0.0	
(4) Increased runoff	Non-floodplain HGMs	Table 5.16	50	Table 5.16	0	0.0	
Indicator-based component							
(5) Erosional features	All non-floodplain HGMs	Table 5.17	10	Table 5.18	2	0.2	
(6) Depositional features	All non-floodplain HGMs	Table 5.19	5	Table 5.20	1	0.1	
(6) Loss of organic matter	All non-floodplain HGMs with peat	see below ⁶		Table 5.21		0.0	
Combined Impact Score based on a sum of all magnitude scores⁷						0.1	

- 1 Extent refers to the extent of the HGM unit affected by the modification, expressed as a percentage of the total area of the HGM unit
- 2 Magnitude = Extent (%) / 100 x Intensity
- 3 Extent is determined based upon the area of the HGM unit that is flooded (in the case of a dam in the HGM unit) and the area of the HGM unit area downstream of the dam (for a dam upstream of the HGM unit, this will be 100% of the HGM unit)
- 4 Extent of area affected by stream straightening is expressed by measuring the length of the wetland affected by stream straightening and expressing this as a percentage of the overall length of the HGM unit. Extent of the wetland affected by stream diversions is determined based upon a distance upstream of the point of diversion along the channel of 20 km if the sediment is sandy and 5 km if it is clayey (or to the upstream end of the HGM unit if this is less than the specified distance). The specified distances are given based on the fact that headward erosion in the stream channel advances much more readily through sand than through clay. Assume that in the example given below the sediment was clayey, then the length of wetland affected by diversion and straightening would be 5 + 5 km, which, expressed as a proportion of the total length of the wetland, would be 11/17 km= 65%



- 5 Extent of area affected by infilling is based on the following guideline: for a small stream (i.e., 1st to 2nd order stream), filled area + 1 km upstream and downstream, and for a large stream (i.e., > 3rd order) 2 km upstream and downstream. Intensity of impact is based on the extent to which flow is blocked by embankments given as a percentage of the HGM width, divided by 10 to give a score ranging from 0 to 10. For example, if embankments block flow across 1.4 km of an HGM unit that is 2 km wide (70% of width) then intensity of impact is 70/10=7.
- 6 Extent of the area affected by organic matter reduction is based on the extent of peat subject to desiccation, ground fires or extraction, expressed as a percentage of the HGM unit.
- 7 If no information on on-site indicators are available, this score is simply calculated as a sum of scores from the diagnostic assessment. Where information on both diagnostic & indicator assessments is available, the combined score is calculated by averaging the combined scores from each of these components.

STEP 3B: DETERMINE THE OVERALL PRESENT GEOMORPHIC STATE OF THE WETLAND BASED ON INTEGRATING SCORES FROM INDIVIDUAL HGM UNITS

See summary page Table 5.28 - integrates geomorphic impact scores from each HGM unit

STEP 3C: ASSESS THE ANTICIPATED TRAJECTORY OF CHANGE OF THE WETLAND GEOMORPHOLOGY

HGM Trajectory of Change score	Table 5.27	0
--------------------------------	------------	---

STEP 4: ASSESS VEGETATION HEALTH OF THE WETLAND

STEP 4A: FAMILIARIZATION WITH THE GENERAL STRUCTURE AND COMPOSITION OF WETLAND VEGETATION IN THE AREA

STEP 4B: IDENTIFY AND ESTIMATE THE EXTENT OF DISTURBANCE CLASSES

See Column 2 in Table below

STEP 4C: ASSESS THE CHANGES TO VEGETATION COMPOSITION IN EACH CLASS, AND INTEGRATE THESE FOR THE OVERALL WETLAND

Disturbance Class	Extent (%)	Table references	Intensity (0 - 10)	Magnitude ²	Additional Notes	
Infrastructure	2	Table 5.22 (Descriptions) & Table 5.23 (Typical Intensity Scores)		0.2		
Deep flooding by dams	0			0.0		
Shallow flooding by dams	0			0.0		
Crop lands	0			0.0		
Commercial plantations	0			0.0		
Annual pastures	0			0.0		
Perennial pastures	0			0.0		
Dense Alien vegetation patches	0			0.0		
Sports fields	0			0.0		
Gardens	0			0.0		
Areas of sediment deposition/ infilling & excavation	20				1.6	
Eroded areas	5				0.4	
Old / abandoned lands (Recent)	0				0.0	
Old / abandoned lands (Old)	20				1.0	
Seepage below dams	0				0.0	
Untransformed areas	53				0.5	
Overall weighted impact score ³				3.7		

¹ Default scores are provided which should be adjusted based on field investigations or local knowledge

² Magnitude of impact score is calculated as extent / 100 x intensity of impact

³ The overall magnitude of impact score for the HGM unit is the sum of magnitude scores for each disturbance class

STEP 4D: DETERMINE THE PRESENT OVERALL VEGETATION STATE OF THE WETLAND BASED ON INTEGRATING SCORES FROM INDIVIDUAL HGM UNITS

See summary page Table 5.28 - integrates vegetation impact scores from each HGM unit

STEP 4E: ASSESS THE ANTICIPATED TRAJECTORY OF CHANGE OF THE WETLAND VEGETATION

HGM Trajectory of Change score	Table 5.27	0
--------------------------------	------------	---

Appendix B – PES calculation for the northern wetland unit

Appendix C – EIS calculation for the southern wetland

Ecological Importance and Sensitivity

ECOLOGICAL IMPORTANCE AND SENSITIVITY	Score (0-4)	Confidence (1-5)	Motivation
Biodiversity support	1.00	4.00	
Presence of Red Data species	1.00	4.00	None were observed and unlikely to be present.
Populations of unique species	1.00	5.00	Some <i>Habenaria</i> sp were observed in the wetland.
Migration/breeding/feeding sites	1.00	3.00	None observed and unlikely to be present often.
Landscape scale	1.80	4.00	
Protection status of the wetland	2.00	4.00	The wetland is located on private land, but likely to be developed.
Protection status of the vegetation type	2.00	5.00	The vegetation type is Vulnerable.
Regional context of the ecological integrity	2.00	4.00	The wetland has some erosion, but most wetlands in the area is more disturbed.
Size and rarity of the wetland type/s present	1.00	4.00	The wetland is fairly large but not very rare.
Diversity of habitat types	2.00	3.00	A number of habitat types are present.
Sensitivity of the wetland	1.33	3.33	
Sensitivity to changes in floods	2.00	4.00	The wetland is already affected by changes in the flood intensity.
Sensitivity to changes in low flows/dry season	1.00	3.00	The low flow are probably changed already as well.
Sensitivity to changes in water quality	1.00	3.00	The wetland is unlikely to be sensitive to changes in water quality.
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.8	3.8	

Hydro-functional Importance

HYDRO-FUNCTIONAL IMPORTANCE		Score (0-4)	Confidence (1-5)	Motivation	
Regulating & supporting benefits	Flood attenuation	1	4	The flood attenuation ability of the wetland is lowered by the erosion in the wetland.	
	Streamflow regulation	2	4	The seepage portions provide water to the system in the dry season.	
	Water Quality Enhancement	Sediment trapping	1	3	The wetland does not seem to trap a lot of sediment.
		Phosphate assimilation	2	3	The wetland receives some pollutants that can be captured to some extent.
		Nitrate assimilation	2	3	The wetland receives some pollutants that can be captured to some extent.
		Toxicant assimilation	2	3	The wetland receives some pollutants that can be captured to some extent.
		Erosion control	0	5	The system is eroding and therefore cannot provide erosion control.
		Carbon storage	0	5	No peat is present in the system.
HYDRO-FUNCTIONAL IMPORTANCE		1.3	3.5		

Direct Human Benefits

DIRECT HUMAN BENEFITS		Score (0-4)	Confidence (1-5)	Motivation
Subsistence benefits	Water for human use	0	4	No signs were seen that the water is used for human use.
	Harvestable resources	1	3	No signs of harvesting were observed, but some species in the wetland may be useful.
	Cultivated foods	0	4	No signs of cultivation were observed.
Cultural benefits	Cultural heritage	0	4	No signs of cultural importance were observed.
	Tourism and recreation	0	4	The wetland is not located in a site likely to be used for tourism or recreation.
	Education and research	1	4	The site may be useful for school trips, but is not likely to be used soon.
DIRECT HUMAN BENEFITS		0.3	4.0	

Appendix D - IBI calculation for the northern wetland

Ecological Importance and Sensitivity

ECOLOGICAL IMPORTANCE AND SENSITIVITY	Score (0-4)	Confidence (1-5)	Motivation
Biodiversity support	1.00	4.00	
Presence of Red Data species	1.00	4.00	None were observed and unlikely to be present.
Populations of unique species	1.00	5.00	Some <i>Habenaria</i> sp were observed in the wetland.
Migration/breeding/feeding sites	1.00	3.00	None observed and unlikely to be present often.
Landscape scale	1.20	4.00	
Protection status of the wetland	3.00	4.00	The wetland is located on private land, but likely to be developed.
Protection status of the vegetation type	3.00	5.00	The vegetation type is Vulnerable.
Regional context of the ecological integrity	1.00	4.00	The wetland is fairly disturbed and not very large on site.
Size and rarity of the wetland type/s present	1.00	4.00	The wetland is fairly large but not very rare.
Diversity of habitat types		3.00	The habitat diversity is low.
Sensitivity of the wetland	1.33	3.33	
Sensitivity to changes in floods	1.00	4.00	
Sensitivity to changes in low flows/dry season	2.00	3.00	
Sensitivity to changes in water quality	1.00	3.00	
ECOLOGICAL IMPORTANCE & SENSITIVITY	1.3	3.8	

