

ANNEXURE D4

COMMUNICATION TO AND FROM I&APs

From: juanita@bokamoso.net
Sent: 07 March 2017 12:28 PM
To: 'slaven@maximumgroup.co.za'; 'jgrobler@geoscience.org.za';
'mseleke@wrdm.gov.za'; 'stoffberg@wrdm.gov.za';
'isabel.olivier@randfontein.org.za'; msebesho; 'asalomon@sahra.org.za';
'keetm@dwaf.gov.za'; 'Siwelane Lilian (GAU)'; 'tshifaror@dwa.gov.za';
'mathebet@dwa.gov.za'; 'paia@eskom.co.za'; 'central@eskom.co.za'; kumen
govender; nkoneigh; mmpshe; 'loveous.tampane@transnet.net'; AntonMa
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Malebo.Baloi@drdlr.gov.za; schmidk; 'alwyn@sabroking.co.za';
'tcrwalters@gmail.com'
Subject: Wheatlands Urban Solar Farm - Public Participation Process
Attachments: Wheatlands Urban Solar Farm - Public Notice.pdf; image001.jpg; Wheatlands Urban
Solar Farm - Landowner & Tenant Letter.pdf

Dear Interested and/or Affected Parties,

Please refer to the attached Public Notice and Landowner & Tenant Letter regarding the proposed **Wheatlands Urban Solar Farm** Project.

Kind Regards/Vriendelike Groete

Juanita De Beer

Senior Public Participation Consultant & EAP in training



Landscape Architects & Environmental Consultants

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: juanita@bokamoso.net | www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

juanita@bokamoso.net

From: juanita@bokamoso.net
Sent: 08 March 2017 11:59 AM
To: 'lerato.april@energy.gov.za'
Subject: Wheatlands Urban Solar Farm - Public Participation Process
Attachments: Wheatlands Urban Solar Farm - Public Notice.pdf; image001.jpg; Wheatlands Urban Solar Farm - Landowner & Tenant Letter.pdf

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juanita@bokamoso.net

From: juanita@bokamoso.net
Sent: 08 March 2017 11:53 AM
To: zanel.chauke@energy.gov.za; lister.mbowane@energy.gov.za;
Avishkar.nandkishore@energy.gov.za
Subject: Wheatlands Urban Solar Farm - Public Participation Process
Attachments: Wheatlands Urban Solar Farm - Public Notice.pdf; image001.jpg; Wheatlands Urban Solar Farm - Landowner & Tenant Letter.pdf

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From: juanita@bokamoso.net
Sent: 10 March 2017 09:51 AM
To: rnoosthuizen@yahoo.com
Subject: RE: Affected party details regarding Wheatlands Urban Solar Farm
Attachments: image001.jpg

Dear Riana Oosthuizen,

Thank you for your response, Bokamoso Environmental registered you as an Interested and/or Affected Party for the proposed **Wheatlands Urban Solar Farm** Project.

Bokamoso Environmental will keep you updated regarding the process in the future.

Kind Regards/Vriendelike Groete

Juanita De Beer

Senior Public Participation Consultant & EAP in training



Landscape Architects & Environmental Consultants

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36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

From: Riana Oosthuizen [mailto:rnoosthuizen@yahoo.com]
Sent: 10 March 2017 09:26 AM
To: Juanita de Beer solar farm
Subject: Affected party details regarding Wheatlands Urban Solar Farm

Good day

I am the resident of smallholdings 123 and 124 Wheatlands Randfontein.
I hereby acknowledge receiving information regarding the proposed Wheatlands Urban Solar Farm.
I would appreciate it if u could keep me informed about the project and its effect on our water supply if any.

My contact information:
Riana Jacobs
Tel 0822268763

[Sent from Yahoo Mail on Android](#)



an agency of the
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: info@sahra.org.za
South African Heritage Resources Agency | 111 Harrington Street | Cape Town
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Enquiries: Andrew Salomon
Tel: 021 462 4502
Email: asalomon@sahra.org.za
CaseID: 10764

Date: Tuesday March 07, 2017
Page No: 1

Letter

In terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)

Attention: Solar Reserve SA (Pty) Ltd

**The establishment of the Wheatlands Urban Solar Farm on the Remaining Extent of the Farm
Wheatlands 260 IQ.**

Thank you for your notification regarding this development.

In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a **Heritage Impact Assessment** is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.

The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologists www.asapa.org.za) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.

The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.

Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary. **Please note that a nationwide fossil sensitivity map is now available on SAHRIS to assist with determining the fossil sensitivity of a study area .**



an agency of the
Department of Arts and Culture

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Date: Tuesday March 07, 2017
Page No: 2

If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority motivating for exemption from having to undertake further heritage assessments.

Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

Andrew Salomon
Heritage Officer: Archaeology
South African Heritage Resources Agency

John Gribble
Manager: Maritime and Underwater Cultural Heritage Unit / Acting Manager: Archaeology, Palaeontology and Meteorites Unit
South African Heritage Resources Agency

ADMIN:

Direct URL to case: <http://www.sahra.org.za/node/388594>
(GDARD, Ref:)

ANNEXURE D5

MINUTES OF PUBLIC/STAKEHOLDER MEETING

NOT APPLICABLE

ANNEXURE D6

COMMENTS & RESPONSE REPORT

**COMMENT AND RESPONSE REPORT-
FOR THE PROPOSED WHEATLANDS URBAN SOLAR FARM PROJECT**

Issue	Commentator	Response
<p>Thank you for your notification regarding this development.</p> <p>In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.</p> <p>The quickest process to follow for the archaeological component is to contract an accredited specialist (see the website of the Association of Southern African Professional Archaeologists www.asapa.org.za) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.</p> <p>The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.</p> <p>Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources – or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary. Please note that a nationwide fossil sensitivity map is now available on SAHRIS to assist with determining the fossil sensitivity of a study area.</p> <p>If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority motivating for</p>	<p>Andrew Salomon asalomon@sahra.org.za SAHRA 7 March 2017</p>	<p>Noted.</p> <p>A Phase 1 HIA is underway.</p>

Issue	Commentator	Response
<p>exemption from having to undertake further heritage assessments.</p> <p>Any other heritage resources that may be impacted such as built structures over 60 years old, sites and cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.</p> <p>I am the resident of smallholding 123 and 124 Wheatlands Randfontein. I hereby acknowledge receiving information regarding the proposed Wheatlands Urban Solar Farm. I would appreciate it if u could keep me informed about the project and its effect on our water supply if any.</p> <p>My contact information: Riana Jacobs Tel: 082 226 8763</p>	<p>Riana Oosthuizen moosthuizen@yahoo.com 10 March 2017</p>	<p>Thank you for your response, Bokamoso Environmental registered you as an Interested and/or Affected Party for the proposed Wheatlands Urban Solar Farm Project.</p> <p>Bokamoso Environmental will keep you updated regarding the process in the future.</p>

ANNEXURE D7

REGISTER OF I&APs

REGISTERED INTERESTED AND AFFECTED PARTIES

Please include all authorities as well as attendees from the public meetings

PROJECT TITLE: _____ Wheatlands Urban Solar Farm



CONTACT	NAME	PHONE	FAX	E-MAIL	ADDRESS (Postal/Physical)
Client	Solar Reserve SA (Pty) Ltd				
Competent Authority - GDARD					
West Rand District Municipality	Susan Stoffberg - Environmentalist Waste, Management & Biodiversity	Tel: 011 411 5131 / 083 409 3150		mseleke@wrtdm.gov.za stoffberg@wrtdm.gov.za	
Randfontein Local Municipality	Isabel Olivier	Tel: 011 411 0318	Fax: 086 610 1597	isabel.olivier@randfontein.org.za	
Council Geo-Science	J. Grobler			grobler@geoscience.org.za msebesho@geoscience.org.za	
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Spoornet	Loveous Tampane			mmpsh@randwater.co.za loveous.tampane@transnet.net	
Department of Agriculture, Forestry and Fisheries (DAFF)	Antho Maluka / Phyllistas M	Tel: 012 319 7560		AntonMa@daff.gov.za ; PhyllistasM@daff.gov.za	
Energy Department	Zanel Chauke/Lister Mbowane			zanel.chauke@energy.gov.za ; lister.mbowane@energy.gov.za ; Avishkar.nandkishore@energy.gov.za	
Department of Energy: Renewable Energy	Mokgadi Modise	Tel: 012 406 7686		lerato.april@energy.gov.za	
Department of Land Claims	Baloi Malebo / Salla Ramaleho			Ramaleho.salla@dldr.gov.za ; Malebo.baloi@dldr.gov.za	
SANRAL	Klaus Schmidt			schmidk@nra.co.za	

Ward Councillor 3 - Rand West City Constituency	Alwyn Jacobus Van Tonder	Cell: 082 593 0313			alwyn@sabroking.co.za	
head Randfontein/Kagiso	Thomas Walters	Cell: 082 521 3763			twalters@gmail.com	
Local Newspaper						

APPENDIX E

SPECIALIST REPORTS

APPENDIX E1

FLORA ASSESSMENT

NOT AVAILABLE YET

APPENDIX E2

FAUNA ASSESSMENT

NOT AVAILABLE YET

APPENDIX E3

WETLAND ASSESSMENT REPORT

The Proposed Wheatlands Solar Farm



Wetland Report

May 2017

Drafted by:

Lizette Delport

Bokamoso Landscape Architects and Environmental Consultants cc

Prepared for:



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Bokamosos Environmental Consultants cc. Reg No: CK 2010/087490/23.

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Declaration of Independence

I, **Lizette Delpport**, in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent specialist and will perform the study in an objective manner free of influence and prejudice, even if the resultant findings are unfavourable to the applicant;
- Have the relevant expertise in conducting the report relevant to this application;
- Will comply with all regulations, Acts and other applicable guidelines that are applicable to the activity;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Do not have any conflicting interests in the preparation of this report;
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision taken with respect to the application by the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- As a registered member of the South African Council for Natural Scientific Professions (SACNASP), will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member; and
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgement.

This report has been prepared according to the requirements of Appendix 6 of the Environmental Impact Assessments Regulations Amendment, 2017 (GNR 326).



Lizette Delpport (Cand.Sci.Nat.)
Wetland specialist
SACNASP Reg. No. 100144/15

Indemnity

This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as information available at the time of study. Therefore the author reserves the right to modify aspects of the report, including the recommendations, if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although the author exercised due care and diligence in rendering services and preparing documents, she accepts no liability, and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of this document.

Disclaimer

This report is aimed at evaluating site specific conditions as determined in context of relevant legislation and guidelines and to ensure the conservation and management of the water resources found on the site. However, the intention of this study is not to function as one of several attempts made by the proponent in order to gain favourable outcomes for the application. Rather, this report functions as an independent study and not as a comparative study between wetland specialists.

This report may be submitted directly to the competent authority should a prolonged correspondence occur between specialists and the applicant due to delineation comparisons.

Specialists

Field work, data analysis and report writing	Lizette Delpont BSc Hons (Environmental Management) MSc (Aquatic Health) Environmental Scientist / Wetland Specialist SACNASP Reg. No. 100144/15
Report Review	Antoinette Bootsma MSc Ecologist/Botanist/Wetland specialist SACNASP Reg. No. 400222/09

EXECUTIVE SUMMARY

Bokamosos Landscape and Environmental Consultants cc was appointed by Solar Reserve SA (Pty) Ltd. to conduct a wetland delineation and functional assessment for the proposed Wheatlands Solar Farm situated on the remaining Extent of farm Wheatlands 260 IQ, Gauteng.

A site visit was conducted on 4 April, 2017.

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

- Delineate the wetland areas;
- Classify the watercourse according to the system proposed in the national wetlands inventory if relevant,
- Undertake strategic functional assessment of wetlands areas within the area assessed;
- Recommend suitable buffer zones; and
- Discuss potential impacts, mitigation and management procedures relevant to conserving wetland areas on the site.
- Perform a risk assessment to determine if the proposed development requires a water use licence.

A channelled valley bottom wetland occurs approximately 200m to the west of the site. The wetland is divided by small dams at regular intervals along the watercourse.

A 17m buffer for the construction phase has been scientifically determined for the site using the buffer tool (MacFarlane et al, 2014). A 15m buffer is applicable during the operational phase. A 50m buffer for wetlands outside of the urban zone as required by GDARD (2014) though the development will have minimal effect on wetland condition since the western outline of the site is found more than 180m from the wetland and the solar farm will not require any crossings or activities within this area.

The combined **PES** score for the wetland area is **2.5** and **C - Moderately modified**. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. The expected trajectory of change is to remain stable should no further impacts occur on the wetland.

The **EIS** scores indicate that the study site is classed as **High** – the wetland is considered to be ecologically important and sensitive. The potential for direct human benefits is low, whereas the dense vegetation growth aids in sediment and pollutant trapping. The presence of small dams at regular intervals allows for the intermittent trapping of sediment and toxicants as water flows further downstream. The wetland is expected to be sensitive to habitat modifications from surrounding land use.

Impacts on the river and wetland are expected to be minimal from the proposed development. The distance from the Wheatlands Solar Farm to the wetland is greater than 180m and no pipelines or electrical lines are planned to cross or be built close to the wetland area.

Risks and impacts on watercourses are not notable and do not require mitigation measures on a higher level, which costs more and requires specialist input. In terms of section 22 of the National Water Act (36 of 1998) (NWA), a section 21 (c) and (i) water use license is not required for the Wheatlands development.

The proposed Wheatlands Solar Farm is expected to have minimum to no impact on nearby watercourses and therefore the project is approved from a wetland perspective, given that effective stormwater management is implemented.

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1 INTRODUCTION

Bokamosos Landscape and Environmental Consultants cc was appointed by Solar Reserve SA (Pty) Ltd. to conduct a wetland delineation and functional assessment for the proposed Wheatlands Solar Farm situated on the remaining Extent of farm Wheatlands 260 IQ, Gauteng.

1.1 Terms of Reference

The focus of the investigation is to:

- Delineate the wetlands according to standardised and accepted methods;
- Classify the wetland units according to the national wetlands inventory;
- Undertake the ecological functional assessment (PES, EIS) of wetland areas within the area assessed;
- Recommend suitable buffer zones;
- Determine potential impacts from the project and discuss mitigation and management procedures relevant to conserving wetland areas on the site.
- Undertake a Risk Assessment to determine if the project requires a water use license.

1.2 Assumptions and Limitations

- The wetland assessment is confined to the proposed development and 500m outside the boundary of the study site.
- The GPS used for wetland and riparian delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters in any direction. It is therefore suggested to measure and peg boundary areas in the field for higher accuracy.
- The on-site assessment of wetlands is based on environmental indicators such as vegetation that are subjected to seasonal variation as well as factors such as fire and drought. Wherever available, background information was gathered to aid in analysis of the site characteristics. Information provided within this report is based on observations made during the site survey on the specified date.
- Wetlands form transitional areas where vegetation species change from terrestrial to wetland species. Within this transition zone, some variation of opinion on the wetland boundary may occur, although all assessors should obtain relatively similar results when using the DWS methodology.

1.3 Definitions and Legal Framework

The NWA defines a wetland as *“land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”* In addition to water at or near the surface, other distinguishing indicators of wetlands include hydromorphic soils and vegetation adapted to or tolerant of saturated soils (DWA, 2005).

Riparian habitat is described as *“the physical structure and associated vegetation of the areas associated with a watercourse, which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas”*. Riparian habitats often perform important ecological and hydrological functions, some similar to those performed by wetlands (DWA, 2005). Riparian habitat is also the accepted indicator used to delineate the extent of a river’s footprint (DWA, 2005).

This document was prepared according to the Gauteng Department of Agriculture and Rural Development (GDARD) Requirements for Biodiversity Assessments Version 3, February 2014, as well as key legislative requirements and guiding principles of the wetland study and the Water Use Authorisation process. The proponent must also comply with the provisions of the following relevant national legislation, conventions and regulations applicable to wetlands and riparian zones:

- The National Water Act, 1998 (Act No. 36 of 1998) [NWA]
- Convention on Wetlands of International Importance - the Ramsar Convention and the South African Wetlands Conservation Programme (SAWCP).
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA].
- National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004).
- National Environment Management: Protected Areas Act, 2003 (Act No. 57 of 2003).
- Regulations GN R.982, R.983, R. 984 and R.985 of 2014, promulgated under NEMA
- Conservation of Agriculture Resources Act, 1983 (Act 43 of 1983).
- Regulations and Guidelines on Water Use under the NWA.
- South African Water Quality Guidelines under the NWA.
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 287 of 2002).

Water uses for which authorisation must be obtained from DWS, are indicated in Section 21 of the NWA. Section 21 (c) and (i) is applicable to any activity related to a wetland:

Section 21(c): Impeding or diverting the flow of water in a watercourse; and

Section 21(i): Altering the bed, banks, course or characteristics of a watercourse.

Authorisations related to wetlands are regulated by Government Notices R.267 of 24 March 2017. GN R.267 of 2017 grants General Authorisation (GA) for the above water uses on certain conditions:

- Any activity in a wetland for the rehabilitation of a wetland for conservation purposes.
- Any activity more than 500 m from the boundary of a wetland.

These regulations also stipulate that these water uses must be registered with the responsible authority. Any activity that is not related to the rehabilitation of a wetland and which takes place within 500 m of a wetland are excluded from a GA under either of these regulations. Wetlands situated within 500 m of proposed activities should be regarded as sensitive features potentially affected by the proposed development (GN R267). Such an activity requires a Water Use Licence (WUL) from the relevant authority.

An initial desktop study was conducted in order to gather background information on the site. The use of maps, aerial photographs and digital satellite imagery were consulted in order to assess the site conditions. GIS data was used to create maps describing the receiving environment, such as locality, soils, vegetation, critical biodiversity areas and hydrology.

A hand held GPS was used to capture co-ordinates in the field and a hand held camera for photographs. 1:50 000 cadastral maps and available GIS data were used as reference material for the mapping of the preliminary watercourse boundaries. These were converted to digital images containing delineation lines and buffers according to the field data received.

The delineation method documented by the Department of Water Affairs and Forestry in their document “Updated manual for the identification and delineation of wetlands and riparian areas” (DWAF, 2008), and the Minimum Requirements for Biodiversity Assessments (GDACE, 2009) as well as the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (SANBI 2013) was followed throughout the field survey. These guidelines describe the use of indicators to determine the outer edge of the wetland and riparian areas.

2.1 Wetland and Riparian Classification and Delineation

2.1.1 Wetland indicators

Wetlands are delineated by means of the Department of Water Affairs and Forestry guideline named ‘A practical field procedure for identification and delineation of wetlands and riparian areas’ (DWAF, 2008).

Wetlands are identified based on one or more of the following characteristic indicators (Figures 1 and 2):

- **The Terrain Unit Indicator** helps to identify those parts of the landscape where wetlands are more likely to occur. These include valley bottoms as well as slopes where groundwater discharge may occur.
- **The Vegetation Indicator** for the presence of plants adapted to saturated soils (hydrophytes). Vegetation growth helps in identifying the outer boundaries of a wetland since species composition changes dramatically between zones. Emphasis is placed on the group of species that dominate the plant community, and not on individual indicator species.
- **The Soil Form Indicator** identifies hydromorphic soils that display characteristics resulting from prolonged and frequent saturation and which are indicative of permanent, seasonal and temporary wetland zones. Gleyed soil has a grey, green or blue colour due to iron being dissolved out of the soil during anaerobic conditions. Seasonal or temporary wetlands generally have a fluctuating water table which creates alternating aerobic and anaerobic conditions in the soil. This causes iron to deposit over decades as yellow or orange patches, called mottles.
- **The Soil Wetness Indicator** to identify morphological changes due to anaerobic conditions developing in the first 50cm of the soil surface as a result of saturation. Specific soil colours and the presence of mottles are indicative of permanent or temporary saturation. The higher the frequency and duration, the more grey the soil matrix becomes. Hydromorphic soils that are permanently saturated generally do not show mottles.

According to the NWA, vegetation is the primary indicator, which must be present under normal circumstances. However, in practise the soil wetness indicator is used as the primary indicator since it shows long term morphological changes from saturation, whereas vegetation is seasonal and responds quickly to changes in soil moisture, human activities and climate. All other indicators are used to confirm the presence of a wetland.

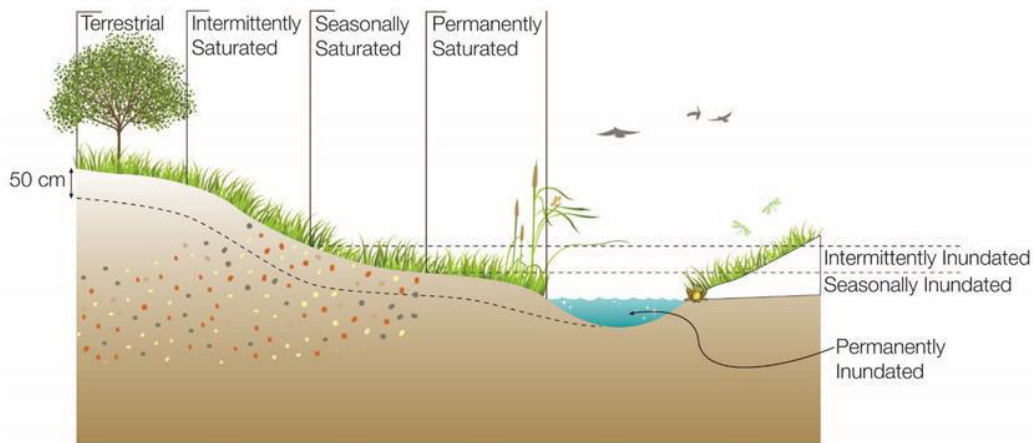


Figure 1: Typical section of a wetland (Ollis, 2013)

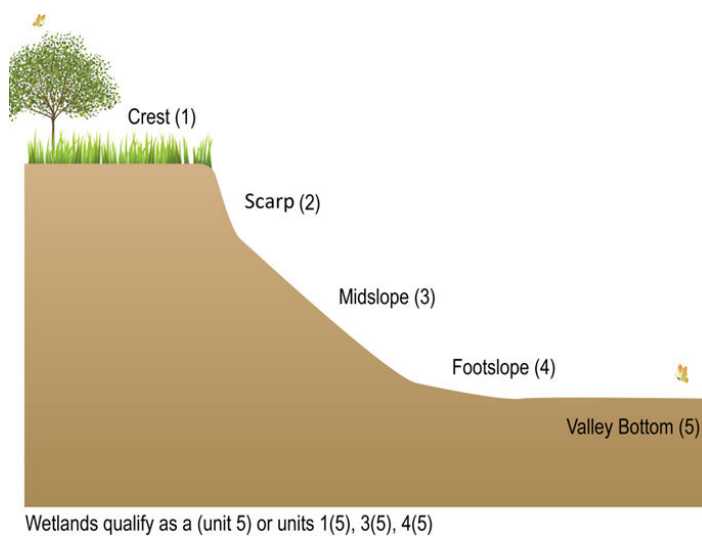


Figure 2. Terrain units (DWAF, 2005).

The boundary of the wetland is defined as the outer edge of the temporary zone of wetness, which is characterised by:

- A minimal grey matrix (<10%)
- Few mottles
- Short periods of saturation of less than 3 months per annum

2.1.2 Riparian Area

Riparian areas have specific characteristics, namely:

- are associated with a watercourse;
- contain distinctively different plant species than adjacent areas, exhibiting more vigorous or robust growth; and
- may have alluvial soils.

River channels flow within a confined valley or within an incised macro-channel. The “river” includes both the active channel (the portion which carries the water) as well as the riparian zone (Kotze, 1999). Riparian habitat is classified primarily by identifying riparian vegetation along the edge of the macro stream channel. Rich alluvial soils deposit nutrients making the riparian area a highly productive zone. This causes a very distinct change in vegetation structure and composition along the edges of the riparian area (DWAF, 2008). Riparian vegetation is supported by perennial and non –perennial streams.

Riparian areas perform valuable functions including:

- store water and help reduce floods;
- stabilize stream banks;
- improve water quality by trapping sediment and nutrients;
- maintain natural water temperature for aquatic species;
- provide shelter and food for birds and animals;
- provide corridors for movement and migration of species;
- a buffer between aquatic ecosystems and adjacent land uses;
- can be used as recreational sites; and
- provide material for human use.

It is possible to delineate riparian areas by checking for the presence of specific indicators. Some areas may display both wetland and riparian indicators, and can accordingly be classified as both. The riparian delineation process requires that the following be taken into account:

- Topography associated with the watercourse;
- Vegetation; and
- Alluvial soils and deposited material.

The most important indicator is vegetation, where the outer edge is adjacent to the watercourse where a distinct change in vegetation occurs. Topography and the presence of alluvial soils are the next indicators used to confirm the riparian area.