Hydro-functional Importance

HYDRO-FUNCTIONAL IMPORTANCE		Score (0-4)	Confidence (1-5)	Motivation	
Regulating & supporting benefits	Flood attenuation	2	4	The wetland may have some flood attenuation function.	
	Streamflow regulation	2	4	The seepage portions provide water to the system in the dry season.	
	Water Quality Enhancement	Sediment trapping	1	3	The wetland does not seem trap a lot of sediment.
		Phosphate assimilation	1	3	The wetland probably receive some pollution from the road, but most of the water comes from the adjacent rocky outcrop.
		Nitrate assimilation	1	3	The wetland probably receive some pollution from the road, but most of the water comes from the adjacent rocky outcrop.
		Toxicant assimilation	1	3	The wetland probably receive some pollution from the road, but most of the water comes from the adjacent rocky outcrop.
		Erosion control	1	5	The wetland may have a limited erosion control function.
		Carbon storage	0	5	No peat is present in the system.
HYDRO-FUNCTIONAL IMPORTANCE		1.1	3.5		

Direct Human Benefits

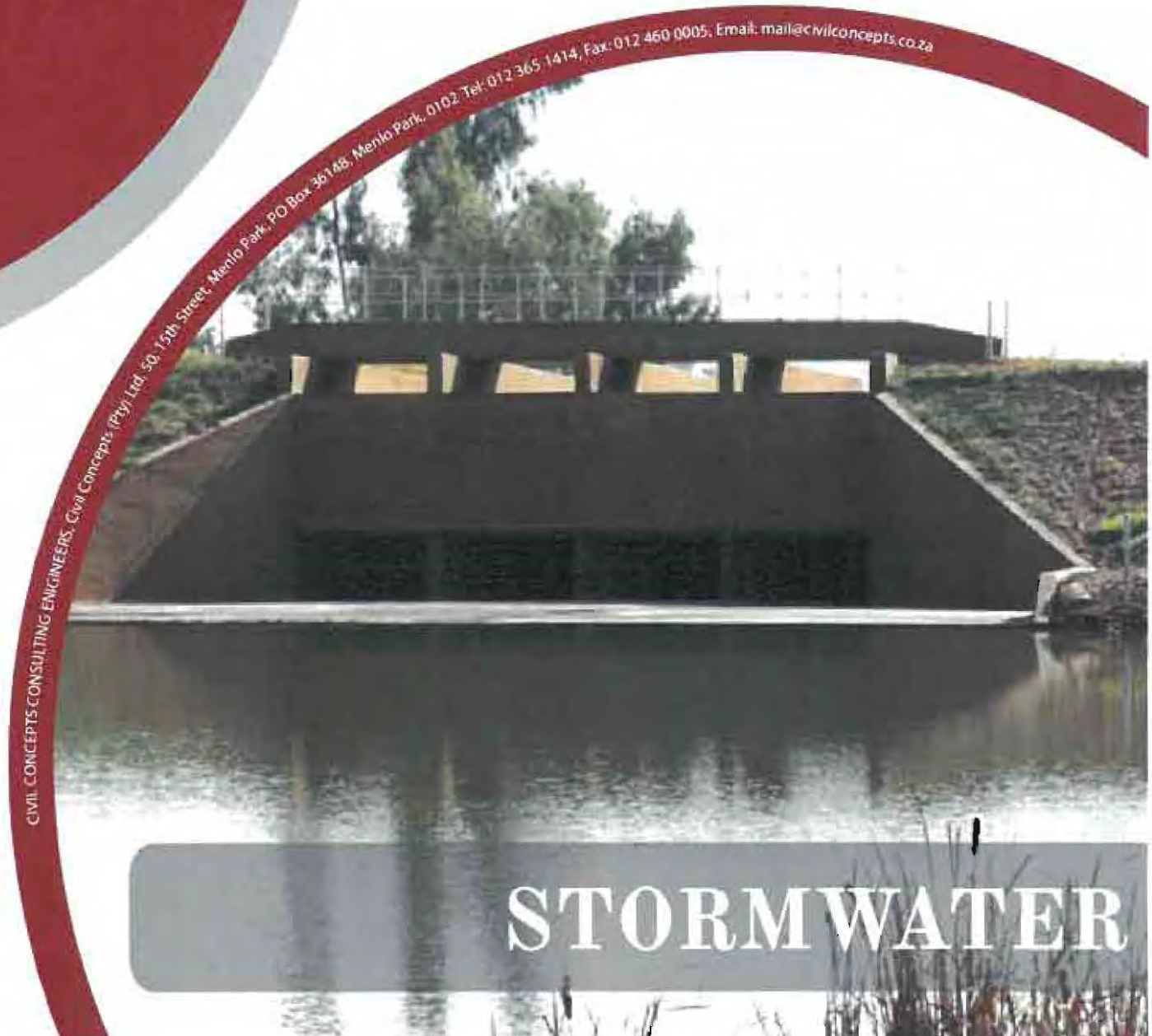
DIRECT HUMAN BENEFITS		Score (0-4)	Confidence (1-5)	Motivation
Subsistence benefits	Water for human use	0	4	No signs were seen that the water is used for human use.
	Harvestable resources	1	3	No signs of harvesting were observed, but some species in the wetland may be useful.
	Cultivated foods	0	4	No signs of cultivation were observed.
Cultural benefits	Cultural heritage	0	4	No signs of cultural importance were observed.
	Tourism and recreation	0	4	The wetland is not located in a site likely to be used for tourism or recreation.
	Education and research	0	4	The site is unlikely to be used for education or research.
DIRECT HUMAN BENEFITS		0.2	4.0	

ANNEXURE H – STORMWATER MANAGEMENT PLAN



STORMWATER MASTER PLANNING (SMP)
PART 2
REPORT NO: SMP/OND/2/REP
SEPTEMBER 2014

ONDERSTEPSPOORT EXT. 33, 34, 38 AND 39

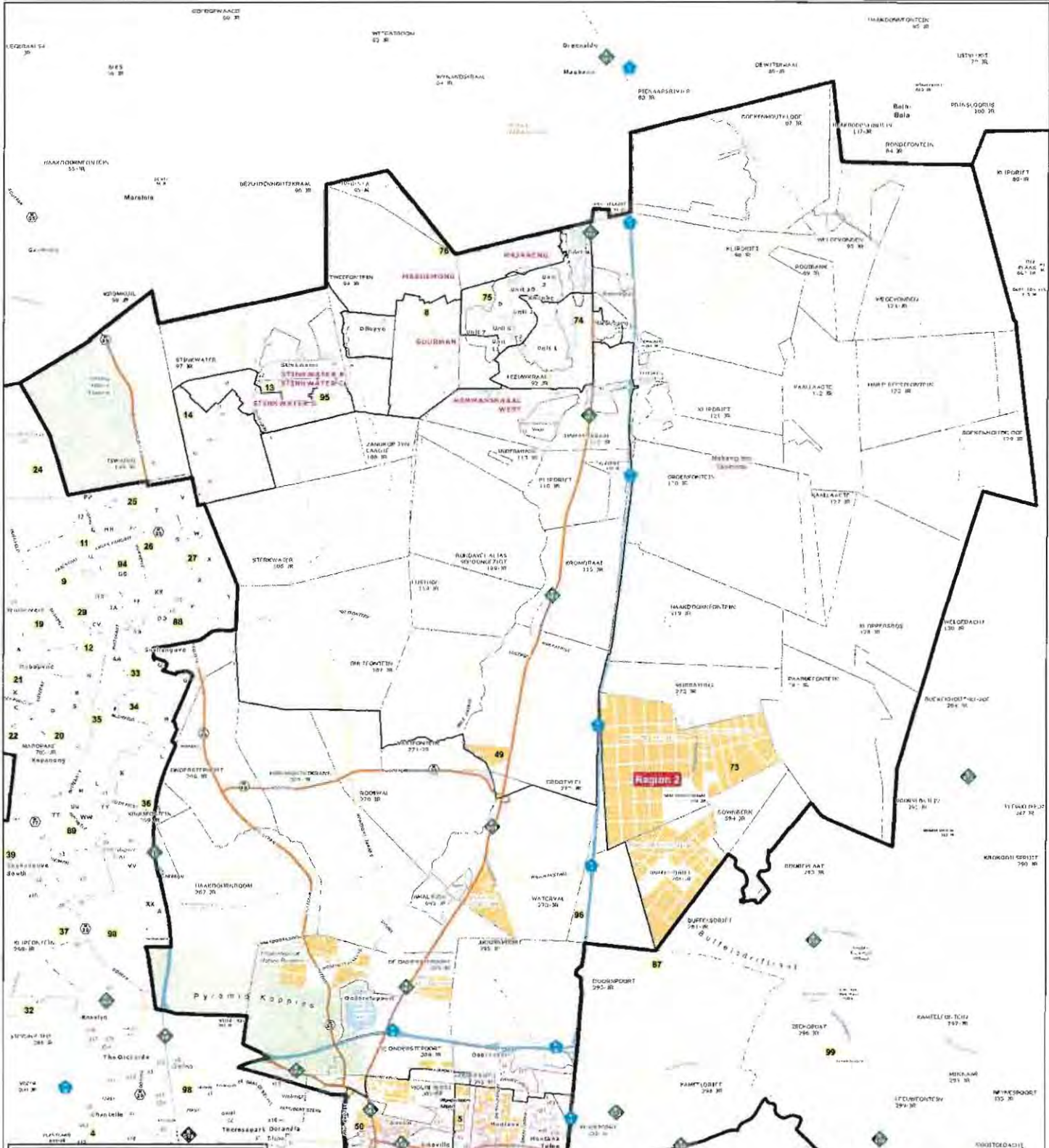


CIVIL CONCEPTS CONSULTING ENGINEERS, Civil Concepts (Pty) Ltd, 50, 11th Street, Menlo Park, PO Box 36148, Menlo Park, 0102 Tel: 012 365 1414, Fax: 012 460 0005, Email: mail@civilconcepts.co.za

STORMWATER

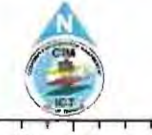
CITY OF TSHWANE

REGION 2



Legend

	Regional Boundary		Township
	Municipal Boundary		AH Township
	Ward Boundary		Farm
	Suburb		Dam
	Township		Airport
	Conservation Area		
	National / Provincial Freeway		
	Main Route		
	Main River		



0 1.5 3 6
Kilometers

Date: April 2013 File: Region_A3_2.mxd
Compiled and issued by: GTC, Cartography Management, J01
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While every care has been taken in compiling the information on this map, THE CITY OF TSHWANE cannot accept responsibility for any inaccuracies.
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3. General Drainage	1
4. Stormwater Design Principles	1
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6. Runoff Calculation	2
7. Catchment Areas and Drainage Proposals	3
8. Conclusion	4
Annexures A—C	

1. INTRODUCTION

Messrs Civil Concepts (Pty) Ltd were appointed by Abland (Pty) Ltd to compile a stormwater master plan (SMP) for Portions 68, 69 and 112 to 116 of the Farm Onderstepoort 266-JR to be known as Onderstepoort Ext. 33, 34, 38 and 39.