Riparian areas can be grouped into different categories based on their inundation period per year. Perennial rivers are rivers with continuous surface water flow, intermittent rivers are rivers where surface flow disappears but some surface flow remains, temporary rivers are rivers where surface flow disappears for most of the channel (Figure 3). Two types of temporary rivers are recognized, namely “ephemeral” rivers that flow for less time than they are dry and support a series of pools in parts of the channel, and “episodic” rivers that only flow in response to extreme rainfall events, usually high in their catchments (Seaman *et al*, 2010).

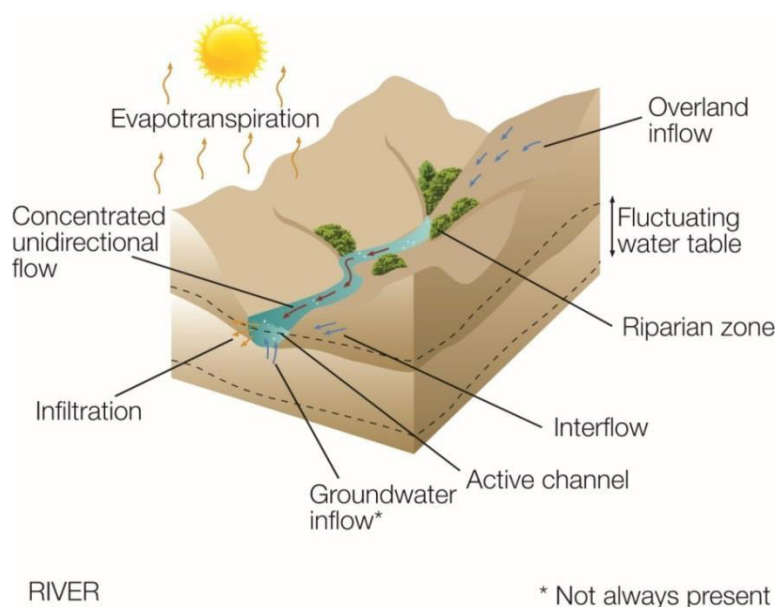


Figure 3: A schematic representation of the processes characteristic of a river area (SANBI 2013).

2.1.3 Wetland Classification

The classification system developed for the National Wetlands Inventory is based on the principles of the hydro-geomorphic (HGM) approach to wetland classification as described by SANBI, 2009 (Figure 4). In general HGM units encompass three key elements (Semeniuk & Semeniuk 1995; Finlayson *et al*. 2002; Ellery *et al*. 2008; Kotze *et al*. 2008, Kotze *et al*, 2005), namely:

- Geomorphic setting - This refers to the landform characteristics and processes
- Water source - Precipitation, groundwater flow, stream flow, etc.
- Hydrodynamics – the presence and movement of water through the wetland.

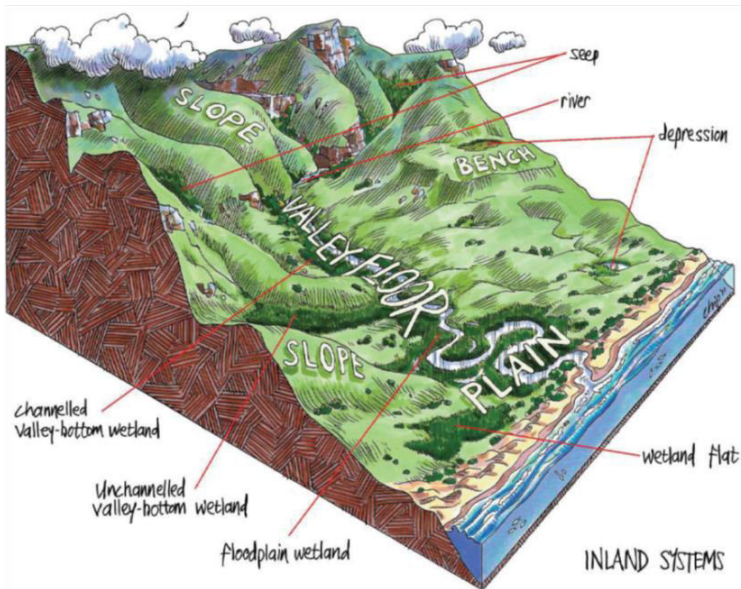


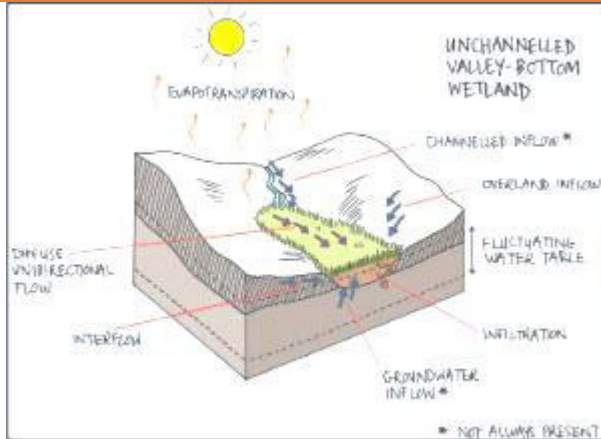
Figure 4: Wetland Units based on hydrogeomorphic types (Ollis et al. 2013)

The Classification of wetland areas found during the study (adapted from SANBI, 2009) is as follows (Table 1):

Table 1: Wetland Hydro-Geomorphic types and descriptions

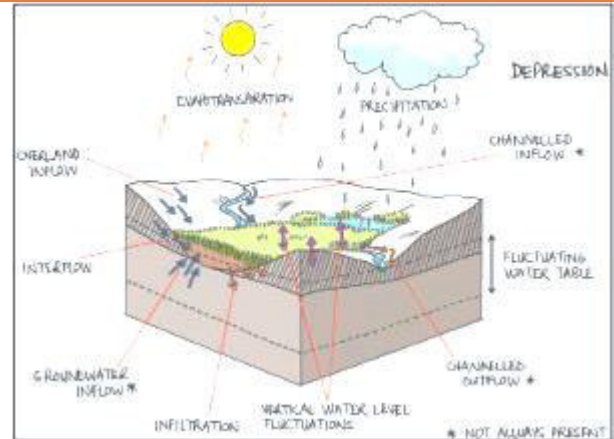
River and Riparian Area	Channelled Valley Bottom
<p>The riparian zone is the portion of land directly adjacent to the active channel of the river, which is influenced by river-related processes. These areas are commonly characterised by alluvial soils and vegetation that is distinct from that of adjacent land areas in terms of its composition and physical structure.</p>	<p>Channelled valley-bottom wetlands are characterised by their location on valley floors, the absence of characteristic floodplain features and the presence of a river channel flowing through the wetland.</p>

Unchannelled Valley Bottom



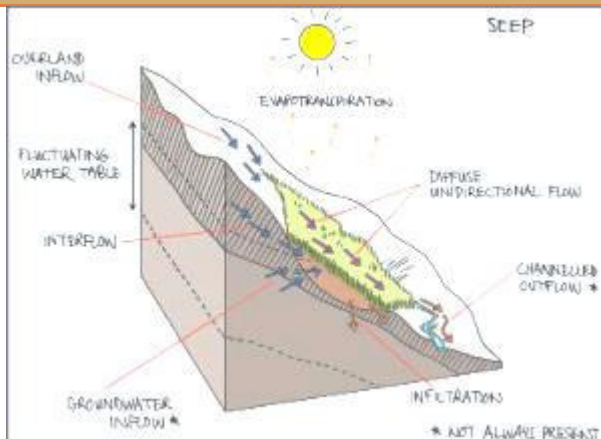
Unchannelled valley-bottom wetlands are characterised by their location on valley floors, an absence of distinct channel banks, and the prevalence of diffuse flows.

Depression or Pan



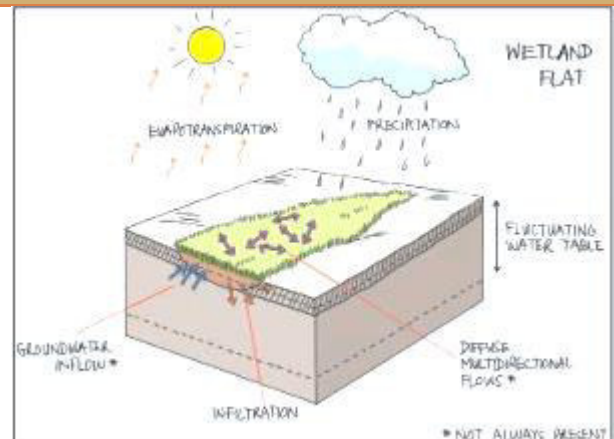
Depressions are wetland or aquatic ecosystems with closed (or near-closed —1) elevation contours, which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates.

Hillslope Seep



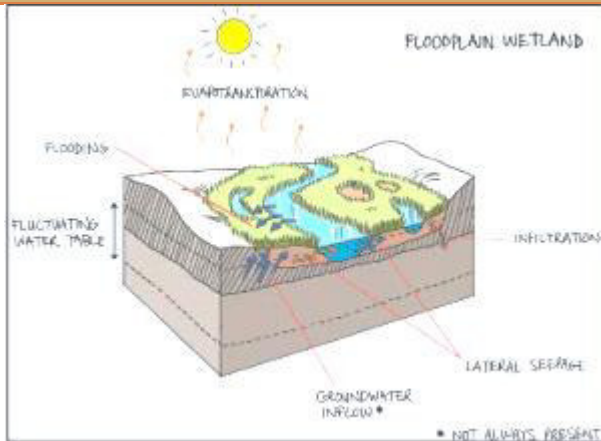
Seeps are wetlands located on gently or steeply sloping land and dominated by colluvial (gravity-driven), unidirectional movement of water and material down slope.

Wetland Flat



Wetland flats are level or near-level wetland areas that are not fed by a river channel and which are typically situated on a plain or bench. Closed elevation contours are not evident around the edge of the wetland.

Floodplain



Floodplain wetlands occur on mostly flat or gently sloping adjacent to and formed by an alluvial river channel under its present climate and sediment load, which are subject to periodic inundation by overtopping of the river banks.

2.2 Buffer Zones

A buffer zone is defined as “a strip of land surrounding a wetland or riparian area in which activities are controlled or restricted” (DWAf, 2005). A development has several impacts on the surrounding environment and on a wetland. The development changes habitats, the ecological environment, infiltration rate, amount of runoff and runoff intensity of the site, and therefore the water regime of the entire site. An increased volume of stormwater runoff, peak discharges, and frequency and severity of flooding is therefore often characteristic of transformed catchments. The buffer zone serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind.

Despite limitations, buffer zones are well suited to perform functions such as sediment trapping, erosion control and nutrient retention which can significantly reduce the impact of activities taking place adjacent to water resources. Buffer zones are therefore proposed as a standard mitigation measure to reduce impacts of land uses / activities planned adjacent to water resources. These must however be considered in conjunction with other mitigation measures.

Local government policies require that protective buffer zones be calculated from the outer edge of the temporary zone of a wetland (KZN DAEA, 2002; CoCT, 2008; GDARD, 2012). Although research is underway to provide further guidance on appropriate defensible buffer zones, there is no current standard other than the generic recommendations.

Wetland buffer requirements:

- 32 meters from the temporary zone for wetlands occurring inside the urban edge;
- 50 meters from the temporary zone for wetlands occurring outside the urban edge; and
- Larger buffer areas for wetlands supporting sensitive faunal or floral species.

Rivers (non-perennial/perennial) buffer requirements:

- A 100 meter buffer zone from the edge of the temporary zone outside the urban edge;
- A 32 meter buffer zone from the edge of the temporary zone inside the urban edge; and
- Larger buffer areas for aquatic ecosystems supporting sensitive species.

The DWS Buffer Guideline (McFarlane et al, 2013) is used to determine the scientific buffer requirements which may be more or less than the generic values.

2.3 Wetland Functionality, Status and Sensitivity

Wetland functionality is defined as “a measure of the deviation of wetland structure and function from its natural reference condition.” The natural reference condition is based on a theoretical undisturbed state extrapolated from an understanding of undisturbed regional vegetation and hydrological conditions. The hydrological, geomorphological and vegetation integrity are assessed for the wetland units associated with the study site, to provide a Present Ecological Status (PES) score (Macfarlane et al, 2007) and an Environmental Importance and Sensitivity category (EIS) (DWAF, 1999).

In the current study the wetland was assessed using WET-Health (Macfarlane et al, 2007) and EIS (DWAF, 1999).

2.3.1 Present Ecological Status (PES) – WET-Health

A summary of the three components of the WET-Health method namely Hydrological, Geomorphological and Vegetation Health assessment for the wetlands found on site is described in Table 2.

Table 2: Health categories used by WET-Health for describing the integrity of wetlands (Macfarlane *et al*, 2007)

Description	Impact Score Range	PES Score	Summary
Unmodified, natural.	>0.9	A	Very High
Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1 - 1.9	B	High
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	Moderate
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4 - 5.9	D	Moderate
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6 - 7.9	E	Low

Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	F	Very Low
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A summary of the change class, description and symbols used to evaluate wetland health are summarised in Table 3.

Table 3: Trajectory class, change scores and symbols used to evaluate Trajectory of Change to wetland health (Macfarlane *et al*, 2007)

Change Class	Description	Symbol
Improve	Condition is likely to improve over the over the next 5 years	(↑)
Remain stable	Condition is likely to remain stable over the next 5 years	(→)
Slowly deteriorate	Condition is likely to deteriorate slightly over the next 5 years	(↓)
Rapidly deteriorate	Substantial deterioration of condition is expected over the next 5 years	(↓↓)

2.3.2 Ecological Importance and Sensitivity (EIS)

Ecological importance is an expression of a wetland’s importance to the maintenance of ecological diversity and functioning on local and wider spatial scales. Ecological sensitivity refers to the system’s ability to tolerate disturbance and its capacity to recover from disturbance once it has occurred (DWAF, 1999). Explanations of the scores are given in Table 4.

This classification of water resources allows for an appropriate management class to be allocated to the water resource and includes the following:

- Ecological Importance in terms of ecosystems and biodiversity.
- Ecological functions including groundwater recharge, provision of specialised habitat and dispersal corridors.
- Basic human needs including subsistence farming and water use.

Table 4: Environmental Importance and Sensitivity rating scale used for the estimation of EIS scores (DWAF, 1999)

Ecological Importance and Sensitivity Categories	Rating	Recommended Ecological Management Class
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<p>Very High</p> <p>Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water in major rivers</p>	>3 and <=4	A
<p>High</p> <p>Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers</p>	>2 and <=3	B
<p>Moderate</p> <p>Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water in major rivers</p>	>1 and <=2	C
<p>Low/Marginal</p> <p>Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water in major rivers</p>	>0 and <=1	D

2.3.3 Impact and Risk Assessment

The risk-based management approach developed by the DWS is required to be undertaken to determine if a Water Use License Application (WULA) is required. The approach is used to assess potential impacts on wetland habitats and takes into consideration control / mitigation measures when scoring the significance of the potential impact (i.e. post mitigation). The model outcome of the impacts is then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with NEMA in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted. Risks/Impacts are assessed for all stages of the project cycle including:

- Planning;
- Construction;
- Operation; and
- Rehabilitation.

The following section is taken verbatim from the Section 21(c) and (i) Risk-based Assessment and Authorisation document (hereafter referred to as DWS, 2015).

In terms of section 22 of the National Water Act (36 of 1998)(NWA) a person may only use water if it is permissible under Schedule 1, a continuation of an ELU, a GA, a licence or the requirement for a licence has been dispensed with under section 22(3). There are 11 different types of water uses contemplated in

section 21, but the purpose of this Risk- Based Water Use Authorisation Guideline is to deal with section 21(c) and (i) water uses only.

Water use in terms of section 21(c) and (i) of the NWA is:

- (c) impeding or diverting the flow of water in a watercourse; and
- (i) altering the bed, banks, course or characteristics of a watercourse.

However, unlike some water uses referred to in section 21, e.g. (a) and (b) which are consumptive and whose impacts are usually clearly evident, easier to manage and quantifiable, section 21(c) and (i) water uses are non-consumptive and their impacts more difficult to detect and manage. They are also generally difficult to clearly quantify. However, if left undetected these impacts can significantly change various attributes and characteristics of a watercourse, and water resources, especially if left unmanaged and uncontrolled. Thus, the risks posed by section 21(c) and (i) water uses on watercourses and water resources are an important consideration during the authorisation of these water uses.

Risk-based management has value in providing an indication of the potential for delegating certain categories of water use “risks” to DWS regional offices (RO) or Catchment Management Agencies (CMA). Risk categories obtained through this assessment serve as a guideline to establish the appropriate channel of authorisation of these water uses. The DWS has therefore developed a risk assessment matrix to assist in quantifying expected impacts. The scores obtained in this assessment are useful in evaluating how the proposed activities should be authorised.

The formula used to derive a risk score is as follows:

RISK = CONSEQUENCE x LIKELIHOOD

CONSEQUENCE = SEVERITY + SPATIAL SCALE + DURATION

LIKELIHOOD = FREQUENCY OF THE ACTIVITY + FREQUENCY OF THE IMPACT +LEGAL ISSUES + DETECTION

“RISK ASSESSMENT KEY” is based on the DWS 2015 publication: Section 21 (c) and (i) water use Risk Assessment Protocol. An explanation of the key is shown below in table 5 - 12. The assessment presented in this document is based on the Risk Assessment Toolkit discussed in DWS (2015).

Table 5: Severity

How severe does the aspects impact on the resource quality (flow regime, water quality, geomorphology, biota, and habitat)?	
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3

Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5
Where "or wetland(s) are involved" it means that the activity is located within the delineated boundary of any wetland. The score of 5 is only compulsory for the significance rating.	

Table 6: Spatial Scale

How big is the area that the aspect is impacting on?	
Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighboring areas (downstream within quaternary catchment)	3
National (impacting beyond secondary catchment or provinces)	4
Global (impacting beyond SA boundary)	5

Table 7: Duration

How long does the aspect impact on the resource quality?	
One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organisation/facility, PES and EIS scores, a E or F	5
PES and EIS (sensitivity) must be considered.	

Table 8: Frequency of the activity

How often do you do the specific activity?	
Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

Table 9: Frequency of the impact

How often does the activity impact on the resource quality?	
Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

Table 10: Legal Issues

How is the activity governed by legislation?	
No legislation	1
Fully covered by legislation (wetlands are legally governed)	5
Located within the regulated areas	

Table 11: Detection

How quickly/easily can the impacts/risks of the activity be observed on the resource quality, people and property?	
Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

Table 12 below provides a description of the classes into which scores are sorted, and their implication for authorisation.

Table 12: Risk Classes

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated.
56 – 169	(M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
170 – 300	(H) High Risk	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

3.1 Locality of the study site

The proposed study area is situated on the farm Wheatlands 260IQ in the West Rand of Gauteng. The R41 runs approximately 1.2km north of the study area and Randfontein is approximately 6km to the east.

3.2 Description of the Receiving Environment

A review of available literature and spatial data formed the basis of a characterisation of the biophysical environment in its theoretically undisturbed state and consequently an analysis of the degree of impact to the ecology of the study site in its current state.

Refer to Figures 5 – 9 below.

3.2.1 Land Use

The proposed development area is situated on agricultural land which is used for crops. The surrounding area consists of small holdings. Agricultural potential for the area is low to moderate and falls within the West Rand Agricultural Hub.

3.2.2 Hydrology:

The subject property is located in the Mooirivier quaternary catchment C23D which is part of the Upper Vaal water management area. The Rietfonteinspruit within the site flows south into the Wonderfonteinspruit, Mooi River and finally into the Vaal River. Ecological condition of the catchment is **D** – largely modified.

3.2.3 Regional Vegetation:

The regional vegetation classification is Soweto Highveld Grassland of the Grassland Biome (Mucina & Rutherford, 2006).

Soweto Highveld Grassland vegetation is within gently to moderately undulating landscape on the Highveld plateau. Vegetation is short to medium-high dense, tufted grassland dominated by *Themeda triandra*. Undisturbed areas may contain small scattered wetlands, pans, and occasional ridges or rocky outcrops. Main grass species include *Elionurus muticus*, *Eragrostis racemose*, *heteropogon contortus*, *Tristachye leucotrix*, *Andropogon appendiculatus*, *Brachiaria serrata* and *Cynodon dactylon*. The vegetation unit is considered endangered with only a few patches on conserved land compared to a target of 24%. Nearly half of the area is transformed by cultivation, urban sprawl, mining and infrastructure. Some areas are flooded by dams and the erosion potential is very low.

3.2.4 Geology and soils:

The underlying geology is a mix of quartzite, shale and minor conglomerate.

3.2.5 Gauteng Conservation Plan

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2011) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. The eastern half of the site is located within an ecological support area. Ecological Support Areas are natural or heavily modified areas required to be maintained in an ecologically functional state to support Critical Biodiversity Areas and/or Protected Areas. These areas maintain the ecological processes on which Critical Biodiversity Areas and Protected Areas depend. Some are irreversibly modified, but are still required as they still play an important role in supporting ecological processes.

Directly to the north of the site outline is irreplaceable area and to the south and east are classed as important areas.

Locality

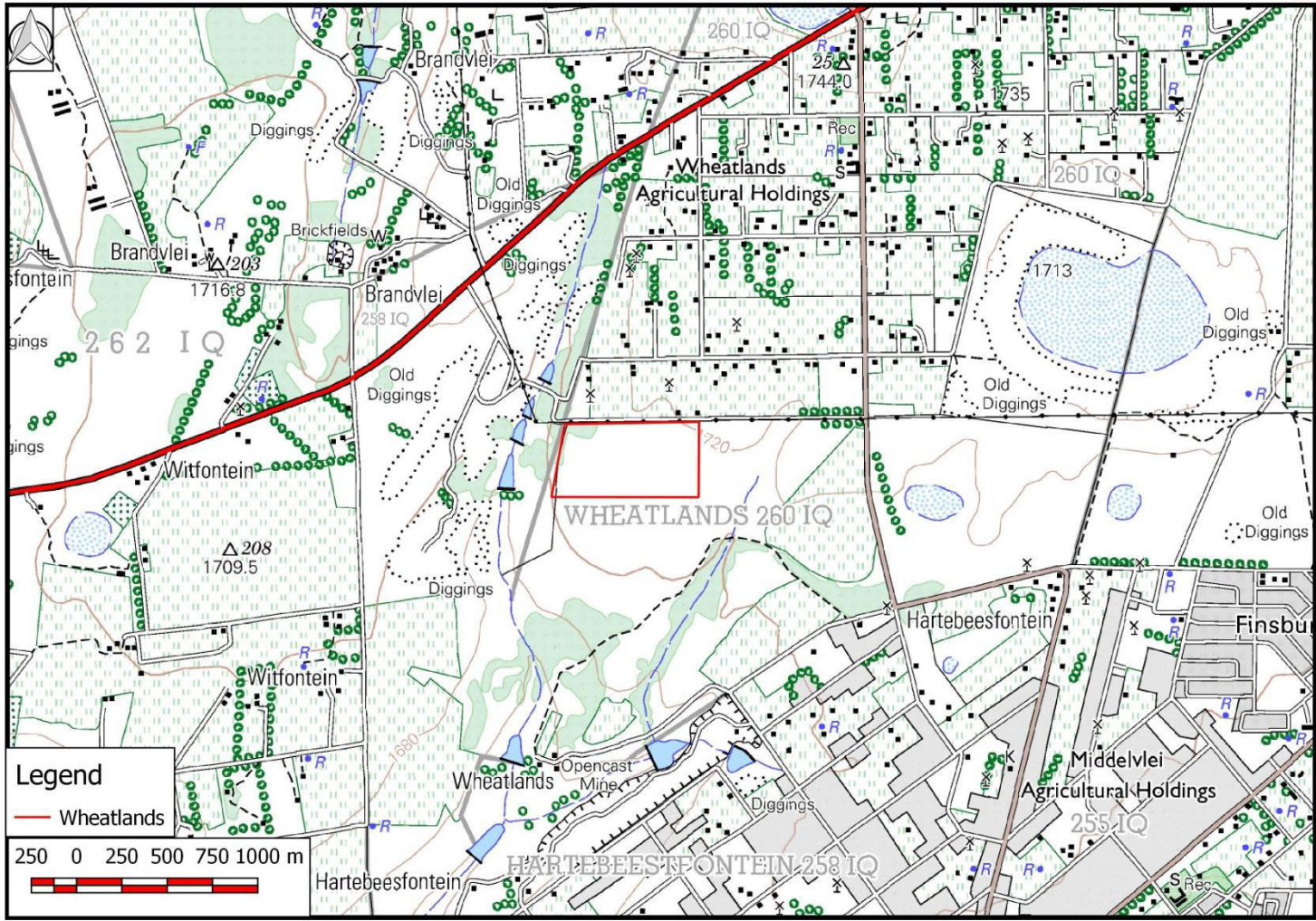


Figure 5: Locality Map

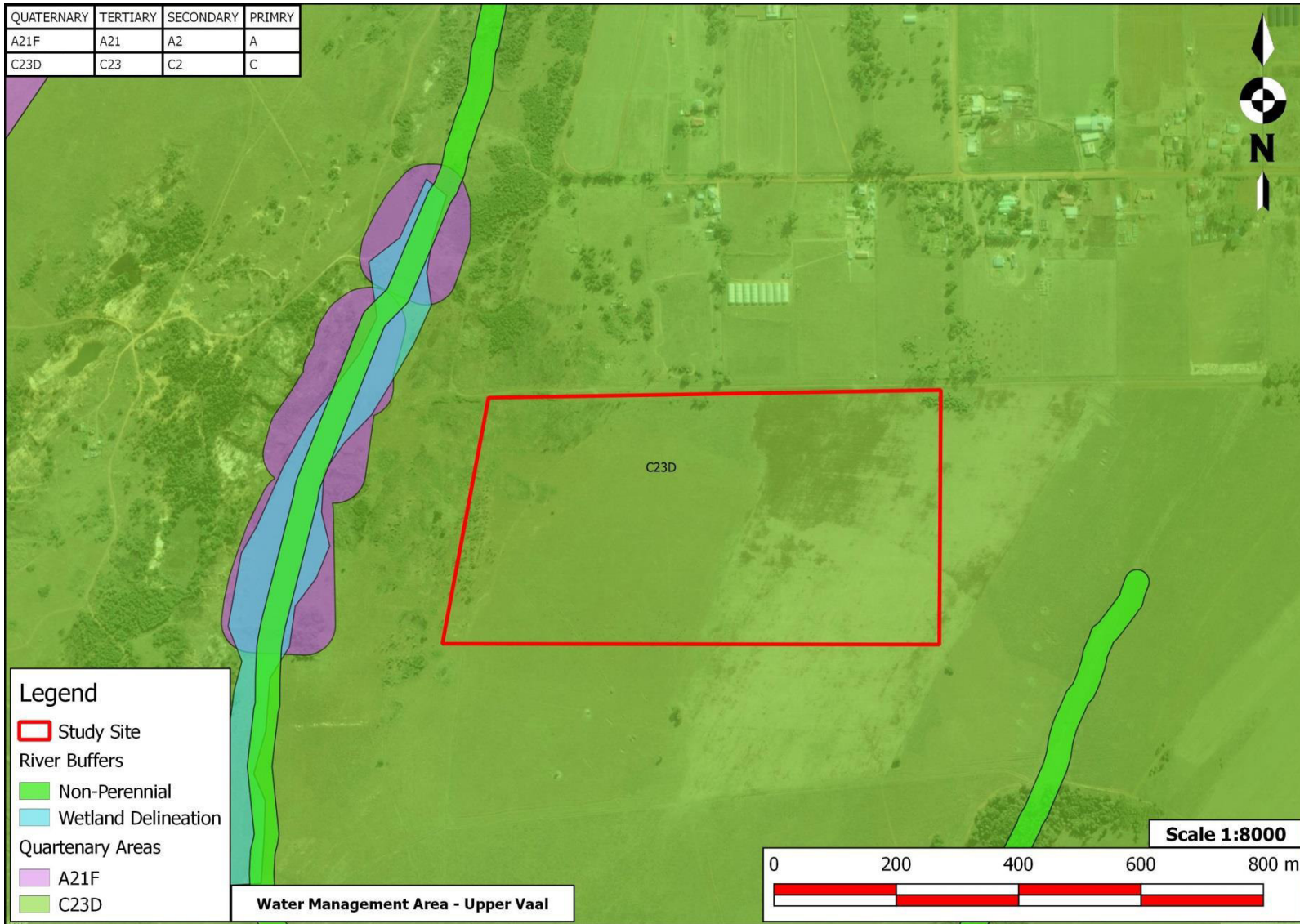


Figure 6: Hydrology of the study site and surrounds as per existing spatial layers.

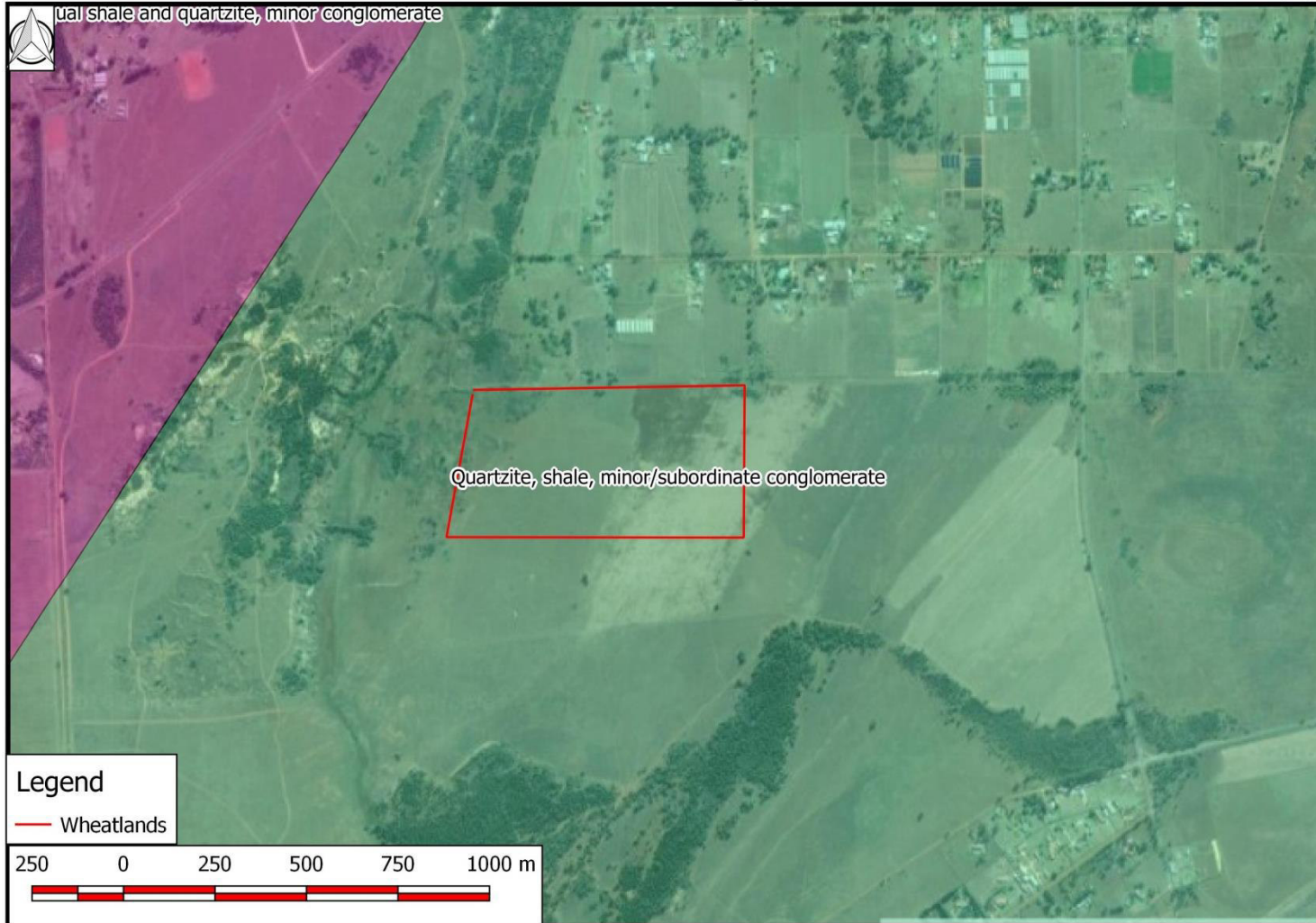
Vegetation



Projection - Transverse Mercator
Datum - Hartbeeshoek 1994
Reference Ellipsoid - WGS 1984
Central Meridian - 29

Figure 7: Vegetation types associated with the study site.

Geology



Project: — Transverse Mercator
Datum: Hartbeespoort 1994
Reference Ellipsoid: WGS 1984
Central Meridian: -29

Figure 8: Soil classes of the study area.

Conservation plan

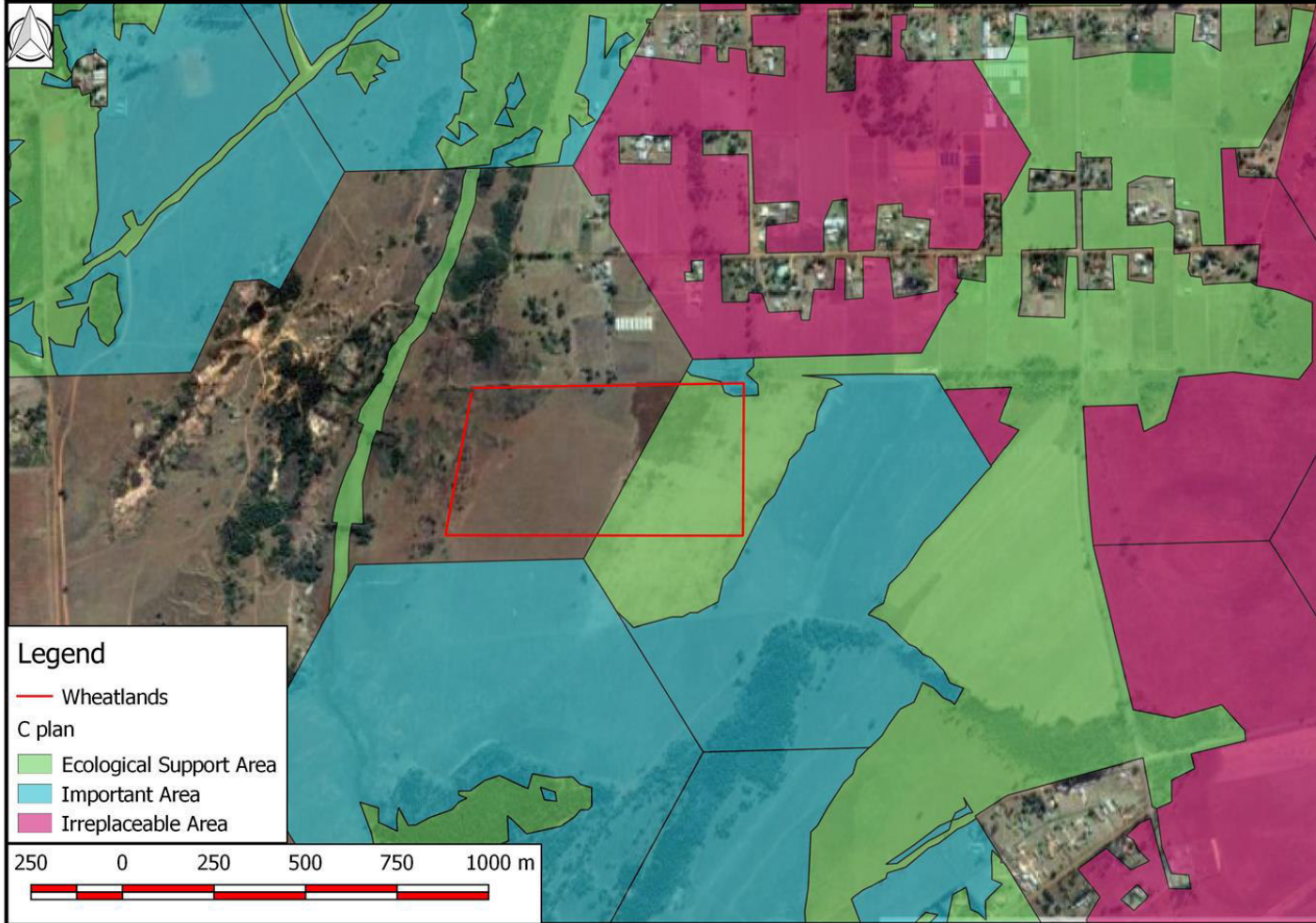


Figure 9: Gauteng C-Plan Map

3.3 Wetland Classification and Delineation

One wetland was found approximately 180m to the west of the study site and is classified as a valley bottom with a channel (non-perennial stream). Vegetation in the surrounding area was mostly uniform with *E. curvula* and *Monocymbium ceresiforme* dominating the landscape, whereas water-loving species within the wetland were *Cyperaceae* and *Paspalum dilatatum* forming dense basal cover. Bankrotbos (*Seriphium plumosum*) grows in scattered stands throughout the area adjacent to the wetland.

Table 13: Dominant vegetation characteristics (van Oudshoorn, 2014):

Species	Characteristics
Wetland	
<i>Cyperaceae</i>	Mostly obligate wetland plants and prefer wet areas.
<i>Paspalum dilatatum</i>	Grows mainly in moist places and near rivers. Prefers clay to loam soil and can be a weed in gardens.
Fields	
<i>Eragrostis curvula</i>	Often found in disturbed areas, mainly overgrazed and trampled veld.
<i>Themeda triandra</i>	Common in undisturbed areas. Prefers moist and fertile soil.
<i>Monocymbium ceresiforme</i>	Grows on slopes in high altitude and rainfall areas. Associated with leached acidic soil and sandy soil where water accumulates.
<i>Heteropogon contortis</i>	Prefers sandy loam to clay loam soils where some disturbance has occurred.
<i>Melinis nerviglumis</i>	Grows in moderate to high rainfall in undisturbed veld. Prefers shallow and gravelly soil.
<i>Eragrostis racemosa</i>	Grows in high rainfall grassland, bushveld and woodland. Grows in shallow sandy, gravelly soil in damp places or disturbed soil.

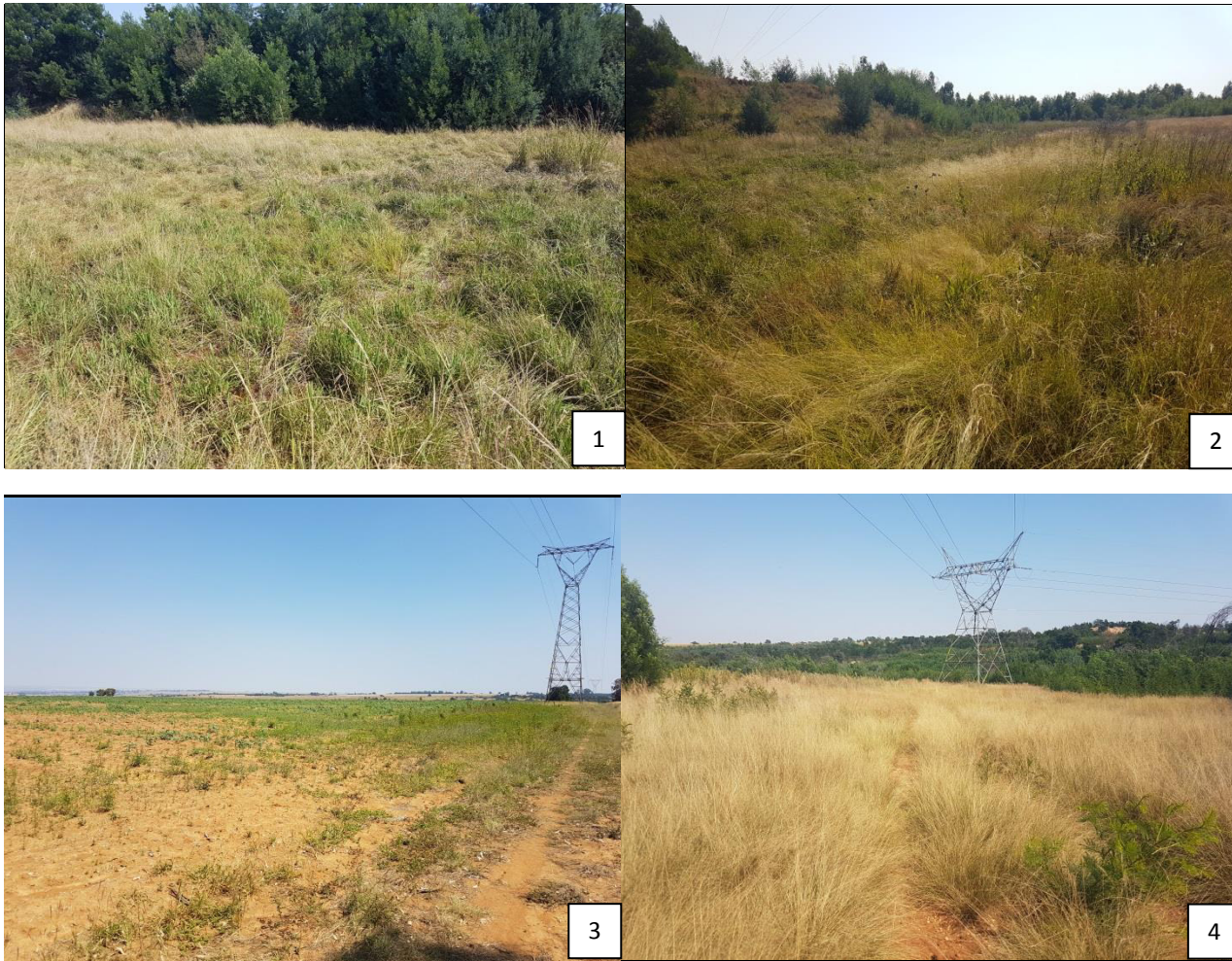


Figure 10: Characteristics of the study site 1-2) Wetland areas, 3-4) Surrounding grassland



Figure 11: Wetland areas associated with the proposed activity including 32m buffer.

3.4 Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS)

The PES was calculated for the wetland that occurs within 500m of the proposed development and which is likely to be impacted by the proposed activities.

The wetland has been impacted predominantly due to invasive plant growth; however other impacts were not visible during the site visit.

The estimated **PES scores** for the wetland that cross the proposed development as well as the estimated **EIS scores** are summarised in Tables 14 and 15 below:

Table 14: The estimated Present Ecological State (PES) of the wetland

	Hydrology		Geomorphology		Vegetation	
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Area weighted impact scores	4.0		1.4		2.2	
PES Category	D	→	B	→	C	→

The combined **PES** score for the wetland area is **2.5** and **C - Moderately modified**. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.

The expected trajectory of change is to remain stable should no further impacts occur on the wetland.

Table 15: The Ecological Importance and Sensitivity (EIS) of the study site wetland

	Importance	Confidence
Ecological Importance & Sensitivity	2.0	3.5
Hydrological/Functional Importance	2.4	4.0
Direct Human Benefits	0.3	3.0
	2.4	4.0

The **EIS** scores indicate that the study site is classed as **High** – the wetland is considered to be ecologically important and sensitive. The potential for direct human benefits is low, whereas the dense vegetation growth aids in sediment and pollutant trapping. The presence of small dams at regular intervals allows for the intermittent trapping of sediment and toxicants as water flows further downstream. The wetland is expected to be sensitive to habitat modifications from surrounding land use.

3.5 Buffer recommendation

A 17m buffer has been determined for the construction phase of the site using the buffer tool (MacFarlane et al, 2014). A 15m buffer is applicable for the operational phase. Calculations are shown in Appendix A.

A 50m buffer for wetlands outside of the the urban zone as required by GDARD (2014) though the development will have minimal effect on wetland condition since the western outline of the site is found more than 180m from the wetland and the solar farm will not require any crossings or activites within this area.

3.6 Risk Assessment

Risks and impacts on watercourses are not notable and do not require mitigation measures on a higher level, which costs more and requires specialist input. In terms of section 22 of the National Water Act (36 of 1998) (NWA), a section 21 (c) and (i) water use license is not required for the Wheatlands development.

Refer to Table 17

3.7 Impacts and Mitigation

Impacts on the river and wetland are expected to be minimal from the proposed development granted that a stormwater management plan is implemented. The distance from the Wheatlands Solar Farm to the wetland is greater than 180m and no pipelines or electrical lines are planned to cross or be built close to the wetland area. High energy runoff needs to be prevented.

Table 16: Current impacts for the Wheatlands wetland.

Hydrology	Geomorphology	Vegetation
Upstream and downstream dams have altered the hydrological regime of the wetlands, although seepage is evident below the dam walls which are of soil.	Sediment cannot be removed from the wetlands due to the multiple dams along the watercourse. Infilling and deposition of soil has occurred around the dams.	Some exotic trees are present scattered around the wetlands. Biodiversity is low.

Recommendations were developed to address and mitigate impacts associated with the proposed project. These recommendations also include general management measures which should be applied during each phase of the proposed development. Mitigation measures address issues from planning, through construction and rehabilitation to after care and maintenance.

Refer to Table 18

Table 17: Risk Assessment Ratings

Phases	Activity	Aspects	Impacts	Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating
C	Clearing of vegetation vegetation in close proximity to a watercourse	Creating Access roads Creating safety clearance. Application of herbicides. Creation of fire breaks.	Loss of biodiversity and habitat. Pollution from sediment, vehicles and mateirals materials.	1	1	1	1	1	1	2	4	1	1	1	2	5	20	L
C	Construction of access roads through or in close proximity to a watercourse	Cutting/reshaping of riverbanks. Installation of culverts/pipes for stream crossings. Construction of low level bridges.	Loss of biodiversity and habitat. Pollution from sediment, vehicles and mateirals materials. Alteration or disruption of flow. Impeding flow. Damage to banks. Erosion of watercourse.	1	1	1	1	1	1	1	3	1	1	1	3	6	18	L
C/O	Erection of solar panels	Denuding the area. Excavation for foundations. Creating platforms for tower erection.	Loss of biodiversity and habitat. Pollution from sediment, vehicles and materials. Alteration or disruption of flow. Impeding flow. Damage to banks. Erosion of watercourse.	1	1	1	1	1	1	2	4	1	1	1	3	6	24	L
C/O	Erosion Control	Donga repair and filling for protection of infrastructure. Building of gabion walls. Installing berms. Stormwater structures.	Pollution from sediment, vehicles and materials. Alteration or disruption of flow. Impeding flow. Damage to banks. Erosion of watercourse.	1	2	2	1	1.50	2	2	5.5	2	2	1	1	6	33	L

C/O	Storm Water Management	Creating diversions in existing water courses. Putting in berms. Construction of drainage channels. Installations of gabions.	Pollution from sediment, vehicles and materials. Alteration or disruption of flow. Impeding flow. Damage to banks. Erosion of watercourse.	2	2	1	1	1.50	2	7	10.5	2	2	1	1	6	63	L/M
O	Maintenance of solar panels.	Vehicle movement through the site. Removal of materials	Pollution from dumped materials. Soil compaction.	1	1	1	1	1.00	2	4	7	2	2	1	1	6	42	L
O	Removal of alien alien vegetation	Physical removal.	Positive impact.	2	2	2	1	1.75	2	4	7.75	1	1	1	1	4	31	L
O	Removal of alien/exotic vegetation	Use of herbicides.	Positive impact.	2	2	2	1	1.75	2	4	7.75	1	1	1	1	4	31	L

Table 18: The mitigation plan for Wheatlands.

Project Phase	Objectives	Mitigation Measures	Severity	
			Before Mitigation	After Mitigation
Planning/ Pre- construction	Minimise the footprint of the development	<ul style="list-style-type: none"> • An Environmental Management Plan and Storm Water Management Plan (SWMP) must be developed and be made available to the Ecological Control Officer (ECO) and be available on site for reference purposes. • Spatial and temporal placement of pipelines and construction areas should be placed as far from watercourses as possible and outside of buffer zones. • Access areas should be placed outside of buffer zones. • River crossings must be positioned where minimal disturbance of water movement occurs. • Culverts must be placed in river crossings at points where water flow is impeded as little as possible. • Geotechnical Engineers should be consulted for a management and rehabilitation plan. • Plan construction in proximity to watercourses to take place during the drier months. • The contractors must provide and maintain a method statement for “cement and concrete batching” which includes plans for storage and disposal of construction materials. 	Medium	Low
Construction	Limit the area of disturbance/ site clearing and related impacts	<ul style="list-style-type: none"> • Construction boundaries and buffers should be clearly demarcated and fenced off. • Only use designated access roads and river crossing points. • River crossing points should be used as little as possible and limited to light vehicles. • Indigenous vegetation should not be removed where possible. • Traffic within sensitive areas should be limited. • Site clearing should be done immediately before construction to limit the time that soils are exposed. • Construction vehicles must not be allowed within wet areas and streams directly after rainfall. 	Medium	Low
	Prevention of pollution of rivers and wetlands	<ul style="list-style-type: none"> • All pollutants should be stored in sealed containers in designated areas. • A bermed area away from watercourses should be used for cleaning of equipment and mixing of cement. • Vehicles and equipment should be cleaned, maintained and repaired in designated areas. • Drip trays must be used to prevent oil spills. 	Low	Low

		<ul style="list-style-type: none"> • Storage of materials may not be within the 1:100 flood lines, watercourses or associated buffer areas. • Solid waste/ refuse must be placed in designated areas and removed daily by appropriate methods. • In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs (DWS) must be informed immediately. • Adequate sanitation facilities must be supplied for workers away from sensitive areas. • Silt traps, berms, sand bags and/or barriers must be used along buffer zones to prevent sedimentation of watercourses • Prevent increased runoff by use of a SWMP. 		
	Prevent loss of topsoil and vegetation	<ul style="list-style-type: none"> • Topsoil that is removed during construction should be stockpiled away from buffer zones. • Stockpiles should be replaced in open areas where construction does not occur. • Limit vegetation clearing. • Red data/ protected species should be fenced off and no removal permitted. • Should red data species need to be removed, this should be done under the guidance of a flora specialist. Plants must be placed in a greenhouse and replanted in natural areas. • Any removal of the protected Marula trees will require a permit. 	Medium	Low

4 CONCLUSION

The majority of the wetland has been impacted predominantly due to anthropogenic activities of which the main impacts include:

- Damming at regular intervals
- Invasive and alien vegetation growth

The combined **PES** score for the wetland area is **2.5** and **C - Moderately modified**. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. The expected trajectory of change is to remain stable should no further impacts occur on the wetland.