The study area forms part of the following drainage areas: DSP16489 and DAPDSRA139.

The major and minor routes were identified as well as other collector routes and the run-off magnitudes were calculated. Refer to Plans SMP/OND/2/001 to SMP/OND/2/002 (**Annexure B**) for the stormwater master plan layout.

This report describes the investigation, methodology and results of the SMP – major and minor stormwater networks.

2. STUDY AREA

The drainage area is located in Region 2 of Tshwane and forms part of the Farm Onderstepoort 266-JR, refer to locality plan in **Annexure A**. It has a study area of 73.65 ha, with 80 stormwater nodes.

3. GENERAL DRAINAGE

The study area is situated west of Soutpan Road (M35) and east of the Mabopane Highway (R80) Mabopane Road (K2) divide the study area into 2 sections (north and south).

The northern portion of the study area has 2 drainage directions, the western portion draining towards the north east, where its final outlet will be into the Soutpan Spruit. The eastern portion drain towards the SP13T tributary of the Soutpan Spruit.

The southern portion of the study area drains south towards the APKAMM2T tributary of the Apies River.

Also note, Mabopane Road forms the watershed between the Apies River and the Soutpan Spruit.

The topography of the study area is steep, with an average ground slope of 3.8%.

4. STORMWATER DESIGN PRINCIPLES

For this study the City of Tshwane Specifications and Guidelines – Local Stormwater Master Plans November 2006 1st Revision were used.

5. SMP DESIGN APPROACH

This SMP consists of major and minor drainage networks.

The design of the networks are based on the following:

- Selection of appropriate design standards;
- Determination of the major catchments and sub-catchments for the area;
- Capturing the topographical data for each catchment i.e. slope, size, imperviousness percentage and overland flow length.
- Determination of an anticipated stormwater drainage network and physical properties, i.e. length and slope.
- Determination of the required type and sizes of the drainage network elements through hydrological modelling using Hydrosim V software.

For this SMP a stormwater node or connection was provided for each sub-catchment in order to comply with stormwater design guidelines.

All systems were considered major networks to accommodate the 1:20 year run-off for each sub-catchment.

Both the 1:2 year and 1:20 year run-off are provided with anticipated sizing of elements, refer to **Annexure C**.

The developer will conduct as part of detail design to determine if only a 1:2 year connection can be provide or if a 1:20 year connection is required. Utilisation of road capacity must also be investigated. The final sizing of elements will be depend on the actual slope, road capacity and location.

6. RUN-OFF CALCULATION

The run-off's were calculated using Hydrosim V software. The following constants were used in the calculations:

- MAP – 607 mm
- Hydrograph Type – Triangular
- Time to Peak Ration – 0.35
- Minimum Storm Duration – 30 Min
- Imperviousness – Between 5 and 90%
- Run-off lengths – Actual
- Infiltration Routine – Horton – 0.00139

7. CATCHMENT AND DRAINAGE PROPOSALS

The study area has been divided into 3 main catchments:



Catchment 1

Catchment 1 is situated in the north eastern corner of the study area.

The catchment drains north east towards the Soutpan Spruit tributary SP13T. The drainage elements for this catchment varies in size from 450 mm \emptyset to 900 mm \emptyset pipe culverts (for major systems).

Refer to **Annexure C** for the detailed run-off calculations and sizes.

Catchment 2

Catchment 2 is situated in the north western corner of the study area. It is the smallest of the three main drainage areas.

The catchment drains north west towards an open area and drainage elements for this catchment varies in size from 450 mm \emptyset to 525 mm \emptyset pipe culverts (for major systems).

Refer to **Annexure C** for the detailed run-off calculations and sizes.

Catchment 3

Catchment 3 is the largest of the catchments and is situated in the southern portion of the study area.

The catchment drains south towards the Apies River Tributary APKAMM2T. The drainage elements for this catchment varies in size from 450 mm \emptyset to 1350 mm \emptyset pipe culverts (for major systems).

Refer to **Annexure C** for the detailed run-off calculations and sizes.

8. **CONCLUSION**

The SMP Part 1 and 2 were completed simultaneously which addresses both the major and minor stormwater systems.

The type and size of each element can be determined during detail design phases, as well as the impact of the road capacity and the total cost of all the proposed networks.

We trust the above meets your approval and await your feedback.

Yours faithfully,

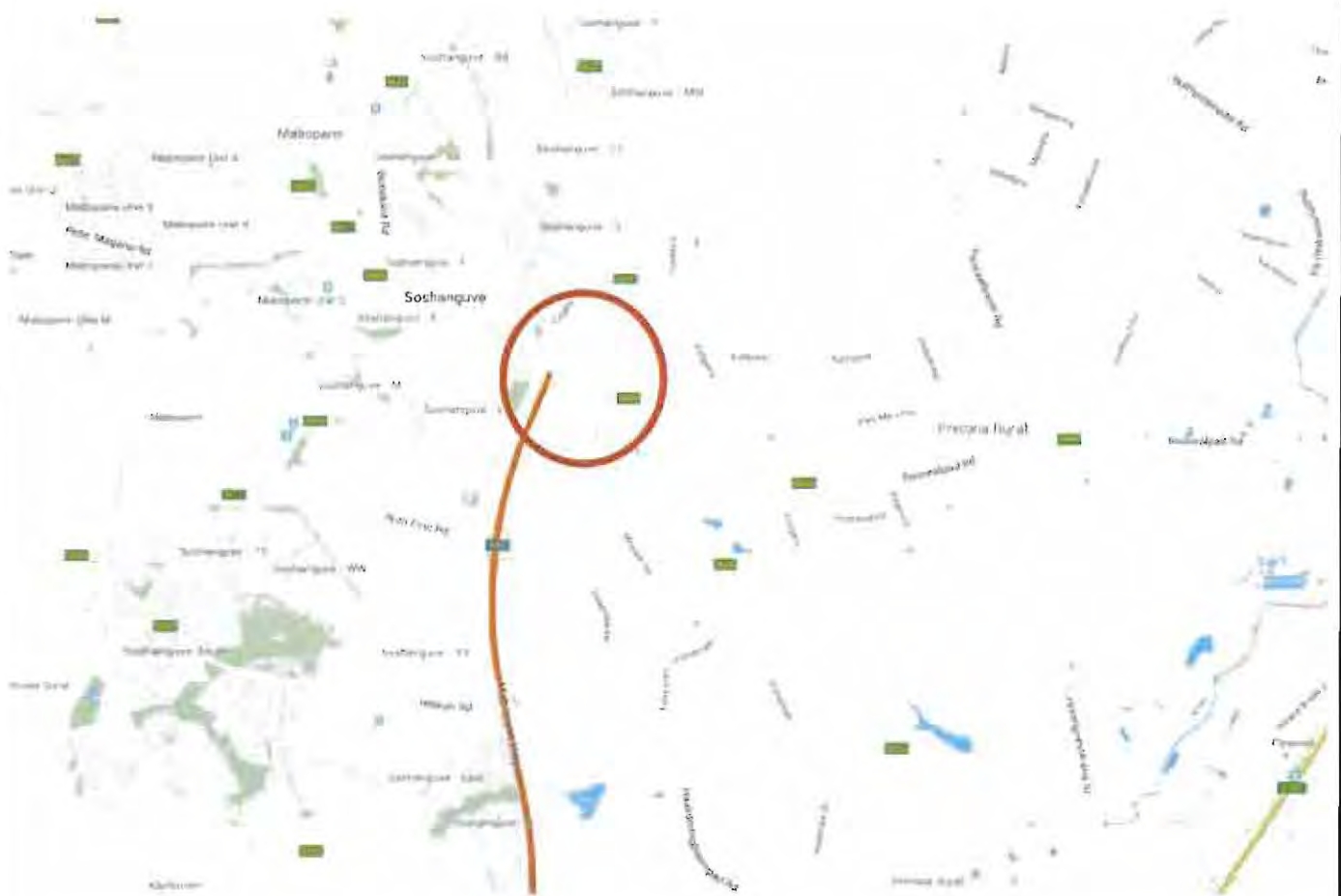
A handwritten signature in black ink, appearing to read 'W. Stander'.