The **EIS** scores indicate that the study site is classed as **High** – the wetland is considered to be ecologically important and sensitive. The potential for direct human benefits is low, whereas the dense vegetation growth aids in sediment and pollutant trapping. The presence of small dams at regular intervals allows for the intermittent trapping of sediment and toxicants as water flows further downstream. The wetland is expected to be sensitive to habitat modifications from surrounding land use.

A 17m buffer during the construction phase has been determined for the site using the buffer tool (MacFarlane et al, 2014). A 15m buffer is applicable during the operational phase.

A 50m buffer for wetlands outside of the the urban zone as required by GDARD (2014) though the development will have minimal effect on wetland condition since the western outline of the site is found more than 180m from the wetland and the solar farm will not require any crossings or activities within this area.

Impacts on the river and wetland are expected to be minimal from the proposed development. The distance from the Wheatlands Solar Farm to the wetland is greater than 180m and no pipelines or electrical lines are planned to cross or be built close to the wetland area.

Risks and impacts on watercourses are not notable and do not require mitigation measures on a higher level, which costs more and requires specialist input. In terms of section 22 of the National Water Act (36 of 1998) (NWA), a section 21 (c) and (i) water use license is required.

Therefore, the project is expected to have minimal to no impact on the watercourse and is approved from a wetland specialist perspective.

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APPENDIX A: BUFFER TOOL CALCULATION

Overall size	Size of the wetland relative to (as a percentage of) its catchment	Average slope of the wetland's catchment	The inherent runoff potential of the soil in the wetland's catchment	The extent to which the wetland (HGM) setting is generally characterized by sub-surface water input
(6-50) Intermediate	Small (<2%)	<3%	Low	Intermediate (The remaining HGM types)
Perimeter to area ratio	Vulnerability of the HGM type to sediment accumulation	Vulnerability of the site to erosion given the site's slope and size	Extent of open water, particularly water that is naturally clear	Sensitivity of the vegetation to burial under sediment
Low (<500 m per ha)	Channelled valley-bottom	Moderately Low (Vulnerability score: 2-3)	Low (0.5-3%)	Moderately High
Peat versus mineral soils	Inherent level of nutrients in the landscape: is the wetland and its catchment underlain by sandstone?	Sensitivity of the vegetation to increased availability of nutrients	Sensitivity of the vegetation to toxic inputs, changes in acidity & salinization	Natural wetness regimes
Mineral	No	Moderately low	Moderately low	Mix of permanently and seasonally saturated soils
Natural salinity levels	Level of domestic use	Mean Annual Temperature	Note: See the guideline document for further information on the rationale for indicator selection and how these attributes affect the sensitivity of wetlands to lateral inputs.	
Intermediate salinity levels	Low	Zone 3 (16.9 - 18.2 Deg C)		

Assess the sensitivity of important biodiversity elements to threats posed by lateral land-use impacts

Threat Posed by the proposed land use / activity	Sensitivity		Site-based Risk Class	Justification for increasing the sensitivity to cater for any important biodiversity elements including special habitats and species of conservation concern.
	Water Resource	Biodiversity		
Construction Phase	1. Alteration to flow volumes	L		N/A
	2. Alteration of patterns of flows (increased flood peaks)	M		VL
	3. Increase in sediment inputs & turbidity	L		M
	4. Increased nutrient inputs	L		N/A
	5. Inputs of toxic organic contaminants	L		VL
	6. Inputs of toxic heavy metal contaminants	L		L
	7. Alteration of acidity (pH)	L		L
	8. Increased inputs of salts (salinization)	L		N/A
	9. Change (elevation) of water temperature	L		N/A
	10. Pathogen inputs (i.e. disease-causing organisms)	L		VL
Operational Phase	1. Alteration to flow volumes	L		M
	2. Alteration of patterns of flows (increased flood peaks)	M		VL
	3. Increase in sediment inputs & turbidity	L		VL
	4. Increased nutrient inputs	L		VL
	5. Inputs of toxic organic contaminants	L		M
	6. Inputs of toxic heavy metal contaminants	L		L
	7. Alteration of acidity (pH)	L		VL
	8. Increased inputs of salts (salinization)	L		VL
	9. Change (elevation) of water temperature	L		VL
	10. Pathogen inputs (i.e. disease-causing organisms)	L		VL

Refine desktop buffer requirements based on site-based investigations

Buffer attributes	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Slope of the buffer	Very Gentle (0 - 2%)			
Vegetation characteristics (Construction phase)	High: Dense vegetation, with good basal cover (e.g. natural grass stands)			
Vegetation characteristics (Operational phase)	High: Dense vegetation, with good basal cover (e.g. natural grass stands)			
Soil permeability	Moderate: Moderately textured soils (e.g. sandy loam).			
Topography of the buffer zone	Uniform topography: Smooth topography with no concentrated flow paths anticipated.			
Site-based aquatic impact buffer requirements (without additional mitigation measures)				
Construction Phase	17	Not Assessed	Not Assessed	Not Assessed
Operational Phase	15	Not Assessed	Not Assessed	Not Assessed

Where appropriate, identify additional mitigation measures and refine aquatic impact buffer width accordingly

Threat Posed by the proposed land use / activity	Specialist Threat Rating	Description of any additional mitigation measures	Refined Threat Class	Specialist justification for refined threat ratings with clear reference to supporting documentation.
Construction Phase	1. Alteration to flow volumes			
	2. Alteration of patterns of flows (increased flood peaks)	N/A		
	3. Increase in sediment inputs & turbidity	H		
	4. Increased nutrient inputs	N/A		
	5. Inputs of toxic organic contaminants	VL		
	6. Inputs of toxic heavy metal contaminants	L		
	7. Alteration of acidity (pH)	L		
	8. Increased inputs of salts (salinization)	N/A		
	9. Change (elevation) of water temperature	N/A		
	10. Pathogen inputs (i.e. disease-causing organisms)	VL		
Operational Phase	1. Alteration to flow volumes			
	2. Alteration of patterns of flows (increased flood peaks)	M		
	3. Increase in sediment inputs & turbidity	VL		
	4. Increased nutrient inputs	VL		
	5. Inputs of toxic organic contaminants	M		
	6. Inputs of toxic heavy metal contaminants	L		
	7. Alteration of acidity (pH)	VL		
	8. Increased inputs of salts (salinization)	VL		
	9. Change (elevation) of water temperature	VL		
	10. Pathogen inputs (i.e. disease-causing organisms)	VL		

	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Revised aquatic impact buffer requirements (including additional mitigation measures)				
Construction Phase	Not Assessed	Not Assessed	Not Assessed	Not Assessed
Operational Phase	Not Assessed	Not Assessed	Not Assessed	Not Assessed

Additional mitigation measures to consider	V/N	Comments
Have additional mitigation measures been identified to cater for any point-source discharges?		
Have additional mitigation measures been identified to cater for potential groundwater impacts?		

Where necessary review and refine aquatic impact buffer requirements to cater for practical management considerations

	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Final aquatic impact buffer requirements (including practical management considerations)				
Construction Phase	17	Not Assessed	Not Assessed	Not Assessed
Operational Phase	15	Not Assessed	Not Assessed	Not Assessed
Final aquatic impact buffer requirement	17	Not Assessed	Not Assessed	Not Assessed

APPENDIX B: GLOSSARY OF TERMS

Activity	a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation
Buffer	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.
Duration	the length of time over which the stressor will cause a change in the resource or receptor.
Environmental aspect	an element of an organizations activities, products and services which can interact with the environment". The interaction of an aspect with the environment may result in an impact.
Frequency of activity	refers to how often the proposed activity will take place.
Frequency of impact	refers to the frequency with which a stressor (aspect) will impact on the receptor.
Hydrophyte	any plant that grows in water or on a substratum that is at least periodically deficient in oxygen as a result of soil saturation or flooding; plants typically found in wet habitats.
Hydromorphic soil	soil that in its undrained condition is saturated or flooded long enough during the growing season to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soils).
Impacts/ Risks	the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
Receptors	comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
Seepage	A type of wetland occurring on slopes, usually characterised by diffuse (i.e. unchannelled, and often subsurface) flows.
Sedges	Grass-like plants belonging to the family Cyperaceae, sometimes referred to as nutgrasses. Papyrus is a member of this family.
Severity	the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.

Spatial extent	the geographical scale of the impact
Soil profile	the vertically sectioned sample through the soil mantle, usually consisting of two or three horizons (Soil Classification Working Group, 1991).
Wetland	“land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.” (National Water Act; Act 36 of 1998).
Wetland delineation	the determination and marking of the boundary of a wetland on a map using the DWAF (2005) methodology. This assessment includes identification of suggested buffer zones and is usually done in conjunction with a wetland functional assessment. The impact of the proposed development, together with appropriate mitigation measures are included in impact assessment tables

APPENDIX C: CV OF SPECIALIST

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Work History

DELTERRA CONSULTING – Environmental Consultant
Wetland delineation
Ecological/ risk and impact assessments
Desktop analysis
Environmental Compliance

WETREST – Research as part of MSc in Aquatic Health

- “A Holocene Wetland: Hydrological Response to Rehabilitation at Colbyn Valley Wetland, Pretoria, Gauteng”
- Weekly groundwater level and pressure monitoring
- Isotope analysis
- Water quality monitoring
- Vegetation growth mapping

Education

MSc IN AQUATIC HEALTH – University of Johannesburg

BSC HONS IN ENVIRONMENTAL MANAGEMENT (CUM LAUDE) – UNISA

BSC AGRICULTURE – University of the Free State

Short Courses

FEB 2017	Taxonomy of wetland Plants (SANBI)
FEB 2016	Grass identification and veld management
NOV 2015	WRC/ ECO-PULSE Workshop in determination of buffers for rivers, wetlands and estuaries
APR 2015	Workshop on environmental compliance, enforcement and risk management

Projects

Wetland delineation, PES/EIS, functional assessment, Impacts and Mitigation, VEGRAI, QHI, Risk Assessments

Riverwalk Electrical

The proposed Residential development that is situated on Erven 1130 & 1131, Ormonde Extension 24 and Erven 962 & 963, Ormonde Extension 22 Coal mining rights application for Berenice, Limpopo Province.

Proposed Ekurhuleni Roads and Stormwater Upgrades in Ekurhuleni Metropolitan Municipality, Gauteng.

Proposed Housing Development on the Farm Middbuilt Position 11 and 81 and Eloff Erf 675, Delmas.

Kagisa and Environs Integrated Development and Housing Project, West Rand, Gauteng.

Proposed Residential development at Witpoortjie, Krugersdorp, Gauteng

Proposed Moretele Distribution Powerlines and Substations, North of Pretoria, Gauteng Province

The Proposed Panfontein Access Road for Rand Water in Midvaal Local Municipality, Gauteng

Proposed Hawerklip Coal Siding at Brazen Algar, Delmas, Mpumalanga Province. BRA-ALG-15-10-19

Proposed Eskom Westgate Ntshona Powerline, Gauteng Province

Ecological Importance and Sensitivity, and Present Ecological Status assessment for water use application for Soweto, Gauteng Province

The Proposed Powerline and Substation in Diepsloot East, Gauteng Province

Gem Valley Residential Development, Pretoria North

Amberfield Residential Development, Centurion

Environmental Compliance

The Construction of Two (2) 9km 88KV Tern Lines Section from Rigi Substation to Sonland Substation in Vereeniging, Emfuleni Local Municipality, Gauteng Province

APPENDIX E4

AGRICULTURAL ASSESSMENT



REPORT

SOIL AND AGRICULTURAL POTENTIAL SURVEY: WHEATLANDS, GAUTENG PROVINCE

13 June 2017

**Compiled by:
J.H. van der Waals
(PhD Soil Science, Pr.Sci.Nat)**

Member of:
Soil Science Society of South Africa (SSSSA)

Accredited member of:
South African Soil Surveyors Organisation (SASSO)

Registered with:
The South African Council for Natural Scientific Professions
Registration number: 400106/08

Declaration

I, Johan Hilgard van der Waals, declare that –

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



J.H. VAN DER WAALS
TERRA SOIL SCIENCE

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SOIL AND AGRICULTURAL POTENTIAL SURVEY: WHEATLANDS, GAUTENG PROVINCE

1. INTRODUCTION

1.1 TERMS OF REFERENCE

Terra Soil Science was appointed by **Bokamoso** to conduct an agricultural potential assessment for the Wheatlands site in the Gauteng Province.

1.2 AGRICULTURAL POTENTIAL BACKGROUND

The assessment of agricultural potential rests primarily on the identification of soils that are suited to crop production. In order to qualify as high potential soils they must have the following properties:

- Deep profile (more than 600 mm) for adequate root development,
- Deep profile and adequate clay content for the storing of sufficient water so that plants can weather short dry spells,
- Adequate structure (loose enough and not dense) that allows for good root development,
- Sufficient clay or organic matter to ensure retention and supply of plant nutrients,
- Limited quantities of rock in the matrix that would otherwise limit tilling options and water holding capacity,
- Adequate distribution of soils and size of high potential soil area to constitute a viable economic management unit, and
- Good enough internal and external (out of profile) drainage if irrigation practices are considered. Drainage is imperative for the removal (leaching) of salts that accumulate in profiles during irrigation and fertilization.

In addition to soil characteristics, climatic characteristics need to be assessed to determine the agricultural potential of a site. The rainfall characteristics are of primary importance and in order to provide an adequate baseline for the viable production of crops rainfall quantities and distribution need to be sufficient and optimal.

In the case where crop production is not possible due to soil or climatic constraints aspects such as grazing potential and carrying capacity is considered. Grazing capacity is mainly determined by vegetation characteristics of a site and would therefore have to be deduced from vegetation reports (that do address carrying capacity) or from dedicated discussions with farmers and land users. The combination of the above mentioned factors will be used to assess the agricultural potential of the soils on the site.

Several soil quality, landscape and surrounding land use parameters influence agricultural potential. These parameters include pollution of soils and water, human activities influencing the economic

viability of farming enterprises, storm water management and water availability (for irrigation purposes or inherent soil properties that provide perched water sources). Where applicable these parameters will be addressed in this report.

1.3 LAND CAPABILITY CLASSIFICATION – DAFF

Land capability refers to the specific land use and agronomic practices that a given piece of land is capable of in the context of the original land capability categories published in the USA in the 1960's. The land capability concept is a bit broader than the "land suitability" approach expounded by the FAO (Food and Agriculture Organisation of the UN) where the latter aims to pronounce on the suitability of a specific area of land for a specific "land utilization type" (LUT). In the more recent South African case for "land capability" the then Department of Agriculture, Forestry and Fisheries (DAFF) established a requirement for the classification of land based on the criteria provided in **Table 1**. These categories are not significantly different from the original concept but have been amended for the South African context.

Table 1 Land capability classes for assessment of land

Land Capability Class	Definition	Conservation Need	Use suitability
I	No or few limitations. Very high arable potential. Very low erosion hazard.	Good agronomic practice.	Annual cropping.
II	Slight limitations. High arable potential. Low erosion hazard.	Adequate run-off control.	Annual cropping with special tillage or ley (25%)
III	Moderate limitations. Some erosion hazards.	Special conservation practice and tillage methods.	Rotation of crops and ley (50 %).
IV	Severe limitations. Low arable potential. High erosion hazard.	Intensive conservation practice.	Long term leys (75 %)
V	Watercourse and land with wetness limitations.	Protection and control of water table.	Improved pastures or Wildlife
VI	Limitations preclude cultivation. Suitable for perennial vegetation.	Protection measures for establishment eg. Sod-seeding	Veld and/or afforestation
VII	Very severe limitations. Suitable only for natural vegetation.	Adequate management for natural vegetation.	Natural veld grazing and afforestation
VIII	Extremely severe limitations. Not suitable for grazing or afforestation.	Total protection from agriculture.	Wildlife

The assessment of land capability rests squarely on the assessment of soil properties for agricultural purposes as discussed in the previous section. These properties will therefore be used to determine the specific land capability class for the survey area.

1.4 REPORT METHODOLOGY

This report was generated following a dedicated satellite image, topographical and land type data interpretation exercise as well as a field soil survey. Due to extensive experience in the field as well as in the general area the pronouncements in this report are considered to be accurate and representative of the specific site.

The report addresses the following aspects:

1. Land use and land cover (satellite image interpretation)
2. General soil associations (topographical parameters, land type data and soil survey)
3. Agricultural potential (experience and interpretation of above information)
4. Risks flagged with agricultural activities on the site (experience on similar projects)

2. BRIEF DESCRIPTION OF THE SURVEY AREA

2.1 SURVEY AREA BOUNDARY

The survey lies between 26° 11' 38" and 26° 11' 58" S and 27° 36' 44" and 27° 37' 21" E south approximately 7 km west of the town of Randfontein in the Gauteng Province (**Figure 1**). The site is surrounded by agricultural land on all sides and a portion has been tilled for dryland crop production.

2.2 SURVEY AREA PHYSICAL FEATURES

The site is underlain by quartzite, shale and conglomerate geology and lies on relatively flat terrain in the east to undulating terrain in the west. It has a south-westerly aspect and the altitude varies from 1700 m in the south-west to 1730 in the north-east. The long-term average rainfall of the area is approximately 650 mm per annum with the site indicated in **Figure 2** on a rainfall map of South Africa.

3. METHOD OF AGRICULTURAL POTENTIAL SURVEY

The survey was conducted in four phases.

3.1 PHASE 1: LAND TYPE DATA

Land type data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 – 2006). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units (in the cross section). The soil data is classified according to the Binomial System (MacVicar et al., 1977). The soil data was interpreted and re-classified according to the Taxonomic System (The Soil Classification Working Group, 1991).

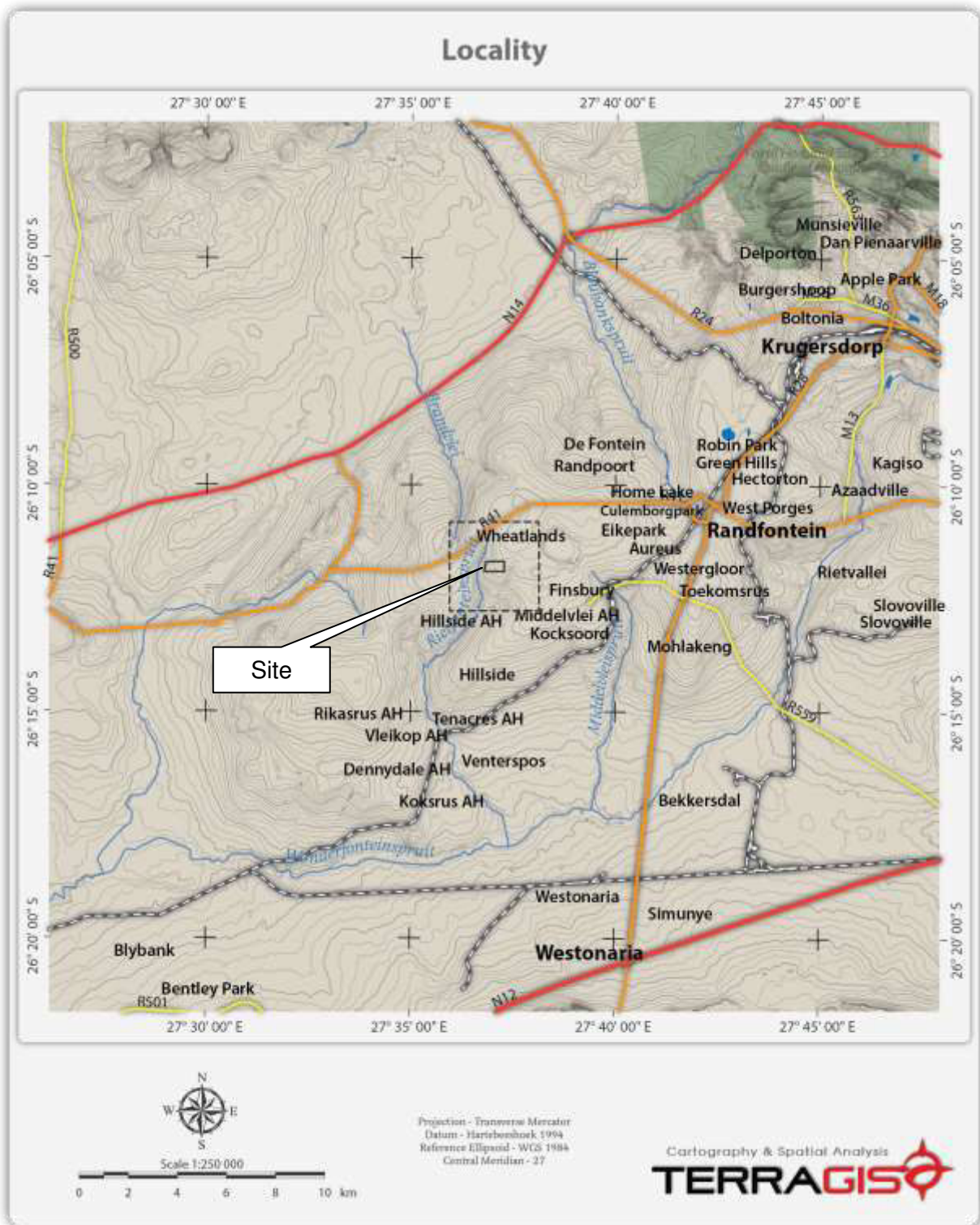


Figure 1 Location of the survey site

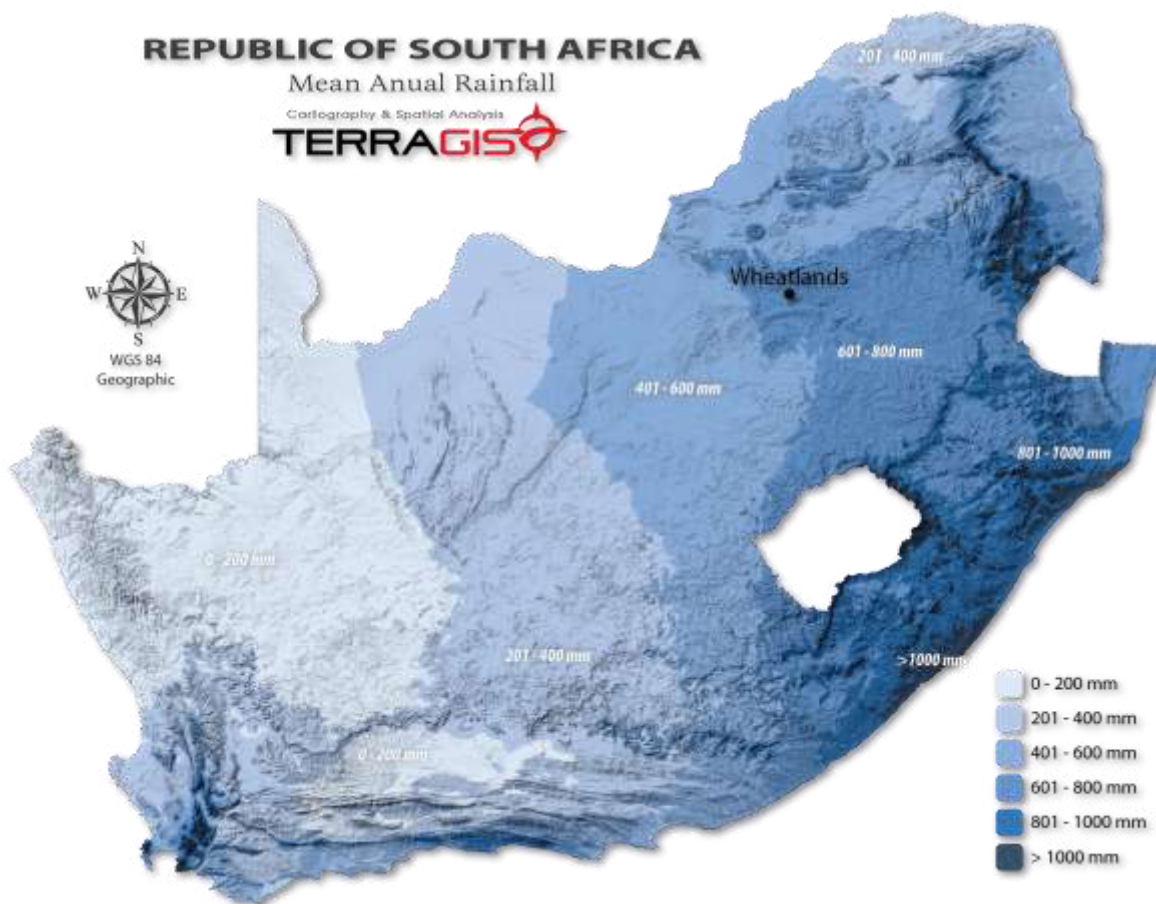


Figure 2 Rainfall map of South Africa indicating the survey site

3.2 PHASE 2: TOPOGRAPHIC PARAMETERS

The topography of the sites was elucidated through the generation of a digital elevation model (DEM) map and a topographic wetness index (TWI) for each site. Data generated during this phase was verified during the field survey phase and used to generate additional soil information for the sites.

3.3 PHASE 3: SATELLITE IMAGE INTERPRETATION

A dedicated satellite image (Google Earth) interpretation exercise was conducted to determine the current site conditions as well as the historical land uses. This was done through the accessing of Google Earth images from different periods in the past.

3.4 PHASE 4: SOIL SURVEY

The site was traversed on foot perpendicular to the access of soil variation identified in the previous phase. The soil conditions and forms were determined through the auguring of holes for classification as well as the observation of general soil properties as expressed in the tilled soils. Photographs were taken of pertinent aspects and are provided in the results section.

4. AGRICULTURAL POTENTIAL SURVEY RESULTS

4.1 PHASE 1: LAND TYPE DATA

Figure 3 presents the land type distribution for the sites and surrounding area. The land types found on the site are **Ba35** and **Ba36** (Land Type Survey Staff, 1972 – 2006). Below follows a brief description of the land type in terms of soils, land capability, land use and agricultural potential.

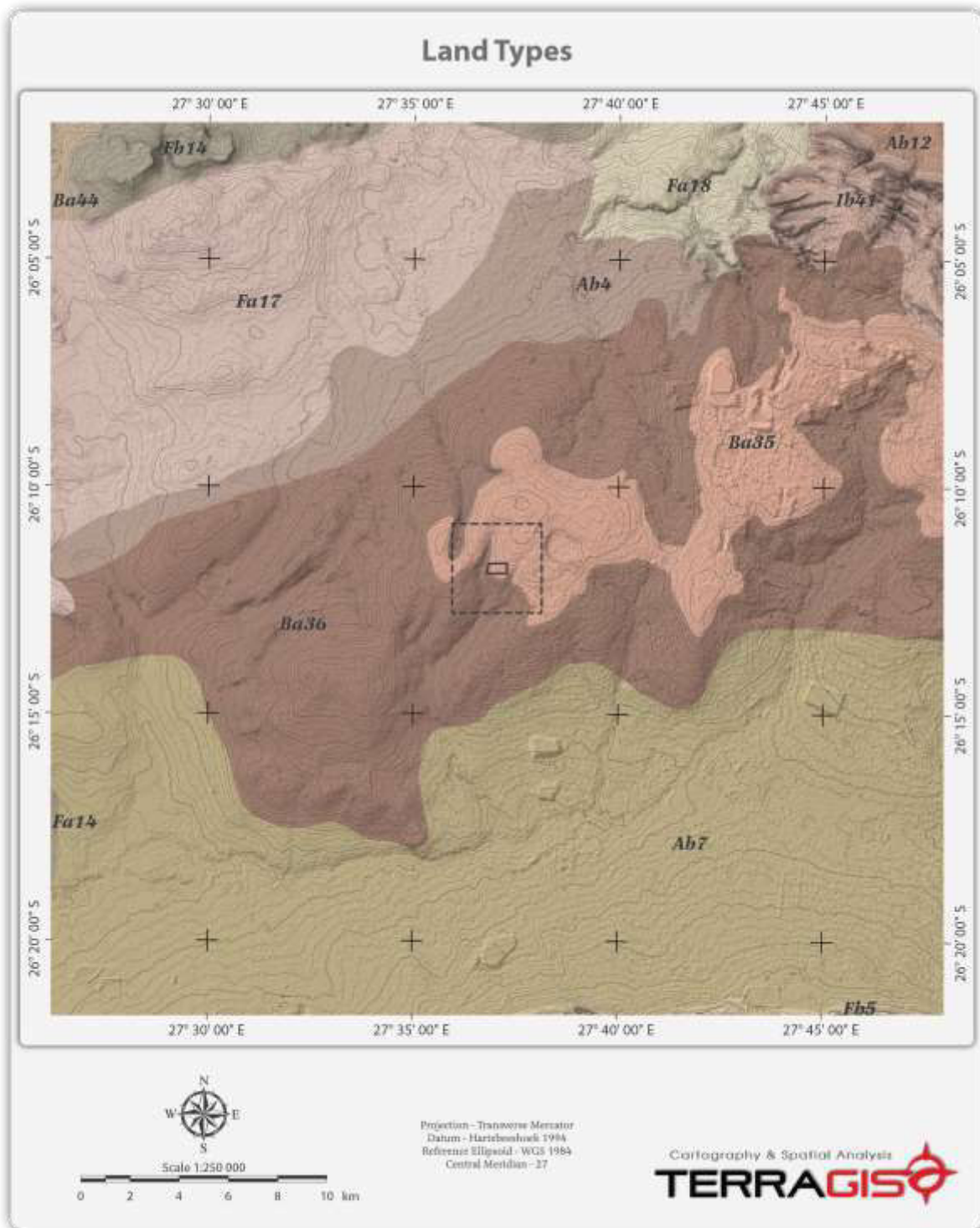


Figure 3 Land type map of the survey site and its surrounding area

Land Type Ba35 and Ba36

Land Type – General: Ba land types denote plinthic landscapes where the dominant soils are well-drained and red with a low to intermediate base status (dystrophic and mesotrophic).

Soils: The land types are dominated by shallow to moderate depth red and yellow soils with extensive hard plinthite and concretionary plinthic horizons. Higher lying areas are dominated by shallow soils that grade rapidly into weathering quartzite and conglomerate at depth with deeper well-drained soils occurring to a limited degree on flat midslope positions. Foothills and valley-bottom areas are characterised by yellow-brown soils with hard plinthic subsoils grading onto bleached sandy soils.

Land capability and land use: The land use in the general land type area is characterised by urban developments, and in the agricultural areas, extensive grazing on the shallower soils and dryland crop production on the deeper soils that exhibit fewer limitations to tillage. Irrigated agriculture is practiced sporadically in areas where soils properties allow and where water is available. The land capability mimics the land use.

Agricultural potential: The agricultural potential ranges from low on the shallow soils to moderate/high on the deeper soils. In areas where irrigation water and infrastructure is available the potential is high due to the suitability of the soils in crest, midslope and foothills positions to irrigation land uses.

4.2 PHASE 2: TOPOGRAPHIC PARAMETERS

Contours of the site (5 meters – **Figure 4**) were used to generate a digital elevation model (**Figure 5**). This data was used to generate the topographic wetness index (TWI) for the site (**Figure 6**).

From extensive experience in the field of hydrogeology it is evident that the TWI provides a very accurate indication of water flow paths and areas of water accumulation that are often correlated with wetlands. This is a function of the topography of the site and ties in with the dominant water flow regime in the soils and the landscape. Areas in blue indicate concentration of water in flow paths with lighter shades of blue indicating areas of regular water flows in the soils and on the surface of the wetland / terrestrial zone interface.

The TWI for the site indicates the distinct drainage features running north to south beyond the western boundary.

4.3 PHASE 3: SATELLITE IMAGE INTERPRETATION

The satellite image provided in **Figure 4** indicates that the investigation site is characterised by grassland with historical and recent tillage activities. The western section of the site is characterised by informal wattle woodlots with clear signs of increased wattle infestation. The eastern section of the site has been used for dryland agriculture and the western section appears to be left to grazing and wattle stands.

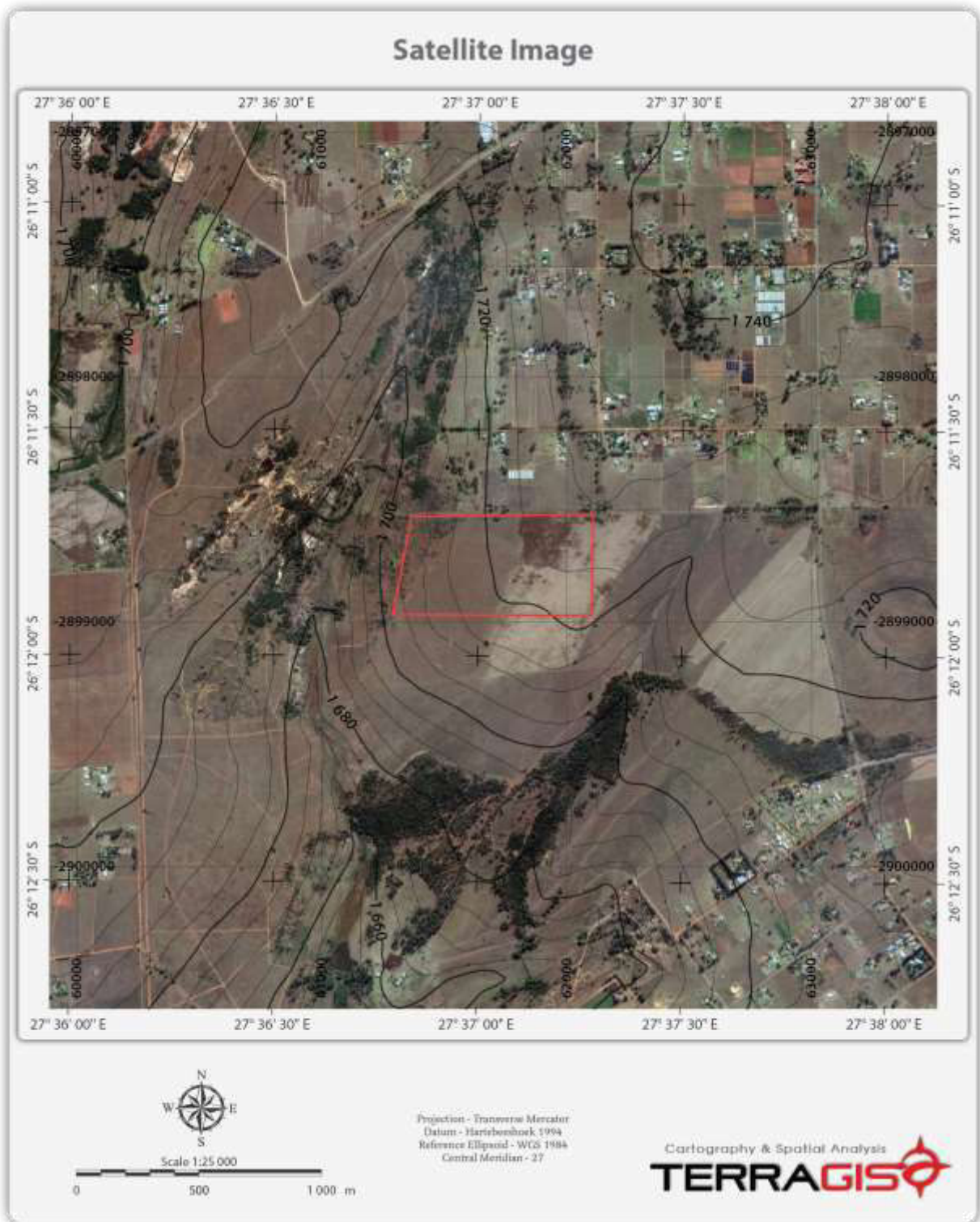


Figure 4 Satellite image of the site with 5 meter contours

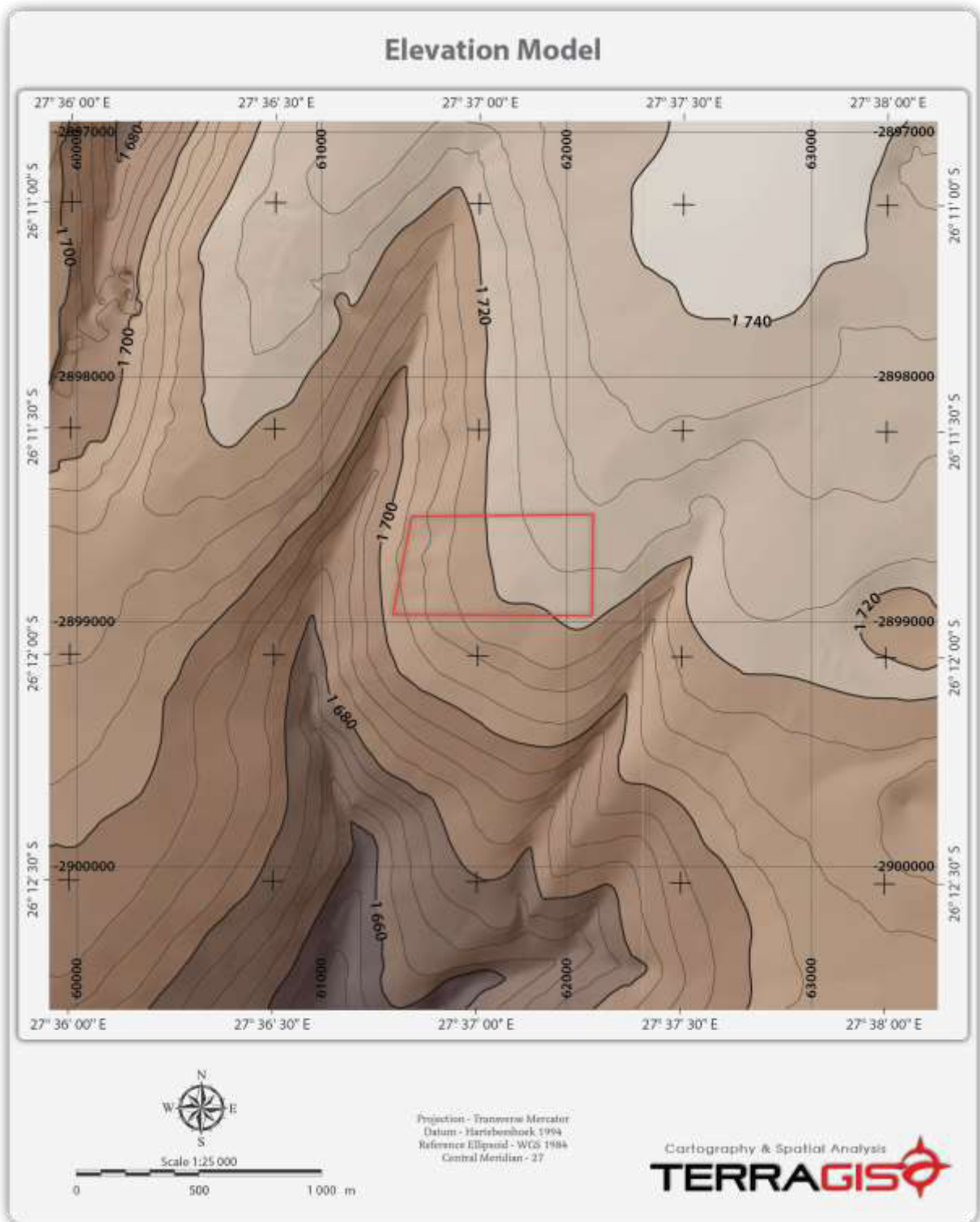


Figure 5 Digital elevation model for the site

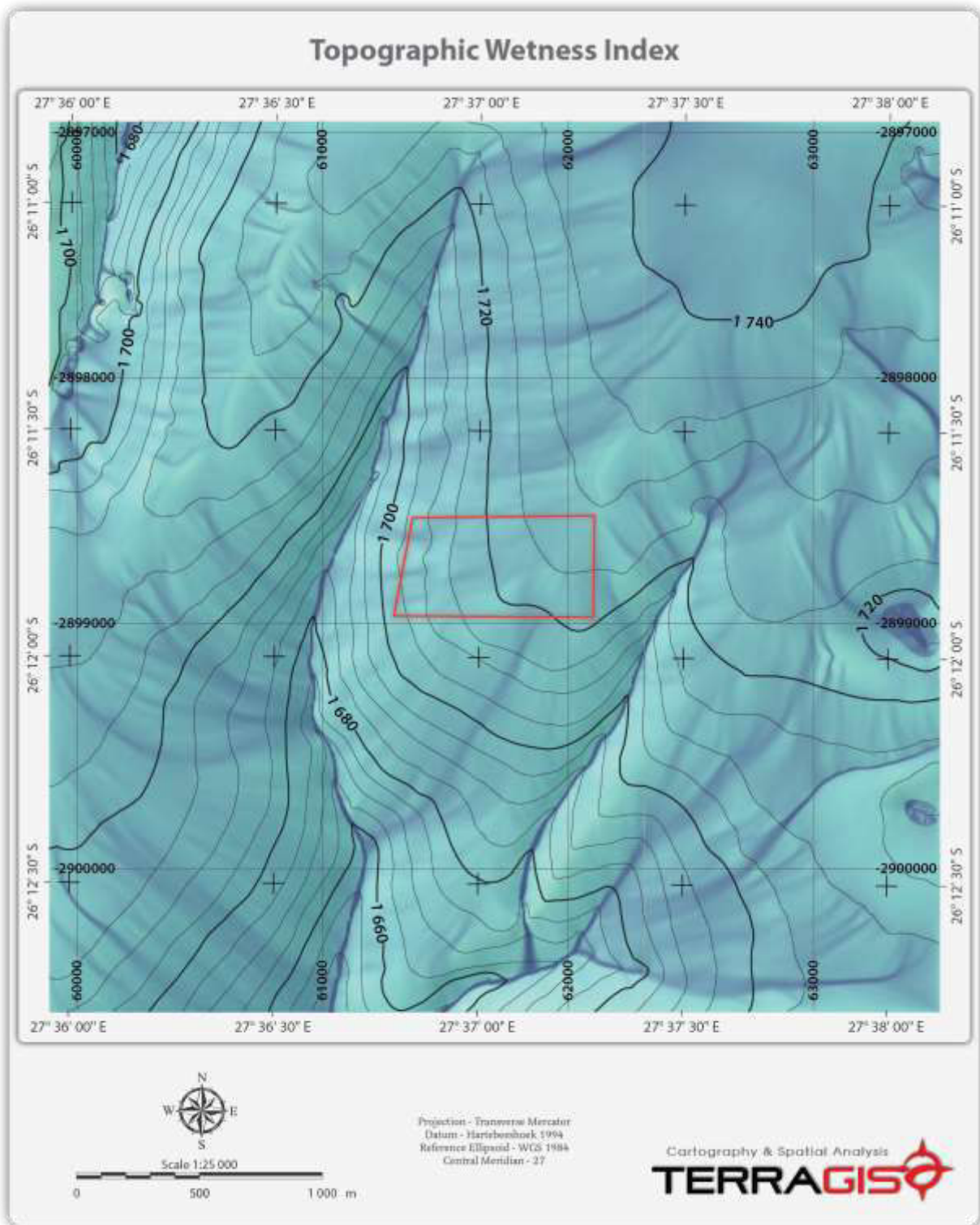


Figure 6 Topographic wetness index for Site 1

4.4 PHASE 4: SOIL SURVEY

The soil survey of the site yielded that there are three soil association areas (**Figure 7**) with their assessed agricultural potential and land capability (**Figure 8**):

1. Mispah (Ms) and Glenrosa (Gs) soils dominant: The western section of the site is characterised by shallow and rocky soils on the more pronounced slope. The dominant soils are of the Mispah (Ms – orthic A / hard rock) and Glenrosa (orthic A / lithocutanic B) forms that have very limited effective rooting depth and water holding capacity (**Figures 9 to 11**). This area is therefore classified as of low agricultural potential with a land capability class VII.
2. Shallow Clovelly (Cv) and Glenrosa (Gs) soils dominant: The central and southern section of the site is characterised by shallow soils of the Clovelly (orthic A / yellow-brown apedal B horizon / unspecified – usually hard or weathering rock) and Glenrosa (orthic A / lithocutanic B) forms (**Figures 12 to 14**). Due to the shallow nature of the soils this area is classified as of moderate to low agricultural potential with a land capability class of IV.
3. Variable depth and shallow Clovelly (Cv) and Glencoe (Gc) soils dominant: The deeper soils areas on the site are characterised by soils of the Clovelly (orthic A / yellow-brown apedal B horizon / unspecified – usually hard or weathering rock) and Glencoe (orthic A / yellow-brown apedal B horizon / hard plinthite) forms (**Figures xx**). These are classified as being of moderate potential due to a thickness of 60 cm and less and have a land capability class of III.

5. AGRICULTURAL POTENTIAL

5.1 AGRICULTURAL POTENTIAL OF THE SITE

The agricultural potential of the site is linked to the dominance of shallow and rocky soils that pose significant limitations to tillage and crop production due to the presence of large volumes of rock. The soils would have a higher potential if water was available for irrigation purposes. However, the rocky nature of the soils and the shallow profiles lead to a very limited rooting depth potential and water storage capacity – both critical parameters for successful dryland crop production on the Highveld.

5.2 SOIL POTENTIAL LINKED TO CURRENT LAND USE AND STATUS

The current land use is grazing, with wattle infestation in the west, and low intensity dryland cropping in the east. The tillage activities on the site are restricted due to the presence of large quantities of rock and the shallow profiles present in large sections. The agricultural potential due to these limitations is as described in section 5.1.



Figure 7 Soil association map of the survey site

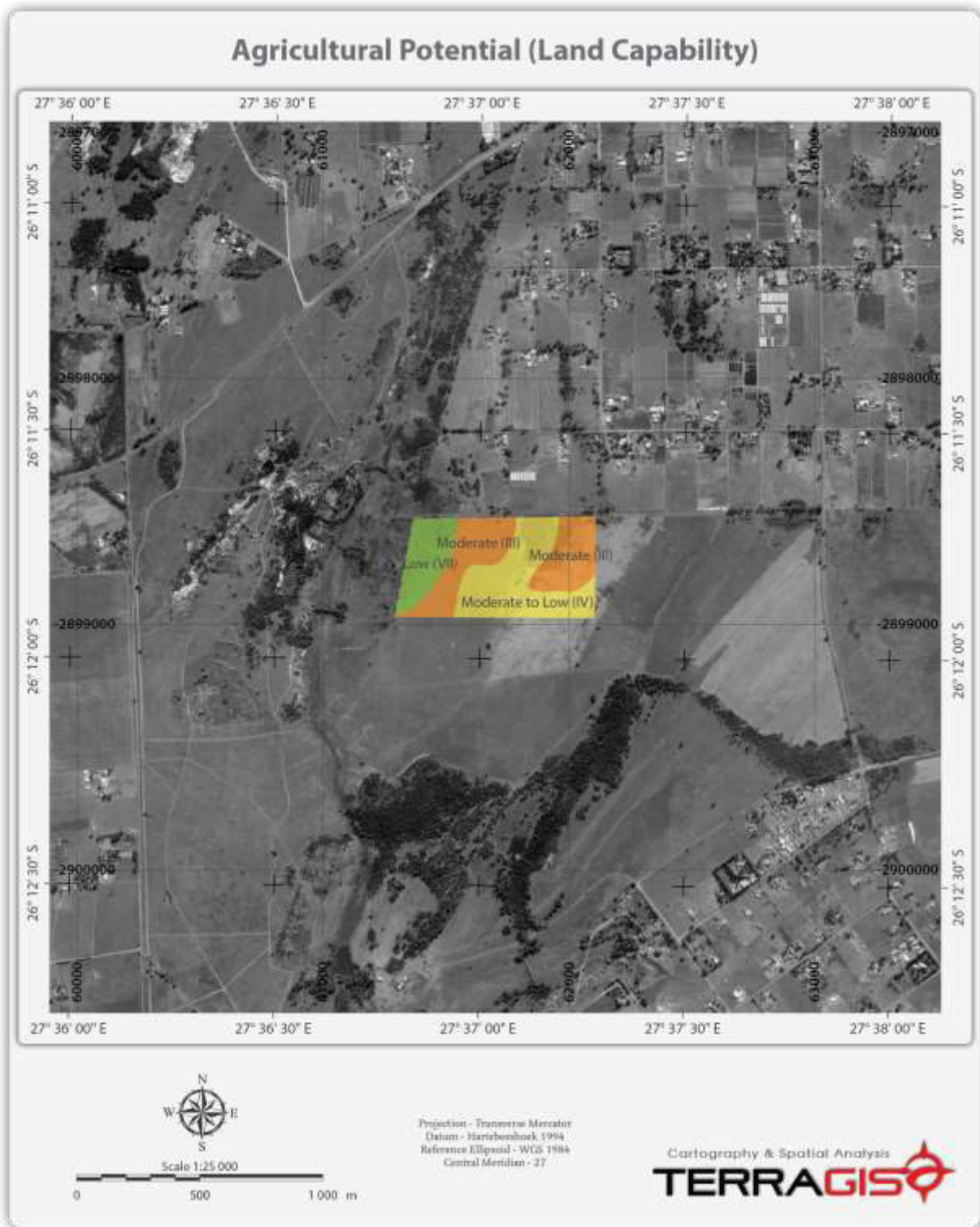


Figure 8 Agricultural potential map of the site with the land capability class indicated in brackets



Figure 9 Rocky soils in the area of the wattle growth in the western section of the site



Figure 10 Rocky soils in the area of the wattle growth in the western section of the site



Figure 11 Dominant vegetation on the western section of the site indicating distinct historical overgrazing (*Seriphium plumosum*)



Figure 12 Shallow and rocky soils as indicated by extensive rock material exposed through ploughing



Figure 13 Shallow and rocky soils as indicated by extensive rock material exposed through ploughing



Figure 14 Shallow and rocky soils as indicated by extensive rock material exposed through ploughing



Figure 15 Deeper soils (60 cm) with moderate agricultural potential



Figure 16 Deeper soils (60 cm) with moderate agricultural potential

5.3 COST-BENEFIT ANALYSIS

A cost-benefit analysis is difficult to conduct due to the shallow nature of the soils and the anticipated regular suppression of yields due to the poor rooting depth and water holding capacity of the soils. In this regard it is concluded that suboptimal yields of maize will occur at a minimum frequency of 5 in every 10 years as the rainfall quantities and distribution vary. This does not apply as strictly for the deeper soils in the surrounding general area. It is therefore concluded that a higher yielding land use (such as solar infrastructure) in monetary terms would always outperform the potential financial benefits of crop production on the specific site. This assumption will change in the event that there is water available for irrigation in which case the financial yield of crop production on the site can be improved.