Werner Stander
for Civil Concepts (Pty) Ltd

September 2014



ANNEXURE A
LOCALITY PLAN



LOCALITY PLAN

ONDERSTEPOORT EXT. 33, 34, 38 & 39





ANNEXURE B

STORMWATER MASTER PLAN
SMP/OND/2/001 TO SMP/OND/2/002

NOTES:

1. RUN-OFF CALCULATION PERFORMED WITH HYDRO3IN COMPUTER PROGRAM, USING THE FOLLOWING CONSTANTS:

- a) RETURN PERIOD:
 - MAJOR SYSTEM : 20 YR
 - MINOR SYSTEM : 2 YR
- b) MAP = 607 mm

- c) % IMPERVIOUSNESS:
 - RESIDENTIAL : 45-50%
 - OPEN SPACES : 5%

LEGEND

- SUBCATCHMENTS
- RAIN CATCHMENTS
- STORMWATER ROUTES
- NATURAL STREAM NODES
- STORMWATER NODES
- TSHWANE RIVERS
- 100 FLOODLINE (DONE BY SRK)
- 50 YEAR FLOODLINE (DONE BY SRK)



1	03/02/2014	REVISED ISSUE
0	23/02/2014	FINAL ISSUE

REVISION
CLIENT



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TSHWANE STORMWATER MASTER PLANNING PART 2 : NETWORK MODELLING

FORMERLY: **THE FARM ONDERSTEPURT 286-JR (ONDERSTEPURT EXT. 30)**

DRAWING NO: **SMF/OND/2001**

DESIGNED	W. STRIEMER
DRAWN	T. VAN NENKERK
CHECKED	W. STANGER

SCALE 1 : 1 500

CONTINUE ON SMF/OND/2001

NOTES:

1. RUN-OFF CALCULATION PERFORMED WITH HYDROSIM COMPUTER PROGRAM, USING THE FOLLOWING CONSTANTS:

- a) RETURN PERIOD:
 - MAJOR SYSTEM : 30 YR
 - MINOR SYSTEM : 2 YR
- b) MAP = 607 MM

c) % IMPERVIOUSNESS:

- RESIDENTIAL : 45-70%
- OPEN SPACES : 5%

LEGEND

- SUBCATCHMENTS
- MAIN CATCHMENTS
- STORMWATER ROUTES
- NATURAL STREAM HOLES
- STORMWATER HOLES
- TSWANE RIVERS
- 100 FLOODLINE (DUNE BY 30K)
- 50 YEAR FLOODLINE (DUNE BY 30K)

1	06/09/2014	REVISED DRAWING
2	28/07/2014	FIRST ISSUE
REVISION		
SUBMIT		



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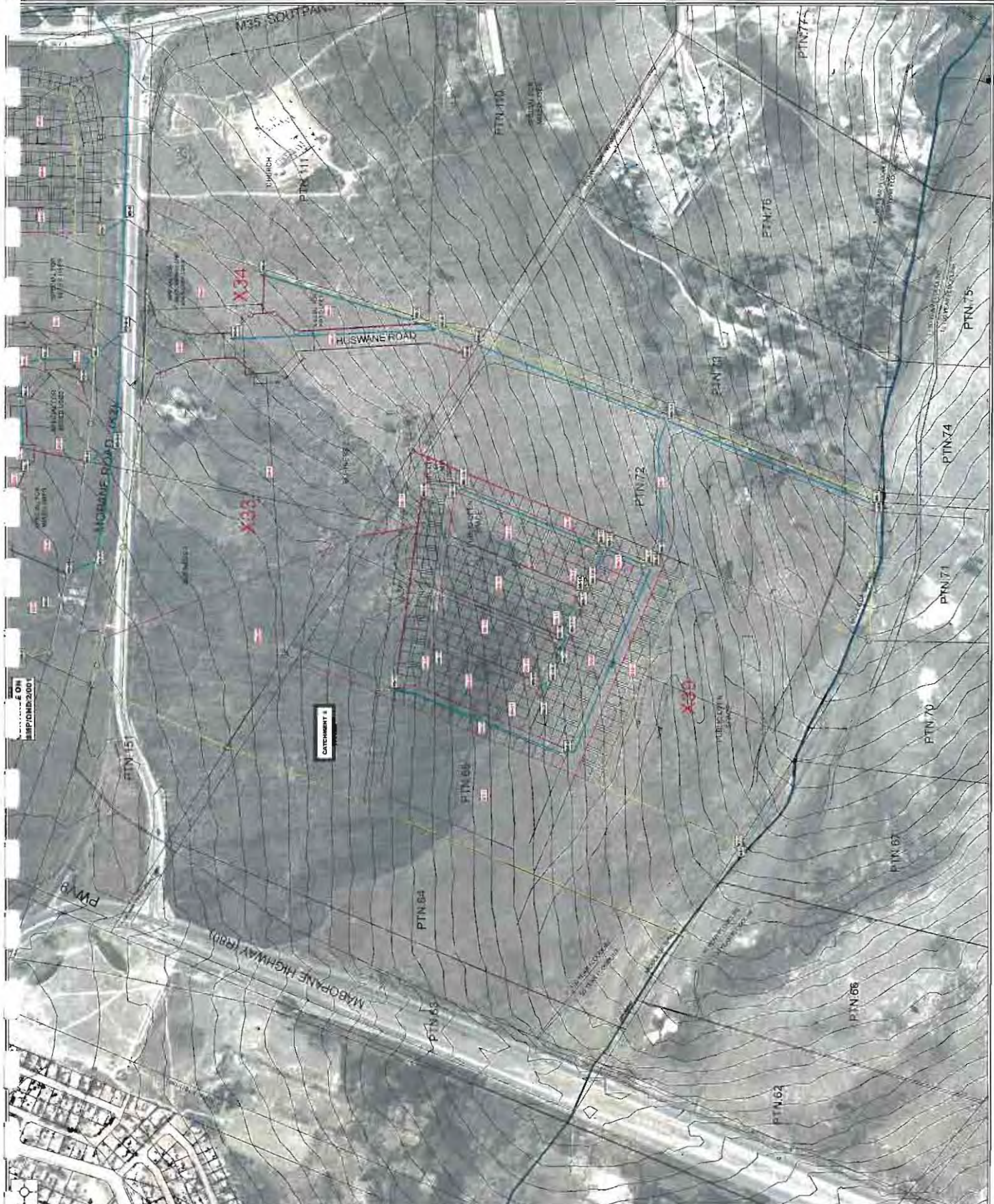
TSWANE STORMWATER MASTER PLANNING PART 2 : NETWORK MODELLING

PORTIONS 88, 89 AND 112 - 116 OF THE FARM ONDERSTEEPOORT 266-JR (ONDERSTEEPOORT EXT. 33, 34 & 39)

DRAWING NO

SHP/OND/2002

DESIGNED	W STANHOPE
DRAWN	J VAN HEERIK
CHECKED	W STANHOPE
SCALE	1 : 1 500



SCALE ON SHP/OND/2002

CATCHMENT 1



ANNEXURE C

RESULT TABLE 2 AND 20 YEAR RUN-OFF

SMP (PORTION 68, 69 AND 112 - 116 OF THE FARM ONDERSTEOORT 266-JR)

Total Area: 73.65

STORMSHAPE:Triangular

M.A.P:607

Pipe No	2 YEAR RUN-OFF						20 YEAR RUN-OFF					
	InletPeak (m3/sec)	Peakflow (m3/sec)	Capacity (m3/sec)	Required Diameter(m)	Velocity (m/sec)	Storm Duration(min)	InletPeak (m3/sec)	Peakflow (m3/sec)	Capacity (m3/sec)	Required Diameter(m)	Velocity (m/sec)	Storm Duration(min)
R1-1	0.0843	0.1158	0.5850	0.450	2.715	30	0.198	0.284	0.585	0.450	3.452	30
R1-2	0.0353	0.0353	0.7279	0.450	2.242	30	0.095	0.095	0.728	0.450	2.999	30
R2-1	0.1032	1.3477	1.5488	0.675	4.552	15	0.215	2.917	3.336	0.900	5.535	30
R2-10	0.0650	0.1151	0.6126	0.450	2.806	15	0.131	0.241	0.613	0.450	3.431	30
R2-11	0.0416	0.0506	0.7279	0.450	2.498	15	0.079	0.111	0.728	0.450	3.129	30
R2-12	0.0153	0.0153	0.6035	0.450	1.528	30	0.038	0.038	0.604	0.450	2.015	30
R2-13	0.0644	0.3833	0.6126	0.450	3.780	15	0.133	0.780	0.924	0.525	4.485	30
R2-14	0.0604	0.3199	0.5559	0.450	3.365	15	0.121	0.647	0.839	0.525	4.018	30
R2-14-1	0.0000	0.1770	0.6889	0.450	3.380	15	0.000	0.360	0.689	0.450	4.133	30
R2-15	0.0475	0.1322	0.8339	0.450	3.575	15	0.083	0.269	0.834	0.450	4.421	30
R2-16	0.0542	0.0895	0.7792	0.450	3.066	15	0.114	0.189	0.779	0.450	3.828	30
R2-17	0.0831	0.0831	0.7203	0.450	2.814	15	0.166	0.166	0.720	0.450	3.478	30
R2-18	0.0452	0.0451	0.9099	0.450	2.771	15	0.091	0.091	0.910	0.450	3.462	30
R2-19	0.0353	0.0353	0.8977	0.450	2.571	15	0.075	0.075	0.898	0.450	3.248	30
R2-2	0.1897	1.2478	1.3386	0.600	5.017	15	0.448	2.704	3.129	0.825	6.175	30
R2-3	0.1192	0.3630	0.6477	0.450	3.932	15	0.264	0.782	0.977	0.525	4.713	30
R2-4	0.0537	0.1290	0.6391	0.450	2.960	15	0.107	0.277	0.639	0.450	3.664	30
R2-5	0.0764	0.0764	0.6035	0.450	2.465	15	0.172	0.172	0.604	0.450	3.087	30
R2-6	0.0491	0.7058	0.9769	0.525	4.613	15	0.096	1.481	1.910	0.675	5.552	30
R2-6-1	0.0000	0.6588	0.7721	0.450	5.102	15	0.000	1.387	1.663	0.600	6.184	30
R2-7	0.0538	0.2765	0.6391	0.450	3.612	15	0.118	0.613	0.639	0.450	4.256	30
R2-7-1	0.0000	0.2230	0.4332	0.450	2.561	15	0.000	0.496	0.653	0.525	3.122	30
R2-8	0.1324	0.1321	0.4203	0.450	2.219	15	0.296	0.296	0.420	0.450	2.694	30
R2-9	0.0914	0.0914	0.6126	0.450	2.590	15	0.200	0.200	0.613	0.450	3.256	30
R3-1	0.1091	0.1091	0.6035	0.450	2.722	15	0.225	0.224	0.604	0.450	3.312	30
R4-1	0.0821	0.4568	0.7126	0.450	4.479	30	0.169	1.092	1.535	0.600	5.559	30
R4-2	0.1211	0.3860	0.7576	0.450	4.526	30	0.305	0.932	1.143	0.525	5.528	30
R4-3	0.0000	0.2662	0.4457	0.450	2.760	30	0.000	0.630	0.672	0.525	3.289	30

SMP (PORTION 68, 69 AND 112 - 116 OF THE FARM ONDERSTEOORT 266-JR)

Total Area: 73.65

STORMSHAPE: Triangular

M.A.P:607

Pipe No	2 YEAR RUN-OFF						20 YEAR RUN-OFF					
	InletPeak (m3/sec)	Peakflow (m3/sec)	Capacity (m3/sec)	Required Diameter(m)	Velocity (m/sec)	Storm Duration(min)	InletPeak (m3/sec)	Peakflow (m3/sec)	Capacity (m3/sec)	Required Diameter(m)	Velocity (m/sec)	Storm Duration(min)
R4-3-1	0.0000	0.2663	0.5459	0.450	3.222	30	0.000	0.630	0.823	0.525	3.939	30
R4-4	0.1300	0.1300	0.4699	0.450	2.394	30	0.310	0.310	0.470	0.450	2.979	30
R4-5	0.0687	0.1370	0.6126	0.450	2.936	15	0.143	0.321	0.613	0.450	3.682	30
R4-6	0.0761	0.0761	0.6561	0.450	2.608	30	0.183	0.183	0.656	0.450	3.344	30
R4-7	0.0172	0.2079	0.6216	0.450	3.329	30	0.034	0.501	0.622	0.450	4.082	30
R4-8	0.0300	0.0300	0.5459	0.450	1.747	30	0.071	0.071	0.546	0.450	2.251	30
R4-9	0.1641	0.1641	0.5850	0.450	2.984	30	0.399	0.399	0.585	0.450	3.724	30
R5-0	0.0000	1.0603	1.3853	0.675	4.011	30	0.000	2.489	2.983	0.900	4.926	30
R5-0-1	0.0000	0.8909	1.1313	0.600	4.163	15	0.000	2.074	2.645	0.825	5.146	30
R5-0-2	0.0000	0.3315	0.5253	0.450	3.290	30	0.000	0.784	0.792	0.525	3.880	30
R5-0-3	0.0000	0.1750	0.4580	0.450	2.543	30	0.000	0.417	0.458	0.450	3.051	30
R5-1	0.1759	0.1759	0.4203	0.450	2.391	30	0.419	0.419	0.420	0.450	2.798	30
R5-2	0.0832	0.5715	0.5755	0.450	3.833	15	0.156	1.291	1.697	0.675	4.896	30
R5-3	0.1019	0.3694	0.5490	0.525	2.567	30	0.240	0.869	1.073	0.675	3.138	30
R5-3-1	0.0000	0.2686	0.3322	0.450	2.184	15	0.000	0.630	0.716	0.600	2.675	30
R5-4	0.1035	0.1035	0.4457	0.450	2.155	15	0.215	0.214	0.446	0.450	2.613	30
R5-5	0.1339	0.1338	0.5943	0.450	2.842	15	0.281	0.281	0.594	0.450	3.488	30
R5-6	0.0466	0.1764	0.5357	0.450	2.861	30	0.096	0.421	0.536	0.450	3.508	30
R5-7	0.1367	0.1366	0.5147	0.450	2.586	30	0.331	0.330	0.515	0.450	3.237	30
R5-8	0.1575	0.1575	0.5943	0.450	2.990	30	0.370	0.370	0.594	0.450	3.717	30
R5-9	0.1750	0.1750	0.4580	0.450	2.543	30	0.417	0.417	0.458	0.450	3.054	30
R6-1	0.4520	3.6115	3.8899	0.900	6.478	30	1.274	8.975	11.469	1.350	8.348	30
R6-1-1	0.0000	3.2899	3.3034	0.825	6.547	30	0.000	8.027	8.972	1.200	8.399	30
R6-10	0.6192	0.6189	0.6561	0.450	4.371	30	1.548	1.548	1.934	0.675	5.648	30
R6-11	0.0304	0.9399	1.2185	0.600	4.435	15	0.060	2.104	2.209	0.750	5.295	30
R6-12	0.0542	0.9103	0.9640	0.525	4.716	15	0.113	2.045	2.495	0.750	5.910	30
R6-12-1	0.0000	0.5184	0.7600	0.525	3.532	15	0.000	1.130	1.486	0.675	4.298	30
R6-13	0.1346	0.3444	0.5943	0.450	3.649	15	0.320	0.810	0.897	0.525	4.387	30

SMP (PORTION 68, 69 AND 112 - 116 OF THE FARM ONDERSTEPSOORT 266-JR)

Total Area: 73.65

STORMSHAPE: Triangular

M.A.P:607

Pipe No	2 YEAR RUN-OFF						20 YEAR RUN-OFF					
	InletPeak (m3/sec)	Peakflow (m3/sec)	Capacity (m3/sec)	Required Diameter(m)	Velocity (m/sec)	Storm Duration(min)	InletPeak (m3/sec)	Peakflow (m3/sec)	Capacity (m3/sec)	Required Diameter(m)	Velocity (m/sec)	Storm Duration(min)
R6-13-1	0.0000	0.2127	0.6304	0.450	3.385	15	0.000	0.490	0.630	0.450	4.120	30
R6-14	0.0881	0.0880	0.8273	0.450	3.144	15	0.180	0.180	0.827	0.450	3.928	30
R6-15	0.1333	0.1333	0.7649	0.450	3.413	30	0.316	0.316	0.765	0.450	4.321	30
R6-16	0.1369	0.1368	0.7792	0.450	3.493	15	0.311	0.311	0.779	0.450	4.361	30
R6-17	0.0532	0.3830	0.6126	0.450	3.814	15	0.105	0.820	0.924	0.525	4.515	30
R6-17-1	0.0000	0.3312	0.5658	0.450	3.463	15	0.000	0.717	0.853	0.525	4.147	30
R6-18	0.1129	0.1128	0.6889	0.450	2.984	15	0.253	0.253	0.689	0.450	3.773	30
R6-19	0.0598	0.2186	0.5253	0.450	2.963	15	0.125	0.464	0.525	0.450	3.494	30
R6-19-1	0.0000	0.1589	0.5039	0.450	2.637	15	0.000	0.339	0.504	0.450	3.206	30
R6-2	0.1343	1.4583	1.8326	0.675	5.338	30	0.325	3.613	3.947	0.900	6.571	30
R6-2-1	0.0000	0.4248	0.5850	0.450	3.768	15	0.000	0.957	1.260	0.600	4.606	30
R6-20	0.0995	0.0995	0.6809	0.450	2.860	15	0.219	0.219	0.681	0.450	3.602	30
R6-21	0.0597	0.0596	0.5039	0.450	1.973	15	0.122	0.122	0.504	0.450	2.464	30
R6-3	0.1010	0.3379	0.4815	0.450	3.080	15	0.240	0.764	1.037	0.600	3.765	30
R6-4	0.2405	0.2404	0.4928	0.450	2.912	15	0.529	0.528	0.743	0.525	3.508	30
R6-5	0.0871	0.0871	0.5755	0.450	2.468	15	0.194	0.194	0.575	0.450	3.079	30
R6-6	0.9481	0.9481	1.3386	0.600	4.841	30	2.418	2.418	2.427	0.750	5.824	30
R6-7	0.0601	1.8434	2.2442	0.825	4.401	30	0.148	4.436	6.095	1.200	5.530	30
R6-8	0.2212	1.7843	2.0098	0.750	4.812	30	0.535	4.292	4.930	1.050	6.009	30
R6-9	0.0788	0.6942	0.7433	0.525	3.640	30	0.187	1.727	1.924	0.750	4.612	30
R7-1	0.3438	0.3438	0.5039	0.450	3.219	75	0.976	0.976	1.085	0.600	4.068	60
R8-1	0.1128	0.3187	0.5039	0.450	3.157	15	0.265	0.737	0.760	0.525	3.721	30
R8-2	0.1407	0.1406	0.3931	0.450	2.142	30	0.331	0.331	0.393	0.450	2.600	30
R8-3	0.0735	0.0731	0.4815	0.450	2.033	15	0.146	0.146	0.481	0.450	2.510	30

ANNEXURE J – VEGETATION REPORT



**An assessment of the vegetation on Portions 68, 69,
and 112 to 116 of the Farm Onderstepoort 266JR,**

Gauteng

March 2014

**An assessment of the vegetation on Portions 68, 69,
and 112 to 116 of the Farm Onderstepoort 266JR,
Gauteng**

by
GJ Bredenkamp DSc PrSciNat

Commissioned by

Ecologic AFRICA

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March 2014



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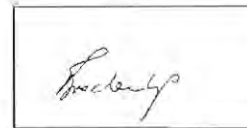
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DECLARATION OF INDEPENDENCE

I, George Johannes Bredenkamp, Id 4602105019086, declare that I:

I, George Johannes Bredenkamp, Id 4602105019086, declare that I:

- Hold a DSc in biological sciences, am registered with SACNASP as a professional ecological scientist which sanctions me to function independently as a specialist consultant
- Declare that, as per prerequisites of the Natural Scientific Professions Act No. 27 of 2003, this project was my work from its inception, reflects exclusively my observations and unbiased scientific interpretations, and was executed to the best of my ability
- abide by the Code of Ethics of the SACNASP
- Am the owner of Eco-Agent CC, CK 95/37116/23
- Act as an independent specialist consultant in the field of ecology, vegetation science and botany
- Am committed to biodiversity conservation but concomitantly recognize the need for economic development
- Am assigned as specialist consultant by Ecologic AFRIKA for the proposed project "An assessment of the vegetation on Portions 68, 69, and 112 to 116 of the Farm Onderstepoort 266JR, Gauteng" described in this report
- Do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work performed
- Have or will not have any 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 client and the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2010
- Will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.
- Reserve the right to only transfer my intellectual property contained in this report to the client(s), (party or company that commissioned the work) on full payment of the contract fee. Upon transfer of the intellectual property, I recognise that written consent from the client(s) will be required for me to release any part of this report to third parties.