5.4 CURRENT ACTIVITIES / DEVELOPMENTS / BUILDINGS

The site itself is not characterised by any buildings or developments but, as has been shown in this report, the surrounding areas are characterised by distinct and intensive urban development and expansion.

5.5 SURROUNDING DEVELOPMENTS / LAND USES / ACTIVITIES WITHIN A 500 M RADIUS

Refer to section 5.4. The immediate surrounding soils and land use suffer from the same limitations as the site itself and as such it is not possible to decrease the risks through expansion of the agricultural activities.

5.6 CURRENT STATUS OF LAND

The current status of the land is as described previously in this report.

5.7 POSSIBLE LAND USE OPTIONS FOR THE SITE

Refer to sections 5.3, 5.4 and 5.5. Within the context of the limitations of the soils on the site the options in terms of agricultural use is to low intensity and low yielding dryland agriculture. From a financial perspective higher yielding land uses, such as solar electricity production, provide a different option.

6. CONCLUSIONS AND RECOMMENDATIONS

It is concluded that:

1. The site is characterised by shallow and rocky soils of the Mispah and Glenrosa forms and slightly deeper soils of the Clovelly and Glencoe forms.
2. The shallow nature of the soils on the site lead to a low yielding dryland agriculture land use and consequently a low general agricultural potential.

3. The agricultural potential can be increased only through the accessing of water for irrigation purposes as the soils are suited to such practices.
4. A cost benefit analysis indicates that other land uses such as solar electricity production will yield higher returns and more constant income on the specific site

References

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Soil Classification Working Group. 1991. Soil Classification. A taxonomic system for South Africa. *Mem. Agric. Nat. Resour. S.Afr.* No.15. Pretoria.

APPENDIX E5
HERITAGE IMPACT ASSESSMENT

NOT AVAILABLE YET

APPENDIX E6

CONSENT USE APPLICATION

NOT AVAILABLE YET

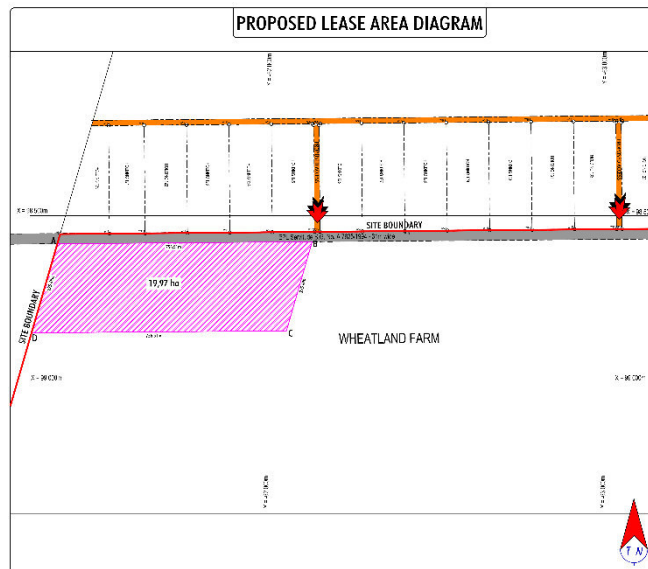
APPENDIX E7

CIVIL ENGINEERING SERVICES REPORT

NOT AVAILABLE YET

APPENDIX E8

ELECTRICAL SERVICES REPORT



WHEATLANDS PV

ELECTRICAL ENGINEERING SERVICES REPORT (REV1)

PROJECT REF. NO. : PE0067

COMPILED FOR:

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Rev0	Report issued for Client Comment	JHS	AWSL	2017-03-31
Rev1	Report issued for Client Comment	JHS	AWSL	2017-05-31

EXECUTIVE SUMMARY

This report outlines the possible intake points for the proposed Wheatlands PV project, gives some alternatives in terms of the connection options (overhead lines or underground cables).

The report does not address any Wheeling Agreements.

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GLOSSARY OF TERMS AND ABBREVIATIONS

3C	Three core
Al	Aluminium
BDMD	Before Diversity Maximum Demand
Cu	Copper
kVA	kilo Volt Ampere
kV	kilo Volt
LM	Local Municipality
MV	Medium Voltage

1. DEVELOPMENT INFORMATION

1.1 DEVELOPER

The developer is SolarReserve SA Management (Pty) Ltd.

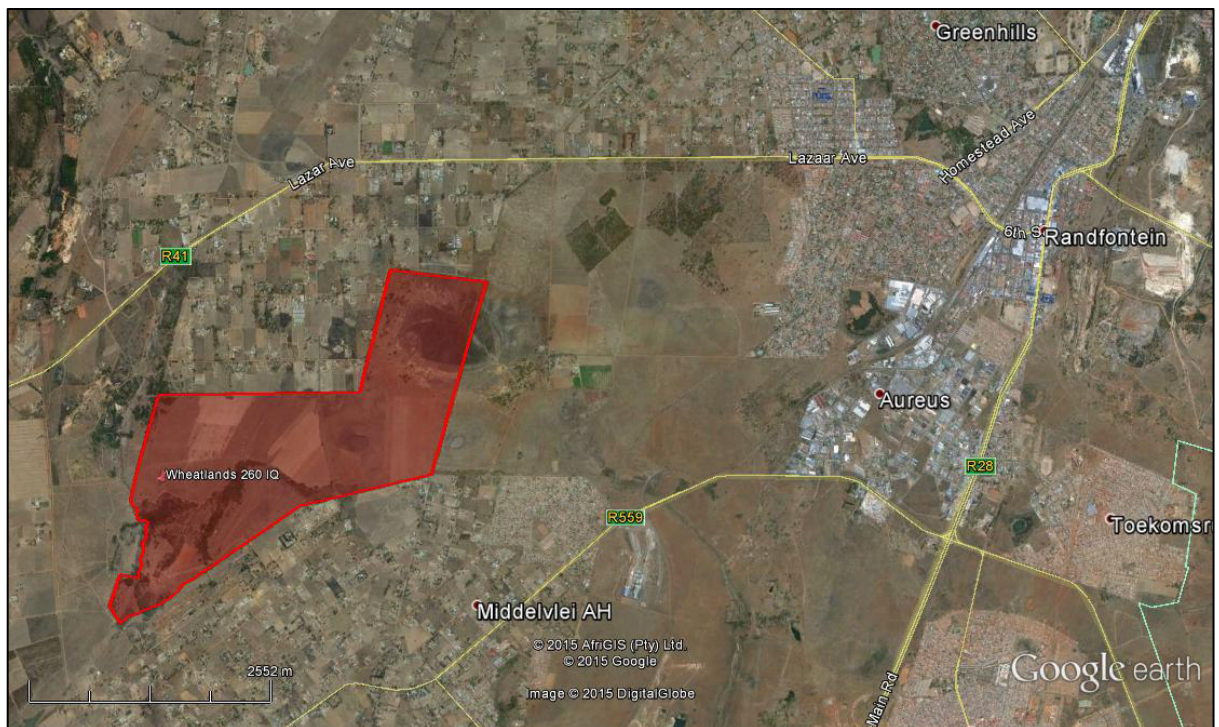
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1.2 LOCALITY OF THE PROPERTY

The Wheatlands 260 IQ property is located to the west of Randfontein town (also north of the Middelvlei AH), to the south of Lazar Avenue (R44) and to the north of the R559 and is situated on the farm Wheatlands 260 IQ, see Picture 1.1 below.



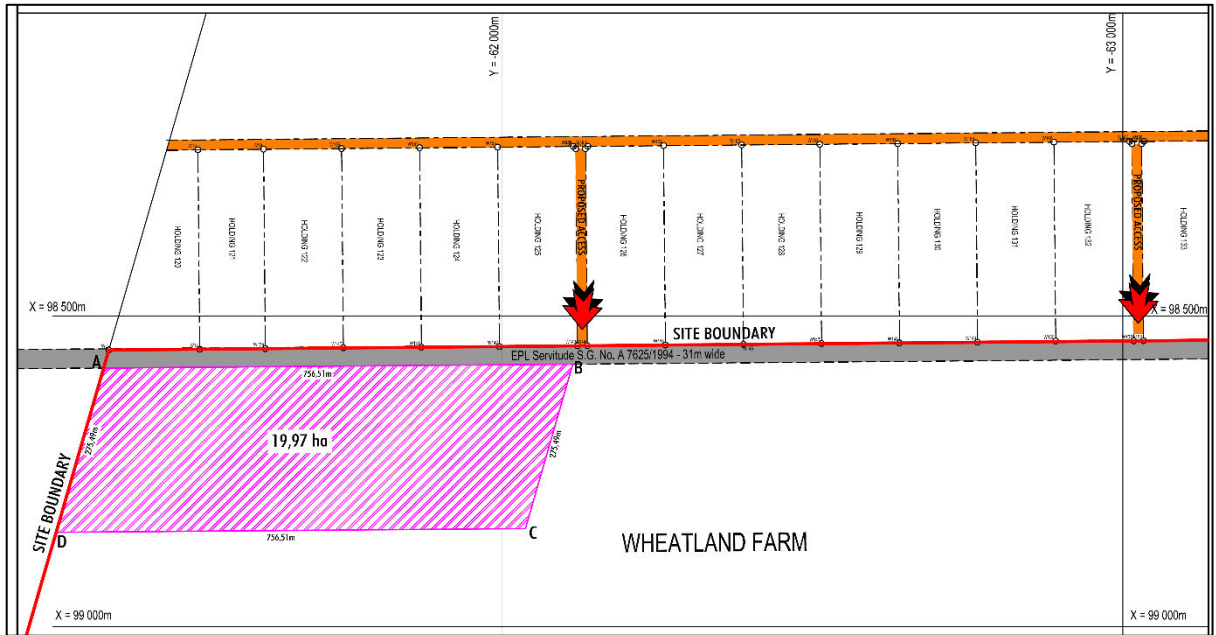
Picture 1.1 - Locality map (courtesy of Google Earth)

1.3 EXISTING LAND USE

The existing land use is Agricultural.

1.4 LOCALITY OF THE PROPOSED PV PLANT

The locality of the Wheatlands PV project is as indicated on the Drawing 1.2 below.



Drawing 1.2 - Proposed Site (courtesy of Hunter Theron Inc.)

1.5 TOWN PLANNING APPLICATION

A consent use application is being prepared by the town planners, Hunter Theron Inc.

2. STATUS QUO OF EXISTING BULK ELECTRICAL SERVICES

2.1 SUPPLY AUTHORITY

The proposed development falls within the Licensed Area of Supply of Randfontein Local Municipality.

A meeting was held with representative from Randfontein Local Municipality to obtain inputs with regards to system capacity as well as other technical and non-technical requirements.

Additional information was requested from Lyon & Partners (master planning consultants for Randfontein Local Municipality) and their feedback is included in his report where applicable.

2.2 PV SUPPLY CAPACITY

2.2.1 Bulk Supply Capacity

The bulk supply capacity generated by the Wheatlands PV plant is 9.3MW AC at 11kV.

2.3 EXISTING INFRASTRUCTURE

2.3.1 Existing Switching Station

The client requested that exporting of the bulk supply capacity to the Finsbury switching station be investigated.

Based on the fact that this is only a switching station and there is no transformers installed or space allowance to change this switching station to a substation, this option is not feasible and will not be further discussed in this report.

2.3.2 Existing Intake Substations

Currently the Randfontein LM has a total of six intake substations from Eskom, namely Drowell, Industries, Middelvlei/Lafarge, Mohlakeng, Randfontein Munic and Westergloor. The idea is to export the bulk supply capacity generated by the Wheatlands PV plant to one of these substations and from there the capacity can be used within that substations local distribution network. At this stage it is not anticipated that this capacity will be exported to Eskom as there is no such agreement between Randfontein LM and Eskom.

The substations details are as listed below:

Substation	Voltage	Installed Transformer Capacity	Notified Maximum Demand	Actual Maximum Demand	Spare Capacity
Drowell	132/11/6.6kV	2 x 20 MVA	25 MVA	22 MVA	No firm transformer capacity, transformer failure may be catastrophic
Industries	44/6.6kV	30 MVA	19 MVA	16 MVA	None or very little firm transformer capacity
Middelvlei / Lafarge	132/6.6kV	1 x 20 MVA	20 MVA	8 MVA	12 MVA
Mohlakeng	44/11kV	2x 10MVA	18 MVA	17.5 MVA	No firm transformer capacity, transformer failure will be catastrophic
Randfontein Munic	44/6.6kV	30 MVA	16.5 MVA	15 MVA	None or very little firm transformer capacity
Westergloor	44/6.6kV	2x 10MVA	13.2 MVA	12.5 MVA	No firm transformer capacity, transformer failure may be catastrophic

The following must be noted in terms of the existing substations:

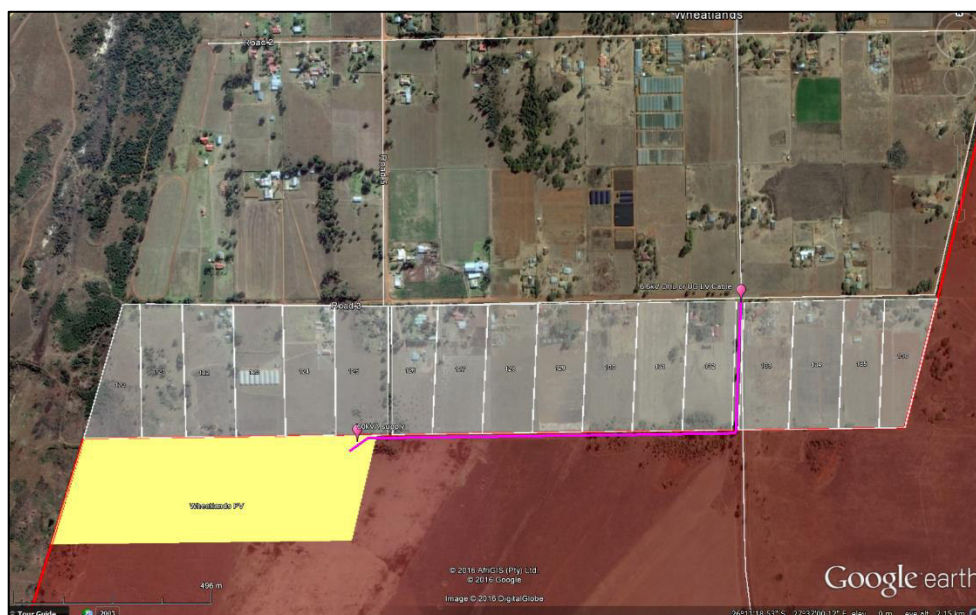
- The Drowell and Middelvlei/Lafarge substations are the nearest to the proposed development
 - The Middelvlei/Lafarge substation is a dedicated substation for Lafarge and is therefore not an option;
- The Drowell and Mohlakeng substations are the nearest and most accessible substations
 - Due to the position of the Mohlakeng substation, at least 9.5km from the proposed Wheatlands PV site, this substation will not be further investigated at this stage;
- Based on the above, Drowell Substation remains the only viable option and will be discussed further as part of this report.

3. REQUIRED NEW INFRASTRUCTURE AND PROPOSED UPGRADES TO EXISTING INFRASTRUCTURE

3.1 REQUIRED BULK CONNECTION POINT

The bulk connection point required for the Wheatlands PV plant is 60kVA, three phase.

It was indicated by Randfontein LM that existing capacity for this connection will be available from the existing 6.6kV network in Road 6. Based on the layout plans of the holdings to the North of the proposed Wheatlands PV site, there is a thoroughfare between Holding 132 and Holding 133, see Drawing 3.1 below.



Drawing 3.1 - Proposed Connection Point (courtesy of Google Earth)

3.2 PROPOSED UPGRADES TO EXISTING INFRASTRUCTURE

In order to connect the bulk supply capacity generated by the Wheatlands PV plant to the Drowell Substation, loss calculations were completed to determine the power distribution philosophy.

3.2.1 Loss Calculation

To determine the overhead (OH) line conductor required to transfer the 9.3MW capacity from the Wheatlands PV plant site to the Drowell substation, a ReticMaster voltage drop calculation was completed, the results are as listed below:

- a. Calc 1 - 11kV SolarReserve PV SS to Drowell SS, 7.2km, Kingbird ACSR OH line, **VD = ±8.5%**
- b. Calc 2 - 11kV SolarReserve PV SS to Drowell SS, 7.2km, 2x Kingbird ACSR OH lines, **VD = ±3.0%**
- c. Calc 3 - 11kV SolarReserve PV SS to Drowell SS, 5.2km, Kingbird ACSR OH line, **VD = ±5.2%**
- d. Calc 4 - 11kV SolarReserve PV SS to Drowell SS, 5.2km, 2x Kingbird ACSR OH lines, **VD = ±1.7%**
- e. Calc 5 - 33kV SolarReserve PV SS to Drowell SS, 7.2km, Hare ACSR OH line, **VD = ±2.0%**
- f. Calc 6 - 33kV SolarReserve PV SS to Drowell SS, 7.2km, 2x Hare ACSR OH lines, VD = ±1.0%**
- g. Calc 7 - 33kV SolarReserve PV SS to Drowell SS, 5.2km, Hare ACSR OH line, **VD = ±1.4%**
- h. Calc 8 - 33kV SolarReserve PV SS to Drowell SS, 5.2km, 2x Hare ACSR OH lines, **VD = ±0.7%**

Based on the above information it is evident that the preferred option will be the 33kV infrastructure where the voltage drop would be less than 1%. Further investigations and calculations would be necessary to finalise the conductor sizing based on optimal costing of the overhead and lifetime least cost analysis. The calculation proved that a Hare ACSR conductor could be used if two lines can be constructed.

It was also indicated that the 5.2km would not be feasible as the site would encroach into an existing wetland, this option will thus not be discussed any further.

In essence, the following infrastructure needs to be constructed, installed or upgraded as discussed in the paragraphs below.

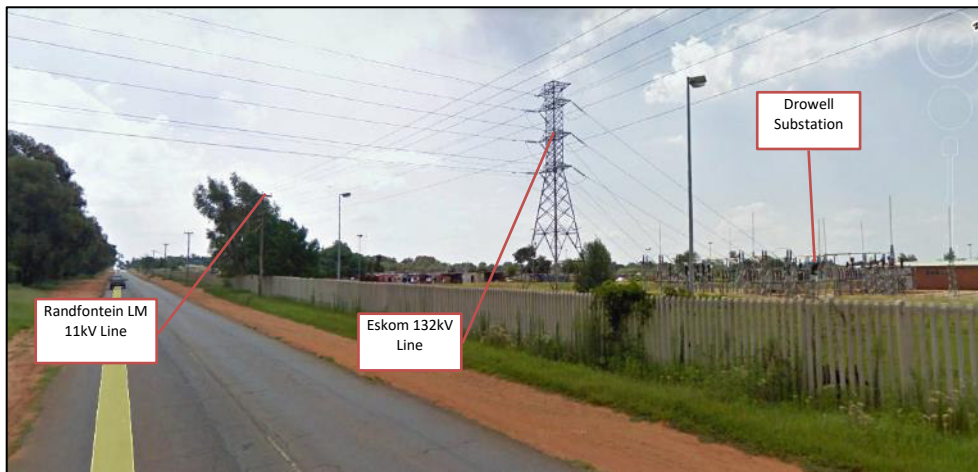
3.2.2 Drowell Substation

- The existing control building needs to be enlarged (extended);

- Two incomer panels (double bus);
- One bus coupler panel (double bus);
- Telemetry (if applicable);

Drowell Substation and Lazar Avenue

Below is a picture (Picture 3.2) indicating the Drowell substation and the crossing of the Eskom 132kV overhead line crossing at Lazar Avenue (R41). An existing Randfontein LM 11kV overhead line is also visible on the Northern side of Lazar Avenue.



Picture 3.2 - Drowell Sub, Services Crossing & Along Lazar Ave (courtesy of Google Earth)

3.3 PROPOSED NEW INFRASTRUCTURE

In order to connect the bulk supply capacity generated by the Wheatlands PV plant to the Drowell Substation, the following infrastructure needs to be constructed:

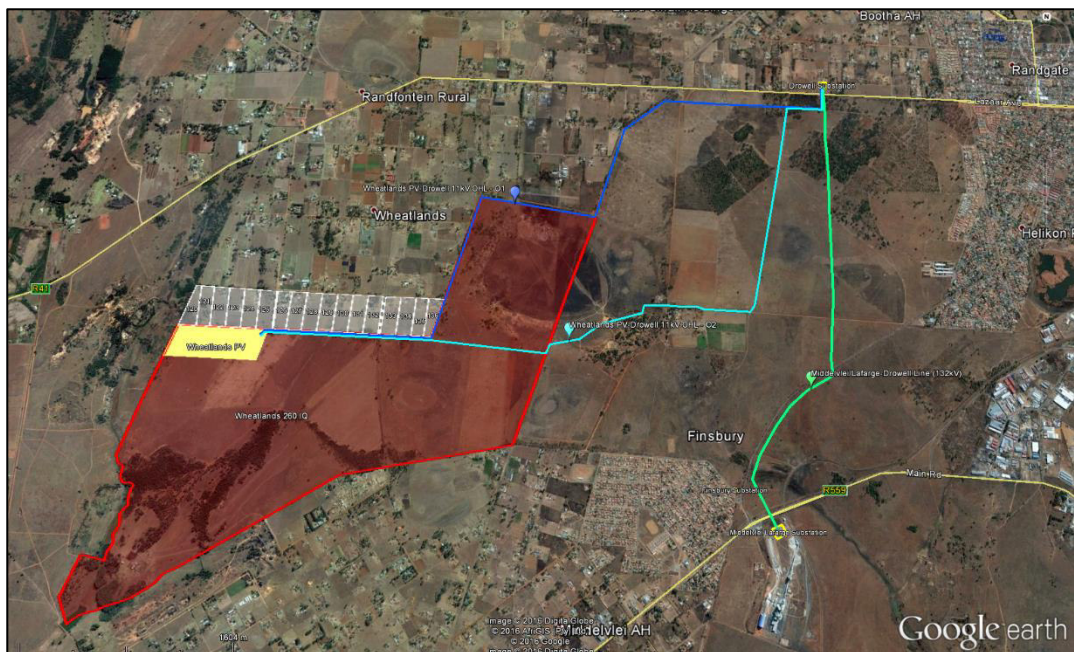
3.3.1 Drowell Substation

- A new 33kV transformer bay would need to be constructed;
- A new 10MVA, 33kV/11kV or 33kV/11kV/6.6kV (minimum) transformer;

3.3.2 Overhead Line

- Overhead line from PV substation to Drowell Substation, based on the following:
 - Conductor, ACSR, supply authority alternatives:
 - Hare (360A, 20.6MVA @33kV), single or double circuit (for firm supply);
 - Bear (650A, 37.1MVA @33kV), single or double circuit (for firm supply) - proposed as it will be able to transfer sufficient capacity at the lowest cost;
 - Kingbird (710A, 40.6MVA @33kV), single or double circuit (for firm supply);
 - A 22m (11m+11m) servitude for a single line or 36m (11m+14m+11m) servitude for dual line will be required (either as part of an existing road reserve with building restrictions) or a completely separate servitude where no road reserve is available or where there is not sufficient clearance in an existing road reserve.
 - Concrete poles, stays and struts:

- Details to be discussed with local municipality, no current 33kV installation (and thus no accepted standards);
- Pole top configuration:
 - Details to be discussed with local municipality, no current 33kV installation (and thus no accepted standards)
- Pole spacing:
 - Details to be discussed with local municipality, no current 33kV installation (and thus no accepted standards, 60m to 80m spacing is normally preferred)
- Proposed 33kV Overhead Line Routes
 - Two options are indicated at this stage, as indicated on the Drawing 3.3 below.
 - Option 1: The dark blue line, a total of approximately 7.0km
 - Option 2: The light blue line, a total of approximately 7.1km



Drawing 3.3 - Proposed 33kV Overhead Line Routes (courtesy of Google Earth)

4. CONTRIBUTIONS PAYABLE

4.1 BULK CONTRIBUTIONS

In terms of the current Randfontein LM tariff policy, bulk contributions of R 2000.22/kVA (inclusive of VAT) is applicable to new customers.