GJ Bredenkamp

SUMMARY

Three different plant communities / ecosystems were identified:

Plant Community	Sensitivity
1 Grassland	High*
2 Bushveld on Hill	High
3 Spruit and Wetland	High

According to the relevant legislation and GDARD regulations, all wetlands (including rivers and spruits) must be regarded as ecologically sensitive and a wetland specialist study must be done. The spruit and wetland are located on the southern boundary of the site, but will affect the southern part of the proposed development. It is therefore strongly recommended that an independent wetland specialist compile a study of the spruit and wetland on the site.

The hill on the site contains a number of indigenous tree species and represents a specific habitat, where the protected *Aloe pretonensis* and the protected reptile, the Python, were found. According to the GDARD hills and ridges policy, this area should be regarded and sensitive, and if at all possible, be protected.

The GDARD minimum requirements also state that all primary grassland should be indicated as ecologically sensitive. This particular grassland area is, albeit primary, quite close to the highly developed and densely populated Soshanguve town.

It is suggested that the stream and wetland with buffer zone be protected according to the regulations, and that the hill be developed as a conservation area, but that the proposed development on the grassland area be supported.

1. ASSIGNMENT

EcoAgent CC Ecology and Biodiversity Consultants was appointed by Ecologic AFRIKA to undertake an independent assessment of the vegetation and flora, and confirm the possible presence of wetlands of the site. In accordance with The Natural Scientific Professions Act (Act 27 of 2003) only a person registered with the Council may practice in a consulting capacity. Prof GJ Bredenkamp of EcoAgent CC

undertook an independent assessment of the vegetation and flora on Portions 68, 69 and 112-116 of the Farm Onderstepoort 266JR Gauteng. The possible occurrence of wetlands on the site must also be confirmed, (though if present an independent wetland specialist should be appointed to do a wetland assessment). A field survey was conducted on 11 March 2014.

This assignment is in accordance with the EIA Regulations (No. R543-546, Department of Environmental Affairs and Tourism, 18 June 2010) emanating from Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

The assignment is interpreted as follows:

Compile a study on

- Vegetation with special emphasis on the possible presence red data species on the alignment of the pipeline,

In order to compile the **vegetation and flora** study, the following had to be done:

1. Initial preparations:

- Obtain all relevant maps, aerial photographs and information on the natural environment of the concerned area. This includes a red data species list for the Flora.

2. Vegetation and habitat survey: In each vegetation type / plant community on site:

- Determine relatively homogeneous potential ecological units / plant communities / ecosystems on recent aerial photographs.
- Determine the broad habitat features within each homogeneous unit.
- List the plant species (trees, shrubs, grasses and herbaceous species of special interest) present in each ecological unit for plant community and ecosystem description.
- Identify potential red data plant species, possible encroacher species and exotic plant species.
- Identify potential habitat for the red data species that may be present in the area.

3. Plant community delimitation and description

- Process data (vegetation and habitat) to determine vegetation types / ecosystems on an ecological basis.
- Describe the habitat and vegetation
- Prepare a vegetation map of the area if more than one plant community is present.
- Prepare an ecosystem sensitivity map for the planning of the development.

4. General

- Identify and describe ecologically sensitive areas.
- Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, degraded areas, reclamation areas.
- Make recommendations on aspects that should be monitored during development.

2. RATIONALE

It is widely recognised that it is of utmost importance to conserve natural resources in order to maintain ecological processes and life support systems for plants, animals and humans. To ensure that sustainable development takes place, it is therefore important that the environment is considered before relevant authorities approve any development. This led to legislation protecting the natural environment. The Environmental Conservation Act (Act 73 of 1989), the National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998) and the National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004) ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment. It also ensures the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes or products or human activities. A draft list of Threatened Ecosystems was published (Government Gazette 2009) as part of the National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004). These Threatened Ecosystems are described by SANBI & DEAT (2009).

All components of the ecosystems (physical environment, vegetation, animals) of a site are interrelated and interdependent. A holistic approach is therefore imperative to effectively include the development, utilisation and where necessary conservation of the given natural resources in an integrated development plan, which will address all the needs of the modern human population (Bredenkamp & Brown 2001).

It is therefore necessary to make a thorough inventory of the plant communities and biodiversity on the site, in order to evaluate the biodiversity and possible rare species. This inventory should then serve as a scientific and ecological basis for the planning exercises.

Authoritative legislation that lists impacts and activities on natural areas, including wetlands and riparian areas that requires authorisation includes (Armstrong, 2009):

- Conservation of Agriculture Resources Act, 1983 (Act 43 of 1983);
- Environment Conservation Act, 1989 (Act 73 of 1989);
- National Water Act, 1998 (Act 36 of 1998);
- National Forests Act, 1998 (Act 84 of 1998);
- National Environmental Management Act, 1998 (Act No. 107 of 1998);
- National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004).

3. STUDY AREA

3.1 Location and the receiving environment

The entire site proposed for development 86.3334 ha in size. The site is located on both sides of Mopane Road (K2) that links the Mabopane Highway with the Soutpan Road (M35) (Figures 1 and 2).

The following applies:

- The site does not fall within a developed town area but is located just east of Soshanguve.
- The site does not fall within a protected area or a conservancy.
- A spruit forms the southern boundary of the site.
- The largest part of the site is currently grassland.

4. METHODS

4.1 Vegetation and Flora

The site was visited on 11 March 2014 by Prof GJ Bredekamp assisted Mr Ian Roos of Ecologic AFRIKA.

The vegetation was stratified into relatively homogeneous units on recent aerial images of the area. At several sites within each homogeneous unit a description of the dominant and characteristic species was made. These descriptions were based on total floristic composition, following established vegetation survey techniques (Mueller-Dombois & Ellenberg 1974; Westhoff & Van der Maarel 1978). Data recorded included a list of the plant species present, including trees, shrubs, grasses and forbs. Comprehensive species lists were therefore derived for each plant community / ecosystem present on the site. These vegetation survey methods have been used as the basis of a national vegetation survey of South Africa (Mucina *et al.* 2000) and are considered to be an efficient method of describing vegetation and capturing species information. Notes were additionally made of any other features that might have an ecological influence.

The identified systems are not only described in terms of their plant species composition, but also evaluated in terms of the potential habitat for red data plant species.

Red data plant species for the area were obtained from the SANBI data bases, with updated threatened status, (Raimondo *et al* 2009). These lists were then evaluated in terms of habitat available on the site, and also in terms of the present development and presence of man in the area.

Critically Endangered, Endangered, Vulnerable and Protected Species (NEMBA species, TOPS species) are evaluated against the list published in Department of Environmental Affairs and Tourism Notice No. 2007 (National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)).

Alien invasive species, according to the Conservation of Agricultural Resources Act (Act No. 43 of 1983) as listed in Henderson (2001), are indicated.

Medicinal plants are indicated according to Hutchings *et al.* (1996). Van Wyk, Van Oudthoorn & Gericke (1997).

The field observations were supplemented by literature studies from the general area (Smit 1992).

4.2 Conservation Value/Sensitivity

The following **conservation value** categories were used for each site:

- High:** Ecologically sensitive and valuable land with high species richness and/or sensitive ecosystems or red data species that should be conserved and no developed allowed.
- Medium-high:** Land where sections are disturbed but which is in general ecologically sensitive to development/disturbances.
- Medium:** Land on which low impact development with limited impact on the vegetation / ecosystem could be considered for development. It is recommended that certain portions of the natural vegetation be maintained as open space.
- Medium-low:** Land of which small sections could be considered to conserve but where the area in general has little conservation value.
- Low:** Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation.

Sensitivity

GDARD requirements include that sensitivity should include only High and Low sensitivity. The categories are as follows:

- High:** High and Medium-High conservation priority categories mentioned above are considered to have a High sensitivity and development should not be supported.
- Low:** Medium, Medium-Low and Low conservation priority categories mentioned above are considered to have a Low sensitivity and development may be supported. Portions of vegetation with a Medium conservation priority should be conserved.

Plant species recorded in each plant community with an indication of the status of the species by using the following symbols:

- | | |
|-----------------------------|------------------------------------|
| A = Alien woody species | P = Protected trees species |
| D = Dominant | p = provincially protected species |
| d = subdominant | RD = Red data listed plant |
| G = Garden or Garden Escape | W = weed |
| M = Medicinal plant species | |

4.3 Species Richness

Species Richness is interpreted as follows: Number of indigenous species recorded in the sample plots representing the plant community. Alien woody species and weeds are not included.