As the Wheatlands PV project will export electricity to the Randfontein LM, thus no bulk contributions will be payable.

5. PROJECT COST ESTIMATE

In terms of this project, the items as listed in the spreadsheet below will be payable.

Description	Unit	Qty	Rate	Total Cost
Drowell Substation				
Preliminary & General	Sum	10%	R 19 076 013.20	R 1 907 601.32
10MVA, 33/11kV transformer c/w earthing				
transformer bay, connections, etc	No	1	R 10 500 000.00	R 10 500 000.00
Drowell Control Room - Extension, Earthing	m ²	60	R 12 000.00	R 720 000.00
Main Incomer Panel c/w protection relay	No	2	R 401 000.00	R 802 000.00
Busbar Coupler c/w protection relay	No	1	R 394 000.00	R 394 000.00
Delivery, installation & commissioning of panels	No	3	R 20 000.00	R 60 000.00
Motorisation of existing panels	No	2	R 50 000.00	R 100 000.00
Telemetry, interlocking, GSM (including Eskom)	No	1	R 500 000.00	R 500 000.00
Maintenance tools	No	1	R 45 000.00	R 45 000.00
33kV Overhead Line - Bear Conductor (dual line)				
Concrete poles (12m/13m)	m	15000	R 365.00	R 5 475 000.00
Connection Point				
Municipal connection (3 phase)	No	60kVA	R 2 000.22	R 120 013.20
Municipal connection (3 phase) - construction	No	1	R 360 000.00	R 360 000.00
Subtotal A				R 20 983 614.52
Contingencies	Sum	10%	R 20 983 614.52	R 2 098 361.45
Subtotal B				R 23 081 975.97
Professional Fees				
Professional Fees	Sum	10.0%	R 23 081 975.97	R 2 308 197.60
Admin and Disbursements	Sum	2.5%	R 23 081 975.97	R 577 049.40
Subtotal C				R 2 885 247.00
Subtotal D (B + C)				
				R 25 967 222.97
Add: VAT @		14.0%		R 3 635 411.22
Total Estimated Project Value				R 29 602 634.19

Notes:

- If the existing panels can't be motorised, an additional two panels may be required.
- Allowance have been made for a dual 33kV overhead line to ensure a firm supply.
- The Municipal connection cost estimate will be based on actual costs once a formal application has been made to the Randfontein LM.

6. RECOMMENDATION

The following is recommended in terms of this development:

- That the Randfontein LM be formally approached in terms of a possible Wheeling Agreement as this has never been implemented and as such there is no current methodology or draft agreement that can be used.
- That a formal application for the connection point be forwarded to the Randfontein LM to firm up on the connection cost payable

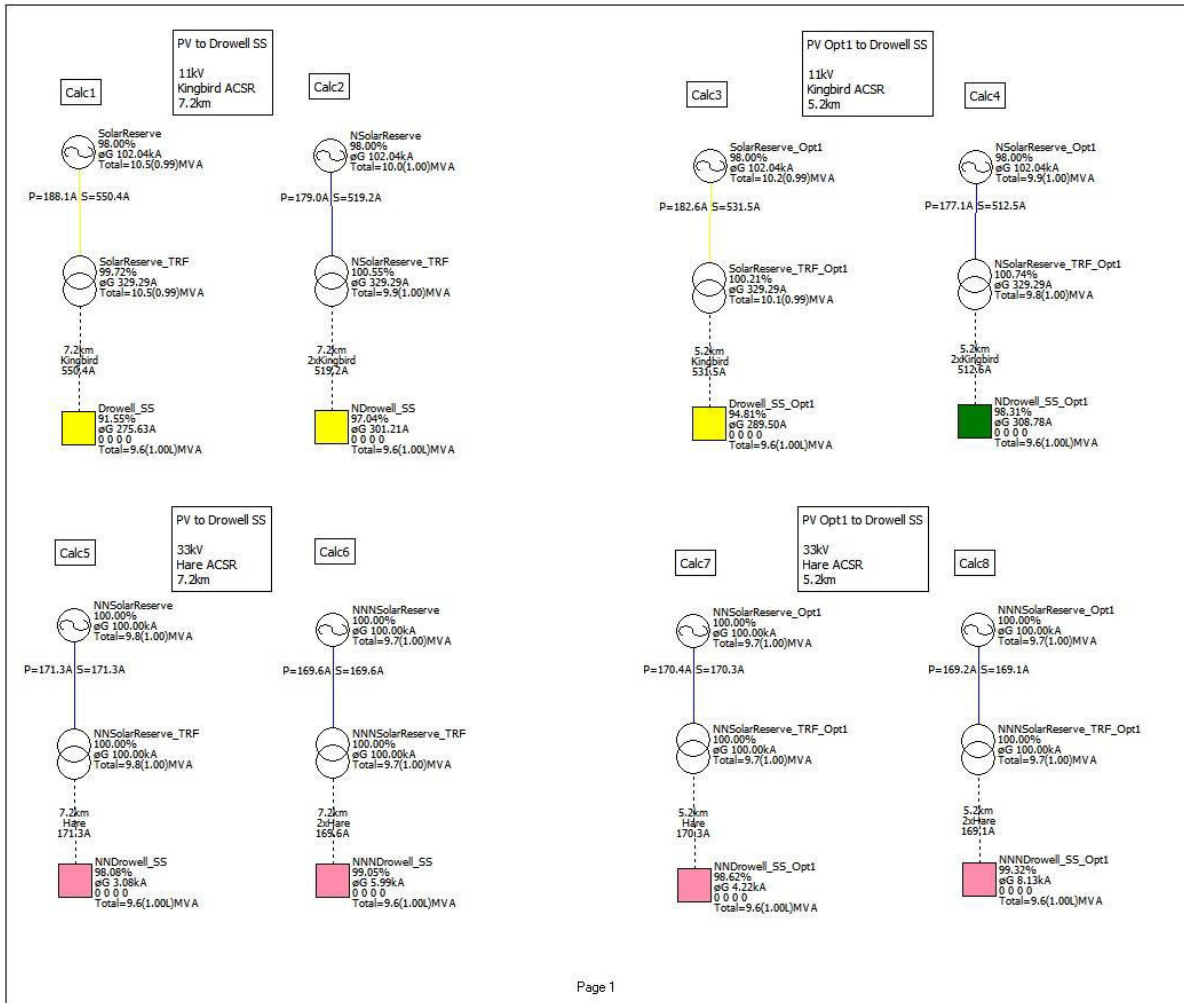
7. TIME FRAMES

Indicative time frames are listed below to give an indication of prospective development time frames:

Application to Randfontein LM for connection point, feedback	8 - 12 weeks
Planning and Construction of Bulk Infrastructure	12 - 18 months

Appendix A

Voltage Drop Calculations



APPENDIX F

CORRESPONDENCE WITH GOVERNMENT DEPARTMENTS



agriculture and rural development

Department: Agriculture and Rural Development
GAUTENG PROVINCE

11 Diagonal Street, Diamond Building, Newtown, Johannesburg
P O Box 8769, Johannesburg, 2000

Telephone: (011) 240-2500

Fax: (011) 240-2700

Website: <http://www.gdard.gpg.gov.za>

Reference:	002/17-18/E0062
Enquiries:	Malesela Sehona
Telephone:	(011) 240-3048
Email:	malesela.sehona2@gauteng.gov.za

Bokamoso Landscape Architects & Environmental Consultants

Email/Fax. Lizelle@bokamoso.net

Dear Sir / Madam

Application for Environmental Authorisation: The establishment of the Wheatlands Urban Solar Farm on the Remaining Extent of the Farm Wheatlands 260 IQ

The Department acknowledges having received the application form for environmental authorisation of the above-mentioned project on 13/06/2017.

The application has been assigned the reference number Gaut: 002/17-18/E0062. Kindly quote this reference number in any future correspondence in respect of the application.

Please circulate the draft report to any state department that administers a law relating to a matter affecting the environment to comment.

You are required to submit three (3) copies (**1 full colour hard copy and 2 CDs-PDF**) of the Draft Basic Assessment Report as well as proof of submission to state departments referred to above.

In order to determine whether a biodiversity assessment is required and, if so, which specialist studies are required, please send a shapefile (WGS84 datum; geographic co-ordinate system) of the application site to our biodiversity information service (GDACE_BiodiversityInfo@gauteng.gov.za), the e-mail clearly indicating the project

reference number. Where biodiversity assessment is required; please ensure that it is conducted consistent with the *GDACE Requirements for Biodiversity Assessments*. A copy of this document can be obtained by e-mailing GDACE_BiodiversityInfo@gauteng.gov.za

In terms of Regulation 45 of the EIA Regulations 2014, this application will lapse should you fail to meet any of the time-frames prescribed in terms of these regulations, unless an extension has been granted in terms of regulation 3(7).

Please draw the applicant's attention to the fact that the activity may not commence prior to an environmental authorisation being granted by the Department in terms of Section 24F of the National Environmental Management Act, Act No 107 of the 1998, as amended.

Yours faithfully



Boniswa Belot
Deputy Director: Strategic Administration Support

Date: 19/06/2017

CC: Solar Reserve SA (Pty) Ltd

Att: J Gerber
Email/Fax: n/a

APPENDIX G

ENVIRONMENTAL MANAGEMENT PLAN

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1 Project Outline

1.1 Background

Solar Reserve SA (Pty) Ltd appointed **Bokamoso Landscape Architects and Environmental Consultants CC** to apply for Environmental authorisation for developing, constructing and operating a 15MW Urban Solar Photovoltaic (PV) Power Plant and associated infrastructure on less than 20 ha of land, situated on the Remainder of the Farm Wheatlands 260 IQ, Rand West City Local Municipality, Gauteng Province.

1.2 Project description

The proposed development of the Wheatlands Urban Solar Farm shall consist of PV panels that encase the solar cells. Solar cells are solid-state semiconductor devices that convert sunlight into direct-current electricity.

The panels will be mounted on metal frames with a height of approximately 600-1000mm above the ground, supported by rammed, concrete or screw pile foundations, and they will face north in order to capture the optimum amount of sunlight. The facility will either be a fixed PV plant where the solar panels are stationary; or a tracking PV plant where the solar panels rotate to track the sun's movement. PV panels are typically up to 2m² in size and will be situated in long rows, usually made up of approximately 100 m sections extending across the site.

The study area is approximately 8.4km from Randfontein situated to the east, and is bordered by the Wheatlands Agricultural Holdings to the North, with the Middelvlei Agricultural Holdings occurring to the south. Road 6 occurs towards the east of the study area, which connects with the R41 (Lazar Road) to the north, and the R559 (Main Road) to the south.

The proposed development site was historically used for crop cultivation and Eskom Servitude and powerline transects the northern boundary of the site from east to west. The PWV1 servitude runs along the western boundary of the site.

Figure 1: Locality map

Figure 2: Aerial map

The total surface area to be impacted by the proposed development is approximately **200,000m²**.

The study area falls within the area of jurisdiction of the Rand West City Local Municipality, Gauteng Province.

1.3 Receiving Environment

Geology:

- An *Engineering Geological Investigation Report of a Part of Remainder Wheatlands 260-IQ Mogale City* compiled by Africa Exposed Consulting Engineering Geologists for the approved Mixed Use Development in close proximity to the proposed Urban Solar Farm concluded that part of the Remainder Wheatlands 260-IQ is underlain by quartzite.

Hydrology & Wetlands:

- A channelled Valley Bottom wetland occurs approximately 200m to the west of the proposed development site. According to the Wetland Specialist the PES is C = Moderately Modified. The wetland is however considered to be ecologically important and sensitive. Despite the aforementioned the Risk Assessment conducted in terms of the National Water Act (Act no 36 of 1998) Regulations pertaining to Section 21 (c) and (i) water use, concluded that the risk posed by the proposed Urban Solar Farm to the wetland is regarded as low.

Fauna and flora:

- The study area is located in the Soweto Highveld Grassland, which is regarded as Vulnerable (Mucina and Rutherford, 2006). The study site has suitable habitat for one Red List species and two Orange List species, of which one Orange List species was recorded during the survey. GDARD to be contacted regarding relocation. More than half of the study site has been transformed to agricultural land and increased alien species. The grassland is about a third of the study site which supports the Orange List species as well as other graminoids and herbaceous species. A third of the study site has a moderate sensitivity while the rest of the site is considered to have a low sensitivity.

Agricultural:

- An Agricultural Potential Assessment established the agricultural potential of the property to be low due to shallow soils.

Cultural /Historical:

- A Heritage Impact Assessment is underway.

Air Pollution (dust and noise):

- During the construction phase of the proposed development, the clearing of land for the construction of solar panels could result in dust nuisance, and construction activities could result in noise nuisance, to adjacent land owners

Traffic:

- Access to the proposed Urban Solar Farm shall be obtained from Road 6 (D2309) connecting to the R41 to the north.

Erosion and loss of topsoil:

- Topsoil removed prior to construction commencing must be stockpiled in designated areas and protected from washing away during flood events, or being damaged by heavy mobile plant.
- Topsoil must be returned to areas where it was removed from upon completion of construction activities for the purpose of rehabilitation.

Waste:

- Waste should be temporarily stored in enclosed containers in a designated already disturbed area, away from natural and artificial drainage lines.
- Waste to be disposed of at a registered landfill site at regular intervals.

Service provision:

- The proposed Urban Solar Farm shall result in upgrading of Electrical Services and supply approximately 10MW of power to the Rand West Local Municipality.

2 EMP Objectives and context

Objectives

The objectives of this plan are to:

- Identify the possible environmental impacts of the proposed activity;
- Develop measures to minimise, mitigate and manage these impacts;
- Meet the requirements of the Authorisation of GDARD and requirements of other Authorities; and
- Monitor the project.

EMP context

This EMP fits into the overall planning process of the project by carrying out the conditions of consent set out by GDARD. In addition, all mitigation measures recommended in the Basic Assessment Report and associated specialist studies are included in the EMP.

This EMP addresses the following phases of the development:

- Planning phase
- Pre-construction;
- Construction phase;
- Decommissioning and rehabilitation phase; and
- Operational phase.

3 Monitoring

In order for the EMP to be successfully implemented all the role players involved must have a clear understanding of their roles and responsibilities in the project.

These role players may include the Authorities (A), other Authorities (OA), Developer/proponent (D), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), Environmental Assessment Practitioner (EAP) and Environmental Site Officer (ESO). Landowners interested and affected parties and the relevant environmental and project specialist's area also important role players.

3.1 Roles and responsibilities

Developer (D)

The developer is ultimately accountable for ensuring compliance with the EMP and conditions contained in the Authorisation. The developer must appoint an

independent Environmental Control Officer (ECO), for the duration of the pre-construction and construction phases, to ensure compliance with the requirements of this EMP. The developer must ensure that the ECO is integrated as part of the project team. The responsibility of compliance will be carried across to the individual property owners as soon as transfer of the erven has taken place. It will be ensured that a copy of this document accompanies the purchase agreements for the erven.

Project Manager (PM)

The project Manager is responsible for the coordination of various activities and ensures compliance with this EMP through delegation of the EMP to the contractors and monitoring of performance as per the Environmental Control Officer's monthly reports.

Environmental Control Officer (ECO)

An independent Environmental Control Officer (ECO) shall be appointed, for the duration of the pre-construction and construction phase of the proposed project, by the developer to ensure compliance with the requirements of this EMP. Thereafter the individual property owners will be responsible for the further appointment of the ECO.

- The Environmental Control Officer shall ensure that the contractor is aware of all the specifications pertaining to the project;
- Any damage to the environment must be repaired as soon as possible after consultation between the Environmental Control Officer, Consulting Engineer and Contractor;
- The Environmental Control Officer shall ensure that the developer staff and/or contractor are adhering to all stipulations of the EMP;

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

- The Environmental Control Officer shall be responsible for monitoring the EMP throughout the project by means of site visits and meetings. This should be documented as part of the site meeting minutes;
- The Environmental Control Officer shall be responsible for the environmental training program;
- The Environmental Control Officer shall ensure that all clean up and rehabilitation or any remedial action required, are completed prior to transfer of properties;
- A post construction environmental audit is to be conducted to ensure that all conditions in the EMP have been adhered to.

Contractor (C):

The contractors shall be responsible for ensuring that all activities on site are undertaken in accordance with the environmental provisions detailed in this document and that sub-contractor and labourers are duly informed of their roles and responsibilities in this regard.

The contractor will be required, where specified to provide Method Statements setting out in detail how the management actions contained in the EMP will be implemented.

The contractors will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the environmental regulations.

Environmental Site Officer (ESO):

The ESO is appointed by the developer and then finally the owners of the individual properties as his/her environmental representative to monitor, review, and verify compliance with the EMP by the contractor. The ESO is not an independent appointment but must be a member of the contractor's

management team. The ESO must ensure that he/she is involved at all phases of the construction (from site clearance to rehabilitation).

Authority (A):

The authorities are the relevant environmental department that has issued the Environmental Authorisation. The authorities are responsible for ensuring that the monitoring of the EMP and other authorization documentation is carried out by means of reviewing audit reports submitted by the ECO and conducting regular site visits.

Other Authorities (OA):

Other authorities are those that may be involved in the approval process of the EMP.

Environmental Assessment Practitioner (EAP):

According to section 1 of NEMA the definition of an environmental assessment practitioner is "the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans, or any other appropriate environmental instruments through regulations".

3.2 Lines of Communication

The Environmental Control Officer in writing should immediately report any breach of the EMP to the Project Manager. The Project Manager should then be responsible for rectifying the problem on-site after discussion with the contractor. Should this require additional cost, then the developer should be notified immediately before any additional steps are taken.

3.3 Reporting Procedures to the Developer

Any pollution incidents must be reported to the Environmental Control Officer immediately (within 12 hours). The Environmental Control Officer shall report to the Developer on a regular basis (site meetings).

3.4 Site Instruction Entries

The site instruction book entries will be used for the recording of general site instructions as they relate to the works on site. There should be issuing of stop work order for the purposes of immediately halting any activities of the contractor that may pose environmental risk.

3.5 ESA/ESO (Environmental Site Officer) Diary Entries

Each of these books must be available in duplicate, with copies for the Engineer and Environmental Site Officer. These books should be available to the authorities for inspection or on request. All spills are to be recorded in the ESA/Environmental Site Officer's diary.

3.6 Methods Statements

Methods statements from the contractor will be required for specific sensitive actions on request of the authorities or ESA/ESO (Environmental Site Officer). All method statements will form part of the EMP documentation and are subject to all terms and conditions contained within the EMP document. For each instance wherein it is requested that the contractor submit a method statement to the satisfaction of ESA/ESO, the format should clearly indicate the following:

- What - a brief description of the work to be undertaken;
- How - a detailed description of the process of work, methods and materials;
- Where - a description / sketch map of the locality of work; and

- When - the sequencing of actions with due commencement dates and completion date estimate.

The contractor must submit the method statement before any particular construction activity is due to start. Work may not commence until the method statement has been approved by the ESA/ESO.

3.7 Record Keeping

All records related to the implementation of this management plan (e.g. site instruction book, ESA/ESO dairy, methods statements etc.) must be kept together in an office where it is safe and can be retrieved easily. These records should be kept for two years at any time be available for scrutiny by any relevant authorities.

4 Applicable legislation

4.1 National Environmental Management Act (Act 107 of 1998)

The NEMA is primarily an enabling Act in that it provides for the development of environmental implementation plans and environmental management plans. The principles listed in the act serve as a general framework within which environmental management and implementation plans must be formulated.

The principles in essence state that environmental management must place people and their needs at the forefront of its concern and that development must be socially, environmentally, and economically sustainable.

Notice **No. R 983, R 984 and R 985** of the 2014 NEMA EIA Regulations as amended during 2017 indicate the process to be followed. The activities listed in Notice No. R 983 requires that a Basic Assessment process be followed and the Activities listed in terms of Notice No. R 984 requires that the Scoping and EIA process be

followed. Notice No. 985 has been introduced to make provision for Activities in certain geographical and sensitive areas.

Impact on proposed Development:

The application for the proposed development consists of activities listed under Notice R. 983 and R. 985 (Listing No. 1 and 3) and therefore a Basic Assessment Report will be submitted to GDARD for consideration.

4.2 The National Water Act, 1998 (Act No: 36 of 1998)

The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways that take into account, amongst other factors, the following:

- ❑ Meeting the basic human needs of present and future generations;
- ❑ Promoting equitable access to water;
- ❑ Promoting the efficient, sustainable and beneficial use of water in the public interest;
- ❑ Reducing and preventing pollution and degradation of water resources;
- ❑ Facilitating social and economic development; and
- ❑ Providing for the growing demand for water use.

In terms of the section 21 of the National Water Act, the developer must obtain water use licences if the following activities are taking place:

- a) Taking water from a water resource;
- b) Storing water;
- c) Impeding or diverting the flow of water in a water course;
- d) Engaging in a stream flow reduction activity contemplated in section 36;
- e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

- f) Discharging waste or water containing waste into a water resource through a pipeline, canal, sewer, sea outfall or other conduit;
- g) Disposing of waste in a manner which may detrimentally impact on a water resource;
- h) Disposing in any manner which contains waste from or which has been heated in any industrial or power generation process;
- i) Altering the bed, banks, course or disposing of water found underground if it is necessary for the safety of people;
- j) Removing, discharging, or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- k) Using water for recreational purposes.

The National Water Act also requires that (where applicable) the 1:50 and 1:100 year flood line be indicated on all the development drawings (even the drawings for the external services) that are submitted for approval.

Impact on proposed Development:

The proposed development site occurs within 500m of a wetland and therefore a Wetland Risk Assessment was conducted. According to the Risk Assessment the risk posed by the Urban Solar Farm to the adjacent wetland is low, and therefore a WULA is not required, only a General Authorisation.

4.3 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

The purpose of the Act is “To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring,

management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.”

The purpose of the Act is to set norms and standards that relate to:

- ❑ Institutional frameworks, roles and responsibilities
- ❑ Air quality management planning
- ❑ Air quality monitoring and information management
- ❑ Air quality management measures
- ❑ General compliance and enforcement.

Amongst other things, it is intended that the setting of norms and standards will achieve the following:

- The protection, restoration and enhancement of air quality in South Africa
- Increased public participation in the protection of air quality and improved public access to relevant and meaningful information about air quality.
- The reduction of risks to human health and the prevention of the degradation of air quality.

The Act describes various regulatory tools that should be developed to ensure the implementation and enforcement of air quality management plans. These include:

- Priority Areas, which are air pollution ‘hot spots’.
- Listed Activities, which are ‘problem’ processes that require an Atmospheric Emission Licence.
- Controlled Emitters, which includes the setting of emission standards for ‘classes’ of emitters, such as motor vehicles, incinerators, etc.
- Control of Noise.
- Control of Odours.

Impact on proposed development:

During the construction phase of the proposed development, the clearing of land for the construction of solar panels could result in dust nuisance, and construction activities could result in noise nuisance, to adjacent land owners.

4.4 National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)

This Act came into effect on 11 June 2009. It aims to consolidate waste management in South Africa, and contains a number of commendable provisions, including:

- The establishment of a national waste management strategy, and national and provincial norms and standards, for amongst other, the classification of waste, waste service delivery, and tariffs for such waste services;
- Addressing reduction, reuse, recycling and recovery of waste;
- The requirements for industry and local government to prepare integrated waste management plans;
- The establishment of control over contaminated land;
- Identifying waste management activities that requires a license, which currently include facilities for the storage, transfer, recycling, recovery, treatment and disposal of waste on land;
- Co-operative governance in issuing licenses for waste management facilities, by means of which a licensing authority can issue an integrated or consolidated license jointly with other organs of state that has legislative control over the activity; and
- The establishment of a national waste information system.

On the 29th of November 2013 the Minister of Environmental Affairs and Tourism amended the list of waste management activities that might have a detrimental effect on the environment.

Impact on proposed development:

No listed waste activities will take place on site and therefore a waste license will not be required.

Construction and operational general waste will have to be removed to a registered landfill site. Strict waste management will have to be applied during the construction phase with regards to plastic and polystyrene packaging material of solar panels to prevent it from becoming airborne.