No of species	Category
1-24	Low
25-39	Medium
40-59	High
60+	Very High

5. RESULTS: VEGETATION AND FLORA

5.1 Vegetation Classification

Three different plant communities / ecosystems were identified:

Plant Community	Sensitivity
1 Grassland	High*
2 Bushveld on Hill	High
3 Spruit and Wetland	High



Figure 3: Vegetation / ecosystem map of the site. Note that GDARD requires that all wetlands and all primary grassland be indicated as ecologically sensitive (see Fig 4). However, this grassland area is directly adjacent to large the residential areas of Soshanguve, and it is suggested that development can be supported. The wetland and spruit systems are, however, regarded as no-go areas (see wetland specialist report for details)

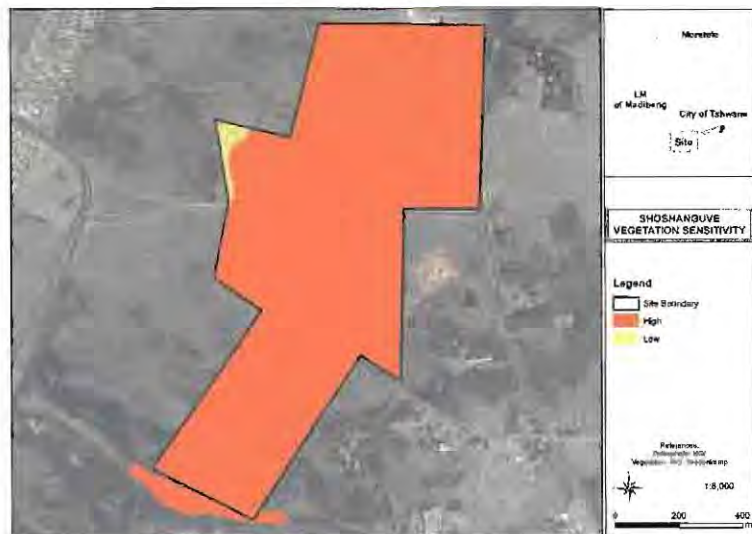


Figure 4: Sensitivity map of the site. Note that GDARD requires that all wetlands and all primary grassland be indicated as ecologically sensitive. According to GDARD regulations all primary grassland should be considered to be sensitive. However, this grassland area is directly adjacent to large the residential areas of Soshanguve, and it is suggested that development can be supported. The wetland and spruit systems are, however, regarded as no-go areas (see wetland specialist report for details)

5.2 Description of the Plant Communities

A vegetation map (Figure 3) indicates the distribution of the plant communities on the site, while the ecological sensitivity is indicated in Figure 4.

1. Grassland

The largest part of the site, on both sides of Mopane Road, is covered with grassland with sparsely scattered trees. The soil is reddish brown and quite shallow. The vegetation forms a mosaic where some areas are dominated by *Hyparrhenia hirta*, which indicates that the grassland has been utilised and somewhat disturbed (Figure 5). However, locally, especially where the soil is shallow, *Trachypogon spicatus* is dominant (Figure 6). Several grass and forb species are present on the shallower soils. The scattered woody plants are mostly *Burkea africana*.



Figure 5: The Grassland, dominated by *Hyparrhenia hirta*



Figure 6: The Grassland, dominated by *Trachypogon spicatus*

The following plant species were recorded from this plant community:

Trees and Shrubs

<i>Burkea africana</i>		<i>Peltoporum africanum</i>	
<i>Eucalyptus</i> sp	A	<i>Sclerocarya birrea</i>	PM
<i>Melia azedarach</i>	A	<i>Vangueria infausta</i>	

Grasses

<i>Aristida congesta barbicollis</i>		<i>Hyparrhenia hirta</i>	D
<i>Aristida diffusa</i>		<i>Melinis repens</i>	
<i>Brachiarie serrata</i>		<i>Pogonarthria squarrosa</i>	
<i>Cynodon dactylon</i>		<i>Setaria sphacelata torta</i>	
<i>Diheteropogon amplexans</i>		<i>Sporobolus africanus</i>	
<i>Eragrostis curvula</i>		<i>Themeda triandra</i>	
<i>Eragrostis racemosa</i>		<i>Trachypogon spicatus</i>	D
<i>Eragrostis rigidior</i>		<i>Trichoneura grandiglumis</i>	
<i>Heteropogon contortus</i>			

Forbs

<i>Acalypha angustata</i>		<i>Kyllinga alba</i>	
<i>Acanthospermum rigidum</i>	W	<i>Ledebouria revoluta</i>	
<i>Aloe davyana</i>		<i>Leucas glabrata</i>	
<i>Anthospermum hispidulum</i>		<i>Lippia javanica</i>	
<i>Asparagus suaveolens</i>		<i>Monsonia burkeana</i>	
<i>Chamaecrista mimosoides</i>		<i>Nidorella hottentotica</i>	
<i>Cleome monophylla</i>		<i>Oxalis obliquifolia</i>	
<i>Commelina africana</i>		<i>Parinari capensis</i>	
<i>Elephanthorrhiza elephantina</i>		<i>Peersonia sessilifolia</i>	
<i>Eriosema saligna</i>		<i>Pentarrhinum insipidum</i>	
<i>Felicia mucicata</i>		<i>Phyllanthus parvulus</i>	
<i>Fimbristylis hispidula</i>		<i>Rhynchosia monophylla</i>	
<i>Gomphrena celocoides</i>		<i>Scabiosa columbaria</i>	
<i>Helichrysum chionosphaerum</i>		<i>Schkuhria pinnata</i>	WM
<i>Helichrysum nudifolium</i>		<i>Senecio inaequidens</i>	W
<i>Hermannia betonicifolia</i>		<i>Solanum incanum</i>	W
<i>Hermannia lancifolia</i>		<i>Stoebe vulgaris</i>	
<i>Hypoxis iridifolia</i>		<i>Tagetes minuta</i>	W
<i>Indigofera melanadenia</i>		<i>Triumfetta sonderi</i>	
<i>Ipomoea ommeneyi</i>		<i>Xerostegia tridentata</i>	
<i>Justicia anagalloides</i>		<i>Zornia glochdiata</i>	
<i>Kohautia amatymbica</i>			

Number of species

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	2	2	4	0	1	1
Grasses	17	0	17	0	0	0
Forbs	38	5	43	0	0	1
Total	57	7	64	0	1	2

The species richness of his grassland is considered to be High.

1. Grassland summary			
Status	Disturbed but mostly primary		
Soil	Reddish brown, shallow	Rockiness % cover	0
Conservation priority:	Medium	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	Low
Dominant spp.	<i>Hyparrhenia hirta</i> , <i>Trachypogon spicatus</i>		

Discussion

According to GDARD regulations all primary grassland should be considered to be sensitive. However, this area is directly adjacent to large the residential areas of Soshanguve, and development could be supported.

2. Hill

There is a small quartzite hill in the northern part of the study area. The hill is covered with indigenous trees and shrubs (Figure 7). The most prominent trees on the hill are *Burkea africana* and *Lannea discolor* (Figure 8). Some alien woody species are present. The red data reptile, Southern African Python, was observed on the site (Figure 9).

The following plant species were recorded from this plant community:

Trees and Shrubs

<i>Acacia caffra</i>		<i>Lannea edulis</i>	
<i>Burkea africana</i>	d	<i>Melia azederach</i>	A
<i>Combretum molle</i>		<i>Ozoroa paniculosa</i>	
<i>Dombeya rotundifolia</i>		<i>Protea caffra</i>	
<i>Eucalyptus</i> sp	A	<i>Tecoma stans</i>	A
<i>Jacaranda mimosifolia</i>	A	<i>Vangueria infausta</i>	
<i>Lannea discolor</i>	d	<i>Vitex rehmannii</i>	

Grasses

<i>Aristida diffusa</i>	<i>Melinis repens</i>
<i>Brachiaria serrata</i>	<i>Pogonarthria squarrosa</i>
<i>Cymbopogon validus</i>	<i>Schizachyrium sanguineum</i>
<i>Digitaria eriantha</i>	<i>Setaria sphacelata torta</i>
<i>Diheteropogon amplexens</i>	<i>Themeda triandra</i>
<i>Eragrostis rigidior</i>	<i>Trachypogon spicatus</i>
<i>Heteropogon contortus</i>	<i>Trichoneura grandiglumis</i>
<i>Hyparrhenia hirta</i>	<i>Urochloa mosambicensis</i>

Forbs

<i>Acalypha petiolaris</i>	<i>Felicia muricata</i>		
<i>Aloe davyana</i>	<i>Ledebouria revoluta</i>		
<i>Aloe pretoriensis</i>	p	<i>Leonotis ocymifolia</i>	
<i>Asparagus suaveolens</i>		<i>Lippia javanica</i>	
<i>Bidens bipinnata</i>	W	<i>Pellaea calomelanos</i>	
<i>Campyloclinium macrocephalum</i>	W	<i>Pentarthnum insipidum</i>	
<i>Chascanum hederaceum</i>		<i>Rhynchosia monophylla</i>	
<i>Cleome monophylla</i>		<i>Stoebe vulgaris</i>	
<i>Commelina africana</i>		<i>Tagetes minuta</i>	W
<i>Convolvulus</i> sp		<i>Ursinia nana</i>	
<i>Dicoma zeyheri</i>		<i>Xerophyta retinervis</i>	
<i>Euryops laxus</i>		<i>Zinnia peruviana</i>	W

Number of species

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	10	4	14	0	0	1
Grasses	16	0	16	0	0	0
Forbs	20	4	24	0	0	1
Total	46	8	54	0	1	2

The species richness of this bushveld is considered to be High.

2. Hill vegetation summary

Status	Disturbed rocky hill with woody vegetation		
Soil	Brown, shallow, rocky	Rockiness % cover	20
Conservation priority:	High	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	Low
Dominant spp.	<i>Lannea discolor</i> , <i>Burkea africana</i>		



Figure 7: The isolated wooded hill in the northern part of the study area



Figure 8: The vegetation on the hill



Figure 9: A python was found on the hill

1. Spruit and wetland summary			
Status	Functional seepage wetland and spruit		
Soil	Black vertic	Rockiness % cover	0
Conservation priority:	High	Sensitivity:	High
Agricultural potential:	Low	Need for rehabilitation	Medium – remove alien woody species
Dominant spp.	<i>Typha capensis</i> , hygrophilous grasses and sedges		

Discussion

This area is clearly wetland. This is not a specialist wetland delineation and functional analysis. It is only a recognition of a wetland system and brief description of its vegetation. The area is indicated as ecologically sensitive. A buffer zone will be needed, of at least 32 m from the outside edge of the wetland. The area and its buffer zone must be excluded from the development. Due to regulations concerning wetlands, a specific wetland specialist study will be needed.

5.3 Species of Conservation Concern, Red Data Species

A list of Species of Conservation Concern for the Grid 2528CA was obtained from the database on the SANBI website. Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered (CE), Endangered (EN) and Vulnerable (VU). Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened (NT), Data Deficient (DD), (DDT = lack of taxonomic data), Critically Rare (CR), Rare (R) and Declining (D). This is in accordance with the new Red List for South African Plants (Raimondo et al. 2009).

Family	Species	Status	Habitat on site
Fabaceae	Acacia erioloba E.Mey.	Declining	No
Euphorbiaceae	Acalypha caperonioides Bail. var. caperonioides	DDT	Marginal
Crassulaceae	Adromischus umbraticola C.A.Sm. subsp. umbraticola	NT	
Asphodelaceae	Aloe peglerae Schönland	EN	No
Fabaceae	Argyrolobium campicola Harms	NT	No
Fabaceae	Argyrolobium megarrhizum Bolus	NT	No
Amaryllidaceae	Boophone disticha (L.f.) Herb.	Declining	Yes
Hyacinthaceae	Bowiea volubilis Harv. ex Hook.f. subsp. volubilis	VU	Marginal
Asteraceae	Callilepis leptophylla Harv.	Declining	No
Callitricaceae	Callitriche compressa N.E.Br.	DDT	No
Rhizophoraceae	Cassipourea malosana (Baker) Alston	Declining	No
Apocynaceae	Ceropegia decidua E.A.Bruce subsp. pretoriensis R.A.Dyer	VU	No
Apocynaceae	Ceropegia turricula E.A.Bruce	NT	No
Commelinaceae	Commelina bella Oberm.	DDT	No
Amaryllidaceae	Crinum macowanii Baker	Declining	Marginal
Cucurbitaceae	Cucumis humifructus Stent	VU	No
Acanthaceae	Dicliptera magaliesbergensis K.Balkwill	VU	No
Hyacinthaceae	Drimia altissima (L.f.) Ker Gawl.	Declining	No
Hyacinthaceae	Drimia elata Jacq.	DDT	No
Hyacinthaceae	Drimia sanguinea (Schinz) Jessop	NT	No
Mesembryanthemaceae	Drosanthemum micans (L.) Schwantes	EN	No
Zamiaceae	Encephalartos friderici-guilielmi Lehm.	NT	No
Zamiaceae	Encephalartos horridus (Jacq.) Lehm.	EN	No
Zamiaceae	Encephalartos lehmannii Lehm.	NT	No
Poaceae	Festuca dracomontana H.P.Linder	VU	No

Mesembryanthemaceae	Gibbaeum petrense (N.E.Br.) Tischer	VU	No
Asteraceae	Gnaphalium nelsonii Burtt Davy	Rare	No
Orchidaceae	Habenaria bicolor Conrath & Kraenzl.	NT	
Orchidaceae	Habenaria kraenzliniana Schltr.	NT	Marginal
Orchidaceae	Holothrix randii Rendle	NT	No
Hypoxidaceae	Hypoxis hemerocallidea Fisch., C.A.Mey. & Avé-Lall.	Declining	Yes
Aquifoliaceae	Ilex mitis (L.) Radlk. var. mitis	Declining	No
Crassulaceae	Kalanchoe longiflora Schltr. ex J.M.Wood	VU	No
Proteaceae	Leucospermum cordifolium (Salisb. ex Knight) Fourc.	NT	No
Asteraceae	Macledium pretoriense (C.A.Sm.) S.Ortiz	EX	No
Fabaceae	Melolobium subspicatum Conrath	VU	No
Myrothamnaceae	Myrothamnus flabellifolius Welw.	DDT	No
Orchidaceae	Nervilia renschiana (Rchb.f.) Schltr.	DDD	No
Fabaceae	Pearsonia bracteata (Benth.) Polhill	NT	No
Anacardiaceae	Searsia gracillima (Engl.) Moffett var. gracillima	NT	No
Apocynaceae	Stenostelma umbelluliferum (Schltr.) S.P.Bester & Nicholas	NT	Marginal
Asphodelaceae	Trachyandra erythrorhiza (Conrath) Oberm.	NT	Marginal
Alliaceae	Tulbaghia pretoriensis Vosa & Condy	DDT	No

In spite of the large number of plant species of conservation concern listed for grid 2528CA (Raimondo et al. 2009), no species of conservation concern were recorded from the specific site during the field survey. This is probably a result of the disturbed nature of the grassland on the site.

6.4 Protected species

A single protected tree species (a single individual along the Mopane Road) of *Sclerocarya birrea* (Marula) was present.

A single provincially protected plant species *Aloe pretoriensis* were found on the hill on the site.

No TOPS protected plant species are present on the site (The National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004)).

5.4 Medicinal Plants

Except for *Sclerocarya birrea*, very limited important medicinal plants were recorded from the site. The weedy medicinal *Schkuhnia pinnata* was recorded.

5.5 Alien Plants

Some alien woody plants were found on the site. Locally, especially in the House Area and along the spruit some alien invader trees are present. Species listed as declared invasive plants (Henderson 2001) and should be removed and controlled (Conservation of Agricultural Resources Act (Act 43 of 1983) include:

Eucalyptus sp

Jacaranda mimosifolia

Melia azedarach

Tecoma stans

Except for the normally present *Tagetes minuta*, *Bidens bipinnata* *Zinnia perviana* and a few other weeds, the serious *Campylocinium macrocephalum* was also recorded from the site.

6. GENERAL DISCUSSION AND CONCLUSION

According to the relevant legislation and GDARD regulations, all wetlands (including rivers and spruits) must be regarded as ecologically sensitive and a wetland specialist study must be done. The spruit and wetland are located on the southern boundary of the site, but will affect the southern part of the proposed development. It is therefore strongly recommended that an independent wetland specialist compile a study of the spruit and wetland on the site.

The hill on the site contains a number of indigenous tree species and represents a specific habitat, where the protected *Aloe pretonensis* and the protected reptile, the Python, were found. According to the GDARD hills and ridges policy, this area should be regarded as sensitive, and if at all possible, be protected.

The GDARD minimum requirements also state that all primary grassland should be indicated as ecologically sensitive. This particular grassland area is, albeit primary, quite close to the highly developed and densely populated Soshanguve town.

It is suggested that the stream and wetland with buffer zone be protected according to the regulations, and that the hill be developed as a conservation area, but that the proposed development on the grassland area be supported.

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1967 B.Sc. University of Pretoria, Botany and Zoology as majors,

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Theses: (M.Sc. and D.Sc.) on plant community ecology and wildlife management in nature reserves in South African grassland and savanna.

Professional titles:

• MSAIE South African Institute of Ecologists and Environmental Scientists
- 1989-1990 Council member

• MGSSA Grassland Society of Southern Africa
- 1986 Elected as Sub-editor for the Journal
- 1986-1989 Serve on the Editorial Board of the Journal

- 1990 Organising Committee: International Conference: Meeting Rangeland challenges in Southern Africa

- 1993 Elected as professional member

• PrSciNat. South African Council for Natural Scientific Professions **Registration Number 400086/83**

- 1993-1997 **Chairman** of the Professional Advisory Committee: Botanical Sciences

- 1993-1997: **Council Member**

- 1992-1994: **Publicity Committee**

- 1994-1997: **Professional Registration Committee**

Professional career:

- Teacher in Biology 1970-1973 in Transvaal Schools
- Lecturer and senior lecturer in Botany 1974-1983 at University of the North
- Associate professor in Plant Ecology 1984-1988 at Potchefstroom University for CHE
- Professor in Plant Ecology 1988-2008 at University of Pretoria.
- 2009 – current Professor Extra-ordinary in the Dept of Plant Science, University of Pretoria
- • Founder and owner of the Professional Ecological Consultancy firms Ecotrust Environmental Services CC and Eco-Agent CC, 1988-present.

Academic career:

• Students:

- Completed post graduate students: M.Sc. 53; Ph.D. 14.

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• Author of:

- 175 scientific papers in refereed journals

- >150 papers at national and international congresses

- >250 scientific (unpublished) reports on environment and natural resources

- 17 popular scientific papers.

- 39 contributions in books

• Editorial Committee of

- South African Journal of Botany,
- Journal Grassland Society of Southern Africa,
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Membership:

- International Association of Vegetation Science.
- British Ecological Society
- International Society for Ecology (Intecol)
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 - 1988-1993 Elected to the **Council** of SAAB.
 - 1989-1990 Elected as **Chairman** of the Northern Transvaal Branch
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 - 1990- Sub-editor Editorial Board of the Journal
 - 1991-1992 Elected as **President** (2-year period)
 - 1993 **Vice-President** and Outgoing President
- Wildlife Management Society of Southern Africa
- Suid-Afrikaanse Akademie vir Wetenskap en Kuns
(=South African Academy for Science and Art).
- Wildlife Society of Southern Africa
 - 1975 - 1988: Member
 - 1975 - 1983: Committee member, Pietersburg Centre
 - 1981 - 1982: **Chairman**, Pietersburg Centre
- Dendrological Society of Southern Africa
 - 1984 - present: Member
 - 1984 - 1988: Committee member, Western Transvaal Branch
 - 1986 - 1988: **Chairman**, Western Transvaal Branch
 - 1987 - 1989: Member, Central Committee (National level)
 - 1990 - 2000: Examination Committee
- Succulent Society of South Africa

1987 - 2000

- Botanical Society of South Africa
 - 2000 – present: Member
 - 2001- 2008: Chairman, Pretoria Branch
 - 2002 – 2006: Chairman, Northern Region Conservation Committee
 - 2002- 2007: Member of Council

Special committees:

- Member of 10 special committees re ecology, botany, rangeland science in South Africa.
- Member of the International Code for Syntaxonomical Nomenclature 1993-present.

Merit awards and research grants:

- 1968 Post graduate merit bursary, CSIR, Pretoria.
- 1977-1979 Research Grant, Committee re Research Development, Dept. of Co-operation and Development, Pretoria.
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- 2006 South African Association of Botanists Silver Medal for outstanding contributions to South African Botany

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- 1986 Travel Grant, Potchefstroom University for Christian Higher Education, Potchefstroom
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