4.5 National Environmental Management Act: Biodiversity Act, 2004 (Act No. 10 of 2004)

The Biodiversity Act provides for the management and protection of the country's biodiversity within the framework established by NEMA. It provides for the protection of species and ecosystems in need of protection, sustainable use of indigenous biological resources, equity, and bio prospecting, and the establishment of a regulatory body on biodiversity- South African National Biodiversity Institute.

Objectives of the Act:

- (a) With the framework of the National Environmental Management Act, to provide for:
 - (i) The management and conservation of biological diversity within the Republic and of the components of such biological diversity;
 - (ii) The use of indigenous biological resources in a sustainable manner; and
 - (iii) The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources;

- (b) To give effect to ratified international agreements relating to biodiversity which are binding on the republic;

- (c) To provide for co-operative governance in biodiversity management and

conservation; and

- (d) To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

Under this Act notices are published in terms of alien and invasive species or threatened ecosystems in order to promote the biodiversity of natural resources and protect species endemic to South Africa.

Impact on proposed development:

According to the Gauteng Conservation Plan Version 3.3., the proposed development site borders a Critical Biodiversity Area and part of the site is denoted as Ecological Support Area. Orange listed flora species were detected during the site visit conducted as part of Flora Specialist Study.

4.6 National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)

The purpose of this Act is to provide for the protection, conservation, and management of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes.

Impact on proposed development:

The proposed development site does not form part of a protected area or occur near a protected area, the site does however comprise of an Ecological Support Area.

4.7 National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act legislates the necessity and heritage impact assessment in areas earmarked for development, which exceed 0.5 ha. The Act makes provision for the potential destruction to existing sites, pending the

archaeologists' recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

Impact on proposed development:

Considering the proposed development is bigger than 0.5ha a HIA is required.

4.8 The Deeds Registries Act, 47 of 1937

The Act was created to consolidate and amend the laws in force in the Republic relating to the Registration of deeds. The act caters for the registration of servitudes.

Impact on proposed development:

Considering the proposed development entails the installation of services, the developer has to allow for services servitudes, and/or might have to apply for Wayleaves.

4.9 Occupational Health & Safety Act, 85 of 1993

The Act was created to provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

Implications for the proposed development:

The Act not only applies to the persons who will be responsible for construction, but also to the safety of members of the public.

4.10 Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)

This Act provides for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources, the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

Impact on proposed development:

The proposed development site falls within an Agricultural Hub of Gauteng and approximately 20% of the proposed development site has high agricultural potential. Consent use authorisation is thus required for the proposed Urban Solar Farm. An Agricultural Potential Study conducted established that the site has low agricultural potential due to shallow soils.

4.11 Gauteng Transport Infrastructure Act, 1983 (Act No. 43 of 1983)

The act was created to consolidate the laws relating to roads and other types of transport infrastructure in Gauteng; and to provide for the planning, design, development, construction, financing, management, control, maintenance, protection and rehabilitation of provincial roads, railway lines and other transport infrastructure in Gauteng; and to provide for matters connected therewith.

In terms of Section 46 of the Act, no person may erect, construct, or lay, or establish a structure or object on or over, or below the surface of a provincial road or railway line or land in a building restriction area.

Impact on proposed development:

The proposed development site is in close proximity to the R41 to the north and a Class 3 Road (D2309) running from north to south due east of the proposed development site. Both these roads resort under Gautrans and therefore road upgrades associated with the approved residential development adjacent to

the proposed Wheatlands Solar Farm required Gauteng Department of Roads and Transport approval. The planned PWV1 borders the site on the west.

4.12 Gauteng Integrated Energy Strategy, 2010

In terms of the Gauteng Integrated Energy Strategy following on from the national climate change summit, Gauteng is committed to –

- moving the province to a low-carbon economy;
- ensuring that the province's carbon emissions peak and start declining by 2030;
- ensuring that there is an improvement in energy efficiency;
- ensuring the scaling up of renewable energy options; and
- ensuring that energy access for the poor is a priority.

The strategy has established a set of targets over a period of time.

Impact on proposed development:

The proposed Urban Solar Farm will ensure that the following commitment made in the Gauteng Integrated Energy Strategy is met ensuring the scaling up of renewable energy options.

4.13 Randfontein Spatial Development Framework, 2015/2016

Randfontein Local Municipality adopted a five year Integrated Development Plan (IDP) for 2011/12 to 2015/16, in terms of the Chapter 5 Section 25 (1), Section 27 and 28 of the Municipal System Act of 2000. IDPs are strategic planning instruments which were developed and adopted to guide and inform all planning, budgeting, management and decision making in municipalities. IDPs are also developed to guide municipalities on issues such as infrastructure development, promotion of local economic development and institutional transformation in a consultative, systematic and strategic manner. In terms of section 34 of the Municipal Systems Act, each district municipality must adopt a

framework for integrated development planning in the area as a whole, and it must be agreed upon by both local municipalities and district municipality. The IDP framework is therefore developed to ensure coordination and alignment in the whole IDP process by all role players.

Impact on proposed development:

According to the SDF the west rand region has been earmarked for renewable energy development focusing on solar energy. Municipal and household energy costs can be reduced by the introduction of renewable energy.

5 Mitigation Measures and Responsibility per project phase

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Planning Phase							
Legal compliance	Legal non-compliance	Financial provision for legal compliance	Developer to put aside sufficient funding to ensure management and monitoring requirements stipulated in this plan can be met.	Financial provision for environmental management including rehabilitation, conducting specialist studies, rescue, implementing monitoring plans, appointing ECO etc.	Developer	Once off	
	IPP Agreement	Wheeling Agreement in place	Developer to enter into Wheeling agreement with Local Municipality regarding supply of power generated by Urban Solar Farm.	Wheeling Agreement	Developer	Once off	
Design and planning	EMP adherence	To make the EMP enforceable under the general conditions of the contract	The EMP document must be included as part of the tender documentation for all contractor appointments.	The EMP is included as part of the tender documentation	Applicant Contractor	Prior to publishing tender	
Land use	Consent Use	Consent Use approved	Developer to obtain approval for land use	Land use approved	Developer	Once off	
	Servitudes/Way leaves required	Servitudes registered and Wayleaves obtained	Acknowledge servitudes associated with Eskom and PWV1, and register servitude proposed 33kV powerline and access road to site, if applicable.	Servitudes registered	Developer/EAP	Once-off	
Services	Insufficient services	Potable water and ablution available	Compile services report	Report compiled	Developer/EAP	Once off	
		Electricity supply	Electrical Services Report compiled. Install 33kV line transferring power generated by Urban Solar Farm to Drowell Substation for distribution	Report and plan compiled	Developer/EAP	Once off	
Cultural heritage	Loss of or damage to cultural Resources	Preserve cultural historic sites and finds	Inform Provincial Heritage Resources Authority of planned construction activities in terms of section 38 of the National Heritage Resources Act.	Comment/ Approval received from Province	Developer/EAP	Once-off	
			Conduct HIA.	Assessment conducted	Developer/EAP	Prior to construction commencing	

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Planning Phase							
Hydrology	Increased storm water run-off volumes and velocity	No scouring or erosion resulting in siltation wetland.	200,000m ² will be covered with solar panels, stormwater runoff will increase. A Stormwater Management Plan must be compiled.	Storm water Management Plan compiled to protect adjacent wetland	Developer	Before construction activities commence	
Hydrology and wetland	Wetland integrity	Protect wetland	The proposed Urban Solar Farm occurs within 500m from a wetland and thus a Wetland assessment was carried out. Risk established to be low, but GA required in terms of the National Water Act.	Wetland Assessment conducted Apply for GA	Developer/EAP	Before construction activities commence	
Fauna and Flora	Protected flora and fauna	Preserve protected flora and fauna	Conduct ecological assessment due to occurring within Ecological Support Area.	Ecological Assessment conducted	Developer/EAP	Once-off	
		To prevent the destruction of protected fauna and flora discovered during construction	Ecological Assessment established Orange Listed Flora species occur within the proposed development footprint. Search and Rescue to be carried out in accordance with GDARD requirements.	Search & Rescue conducted	ECO/Project Manager	Before construction activities commence and as and when required	
		Protect sensitive areas	If applicable, Sensitive areas are to be fenced off in assistance with the ECO, prior to construction commencing and will serve as a 'NO-GO' areas.	Sensitive areas and indigenous flora protected	ECO/Project Manager	Before construction activities commence	
		To prevent and reduce the negative impact on fauna species residing on the site	No fauna species may be disturbed, trapped, hunted, or killed during the construction phase. No indigenous flora may be removed. Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.	Conservation orientated clause occurs in contracts with contractors.	Developer/Project Manager	Before construction activities commence	
		To prevent invasion and spread of the area with alien invaders	Alien invaders must be eradicated before, during and after construction activities. A clause to this effect should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.	Alien plant eradication clause occurs in contracts with contractors.	Developer/Project Manager	Before construction activities commence	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Planning Phase							
Geology and Soils	Erosion and Siltation	To prevent the unnecessary loss of soil through poor management	Suitable locations should be selected on site to place the topsoil as well as spoil stockpiles as to avoid release of materials. All stockpiles must be appropriately positioned and managed in line with good engineering principles.	Areas for stockpiles are marked out at suitable locations.	Contractor/ ECO	Before construction activities commence	
			Provision of earth bunds or sand bags in areas where a large amount of exposed soils exist is required.	Earth bunds constructed to protect exposed soils during construction.	Contractor	Before or as soon as construction activities commence	
			The construction works shall be properly planned to minimise soil excavation during rainy seasons to prevent soil erosion from exposed soil surfaces.	No visible signs of erosion and sedimentation	Contractor	Before or as soon as construction activities commence	
			Make construction workers aware of sediment controls and the importance prior to work commencing.	Contractors have knowledge of purpose of sediment control	ECO/ Site supervisor	Before or as soon as construction activities commence	
			Suitable locations should be selected on site to place the topsoil and subsoil stockpiles as to avoid release of materials into the drainage channels.	No visible signs of erosion and sedimentation	Contractor	Before or as soon as construction activities commence	
Ecological integrity	Ecological damage	Avoid erosion and disturbance to indigenous vegetation	Designated access point and routes shall be determined for the construction vehicles and designated areas for storage of equipment. Clearly mark the site access point and routes on site to be used by construction vehicles. Provide an access map to all contractors whom in turn must provide copies to the construction workers. Instruct all drivers to use access point and determined route.	Access to must be clearly marked prior to construction commencing	Contractor	Before construction activities commence	
			Considering the solar panels will be constructed above ground with a limited footprint for plinths, as much of	Limited stripping of topsoil	Contractor	Before construction activities	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Planning Phase							
			the natural vegetation should be retained as possible.			commence	
Aesthetics	Waste generation	To control the temporary storage of waste	Temporary waste storage locations on site shall be determined. These storage points shall be accessible by waste removal trucks and these points should not be located in sensitive areas, areas highly visible from the properties of the surrounding land-owners/tenants or in areas where the wind direction will carry bad odours across the properties of adjacent tenants or landowners. Waste storage requirements must be submitted to the Contractor prior to construction commencing.	Waste storage locations marked out and suitable bins are provided for waste at these locations.	Contractor/ ESO	Before construction activities commence	
	Hazardous substance spillage	Containment of hazardous substances	The proposed Urban Solar Farm Substation and transformers must be located at point furthest away from the wetland i.e. to the east. The bunding and storage facility of the transformers and hazardous substance containers must comply with applicable legislation as well as standards, as to prevent contamination of the wetland in case of spillage or emergency incident.		Contractor	Before construction activities commence	
	Waste pollution	Prevent waste from becoming airborne	It is foreseen that the proposed Urban Solar Farm shall generate huge volumes of plastic and polystyrene waste during the construction phase of the project. Enclosed containers must be provided for the storage of the aforementioned. Waste management system must make provision for separation of waste for possible recycling or reuse.	Waste containers and waste management budgeted for	Contractor/ ESO	Before construction activities commence	
	Noise generation	To minimise the noise impact associated with	Construction activities may only take place during " normal working hours " which are from "sunrise to sunset",	Contractors working hours must be stipulated in the	Developer/ Project Manager	Before construction activities	

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Planning Phase							
		the proposed construction activities	Monday through Saturday. Non-working hours and days must be highlighted in the project document i.e. Sundays, public holidays etc.	contract.		commence	
Social	Impact on roads	Inform responsible authorities of proposed development	Developer to inform Local Municipality, GDRT, and SANRAL of planned construction next to the planned PWV1.	Authorities informed	Developer	Before construction activities commence	

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
Legal compliance	Environmental destruction	Sufficient funds available for environmental management	Developer to release funds required for environmental management and monitoring.	Environmental management implemented during construction phase in accordance with EMP and other requirements	Developer	Once off	
		Compliance with EA/EMP/GA etc.	Developer to appoint necessary specialist to ensure compliance with EA, EMP, GA etc.	Authorisation requirements met.	Developer	Throughout construction phase	
Services	Insufficient services	Potable water and ablution available	Install potable water supply and sewerage system as per services report.	Services installed	Developer/EAP	Once off	
		Electricity supply	Install 33kV line transferring power generated by Urban Solar Farm to Drowell Substation for distribution. Upgrade Drowell Substation in accordance with Electrical Services Report.	Electrical Services upgraded and installed	Developer	Once off	
Fauna and Flora	Loss of protected Vegetation, and topsoil	To minimize damage to/loss of protected species	Search and Rescue to be carried out in accordance with GDARD requirements.	Compliance	Contractor/ ESO/ ECO	Once off	
			Construction site to be established under supervision of ECO/ESO.	Minimal vegetation removed	Contractor/ ECO	Before any construction activity commences	
Fauna and Flora	Damage to flora and fauna	To protect the existing fauna and flora	All exotic invaders and weeds must be eradicated. Snaring and hunting of fauna by construction workers on or adjacent to the study area are strictly prohibited and offenders shall be prosecuted. Removal of protected fauna from the study area or adjacent areas shall not be allowed. If any protected species are discovered during construction, procedures as stipulated at the end of the EMP should be followed.	Alien vegetation removed No measurable signs of habitat destruction	Contractor/ ESO	Continuous	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
			Any areas that have been fenced off in assistance with the ECO will be No-Go areas during and after construction.	Minimal damage to indigenous vegetation	Contractor/ ESO	Continuous	
	Spread of invasive and alien vegetation	Spread of weed	Ensure that materials used for mulching and fertilisers are certified weed free. Collect certifications where available. Control weed growth that appears during construction	Weed growth controlled	Contractor/ ESO	Continuous	
Geology and soils	Loss of Vegetation, and topsoil	Strip topsoil to depth of 150mm	Considering the solar panels will be constructed above ground with a limited footprint for plinths, as much of the natural vegetation should be retained as possible. Areas where construction is to take place is to be stripped of topsoil to a depth of at least 150mm .	Vegetation only removed in designated areas. Topsoil stripped to 150mm.	Contractor/ ECO	Before any construction activity commences	
	Loss of topsoil	To prevent the loss of topsoil	Stockpiling of topsoil will only be done in designated areas where it will not interfere with the natural drainage paths of the environment and must not be higher than 1, 5 m. In order to minimise erosion of topsoil and siltation and disturbance to existing vegetation, it is recommended that stockpiling be done in already disturbed/exposed areas. Remove vegetation only in areas designated during the planning stage and for the purpose of construction within the 3m wide servitude.	No loss of topsoil. Excavated materials correctly stockpiled < 1.5m high. No visible signs of erosion of topsoil.	Contractor/ ESO	Before construction commences in a designated area.	
	Erosion	Prevent erosion	Implement Stormwater Management Plan	Plan implemented	Contractor/ ESO	During construction	
	Erosion and siltation	To prevent erosion, siltation & water pollution	Mark out the areas to be excavated prior to excavation commencing. Unnecessary clearing of flora resulting in exposed soil prone to erosive conditions should be avoided. Provision of earth bunds or sand bags in areas where large amounts of	No erosion scars All damaged areas successfully rehabilitated Earth bunds present	Contractor ESO	Continuous	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
			<p>exposed soils exist is required. Construction work must be properly programmed to minimize soil excavation in the rainy season. All stockpiles must be managed in accordance with good engineering principles. It must be positioned appropriately and be protected from run-off. Existing access roads only, may be used to gain access to site and travel on site. All surfaces that are susceptible to erosion, shall be protected either by cladding with biodegradable material or with the top layer of soil being seeded with grass seed/planted with a suitable groundcover. Large exposed areas during the construction phases should be limited. Where possible areas earmarked for construction during later phases should remain covered with vegetation coverage until the actual construction phase. This will prevent unnecessary erosion and siltation in these areas. All embankments must be adequately compacted and planted with grass to stop any excessive soils erosion and scouring of the landscape. Cover stockpiles and surround downhill sides with a sediment fence to stop materials washing away.</p>	<p>Drainage channels established</p> <p>Cut-off drains excavated</p> <p>Stockpiles covered and sediment fence erected around stockpiles</p> <p>Stockpiles suitably covered and sediment fence erected</p>			
	Compaction of soil	To prevent the compaction of valuable soils due to traffic and equipment	Construction vehicles should only use the designated routes as determined in the pre-construction phase. Topsoil stripped should be stockpiled in areas where this material will not be damaged, removed, or compacted. This stockpiled material should be used	No evidence of driving over stockpiled topsoil.	Contractor ESO	Continuous	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
			for the rehabilitation of the site. All compacted areas should be ripped prior to them being rehabilitated by the contractor.				
	Contamination of soil	Prevent contamination of soil	There should not be any unnecessary vehicle maintenance on site and if a vehicle needs to be serviced it should be sent to a registered/certified vehicle garage. Should the soil be contaminated by the leaking of fuel the following should apply: The contaminated soil should be removed to a depth of 200 mm and disposed of as hazardous waste. Thereafter the area should be treated with an organic solvent.	No vehicle maintenance occurring on site. No signs of soil pollution	Contractor/ ESO	Continuous	
Hydrology	Pollution of ground and surface water	Prevent the pollution of the ground- and surface water	Implement conditions associated with GA	GA complied with	Contractor/ ESO	During construction	
			Chemical toilets may not be placed within the aquatic buffer zone or within 100m from a watercourse. At least one chemical toilet must be available for every 15 persons at each construction area. The contractor shall keep the toilets in a clean, neat, and hygienic condition. Toilets provided by the contractor must be easily accessible and a maximum of 50 m from the working area to ensure they are utilized. The contractor (who must use reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and	Toilets are located away from drainage lines. Workforce use toilets provided. Chemical toilets are clean and maintained.	Contractor/ ESO	Before construction activities commence	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
			emptied before the builders' or other public holidays. No person is allowed to use any other area than chemical toilets. No French drain systems may be installed. No chemical or waste water must be allowed to contaminate the run-off on site. The chemical toilets may not be placed in close proximity of adjacent developments to prevent odours.				
		Prevent pollution of ground and surface water by hydrocarbons from mobile plant	Drip trays should be provided for all mobile plant on site for the construction period, while parked; All mobile plant should be equipped with a hydrocarbon spills kit to facilitate cleaning up any spills as a result of a breakdown; An impermeable plastic sheet must be placed underneath the mobile plant to be worked on to prevent ingress of hydrocarbons into soil or water; Any spillages on the impermeable sheet must be cleaned with a spills kit prior to removing the sheet. No leaking vehicle shall be allowed on site. The mechanic/the mechanic of the appointed contractor must supply the environmental officer with a letter of confirmation that the vehicles and equipment are leak proof.	No signs of hydrocarbon spillages on site. The contractor must prove vehicles have been serviced and do not have any leaks.	Contractor/ ESO	Continuous	
Aesthetics	Hazardous substance spillage	To minimize pollution of surface and groundwater resources due to spilling of hazardous	Hydrocarbons and chemicals must be confined to specific secured areas within the site camp. These areas must be bunded with adequate containment (at least 1.5 times the volume of the substance stored) for	No pollution of the environment by hazardous substances visible on site	Contractor/ ESO	Continuous	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
		materials.	<p>potential spills or leaks. All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site. No bins containing organic solvents such as paint and thinners shall be cleaned on site. All spillages must be cleaned up with spills orb product and contaminated soil removed as hazardous waste. Hazardous waste must be disposed of by a registered contractor at an appropriately registered disposal site.</p> <p>Leak detection should be implemented and monitored daily. Emergency response plan to cater for spillages and leaks.</p>				
		To minimize pollution of surface and groundwater resources by cement	The mixing of concrete shall only be done at specifically selected sites outside the aquatic buffer zone, on mortar boards or similar structures to prevent run-off into surrounding drainage lines, streams, and natural vegetation.	No evidence of cement contaminated soil on the construction site	Contractor/ ESO	Continuous	
		To minimize pollution of surface and Groundwater resources due to effluent	No effluent (including effluent from any storage areas) may be discharged into any water surface or groundwater resource.	No evidence of contaminated water resources	Contractor/ ESO	Continuous	
Aesthetic	Waste generation - Visual impact and air pollution	To minimise the visual impact of the proposed activity	<p>Waste containers should be enclosed and waste should be separated.</p> <p>Waste storage locations and stockpile areas should not be in areas highly visible from the properties of the surrounding land-owners/tenants.</p>	Visual impact minimised	ECO	Continuous	
	Waste	To prevent	Weather proof waste bins must be	No waste bins	Contractor/	Continuous	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
	generation	unhygienic usage on the site and pollution of the natural assets	<p>provided and emptied regularly. The contractor shall provide labourers to clean up the contractor's camp and construction site on a daily basis. Waste storage points should be accessible by waste removal trucks and these points should be located in already disturbed areas/areas not highly visible from the properties of the surrounding land-owners/in areas where the wind direction will not carry bad odours across the properties of adjacent landowners. This site should comply with the following:</p> <ul style="list-style-type: none"> • Skips for the containment and disposal of waste that could cause soil and water pollution, i.e. paint, lubricants, etc.; • Small lightweight waste items should be contained in skips with lids to prevent wind littering; and • Bunded areas for containment and holding of dry building waste. <p>No solid waste may be disposed of on the site. No waste materials shall at any stage be disposed of in the open veldt, adjacent properties or in sensitive areas. The storage of solid waste on the site, until such time as it may be disposed of, must be in a manner acceptable to the local authority and the Department of Water Affairs (DWA). Cover any waste that is likely to wash away or contaminate storm water.</p>	<p>overflowing</p> <p>No litter visible on the site</p>	ESO		
	Waste generation	Recycle material where possible and correctly	Waste shall be separated into recyclable and non-recyclable waste, and shall be separated as follows:	Sufficient containers available on site	Contractor/ ESO	Continuous	

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
		dispose of unusable wastes	<ul style="list-style-type: none"> • General waste: • Building rubble; and • Reusable /recyclable material. Recyclable waste shall preferably be deposited in separate bins. All solid must be removed to a permitted waste disposal site on a weekly basis. Keep records of waste generated, reused, recycled, and disposed for future reference. Provide information to ECO. Confirmation to be obtained from Local Municipality of where to dispose building rubble. Recycling of waste to occur as agreed with Local Municipality.	No visible signs of pollution			
Ecological integrity	Increased fire risk to site and surrounding areas	To decrease fire risk	<p>No open fires are allowed on site. Smoking is only allowed in designated areas (signposted) and cigarette buds may not be disposed of in the open veldt. Fire extinguishers to be provided in all vehicles and fire beaters must be available on site. Emergency numbers/contact details must be available on site, at the site camp and with each supervisor.</p>	No signs of burnt veldt. Fire beaters present in vehicles and on site. Emergency numbers displayed.	Contractor/ ESO	Continuous	
Social and Aesthetic	Noise impact	To maintain noise levels below "disturbing" as defined in the national and provincial Noise Regulations	Construction activities shall only take place during working hours which are between sunrise to sunset, Monday through Saturday.	No complaints from surrounding residents and I & APs	Contractor/ ESO	Continuous	
	Dust impact	Minimise dust from the site	Dust pollution could occur during the construction works, especially during the dry months. Regular and effective dust suppression of working areas	No visible signs of dust pollution No complaints from	Contractor/ ESO	Continuous	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
			(especially during the dry and windy periods) must be carried out to avoid dust pollution, impacting on adjacent residential areas and creating dangerous driving conditions on nearby roads. If necessary, construction areas and access roads should be watered in the mornings and afternoons.	surrounding residents and I & APs			
	Safety and security	To ensure the safety and security of the public	Signage indicating the operations of heavy vehicles on access roads and on the construction site is to be erected. Construction personnel may not stay over on site. The following actions would assist in management of safety along the road: <ul style="list-style-type: none"> • Adequate road traffic signs; • Erect proper signs indicating the danger of the excavation in and around the site; and • All areas that are excavated to a depth of 1.5 m and more must be marked with barrier tape to prevent injury. No fires are permitted on site.	Traffic signs are visible No signs of sleeping quarters on site Barrier tape erected around excavations No fire hazard	Contractor/ ESO	Continuous	
	Influx of people from other areas	Prevent the influx of people from other areas	It is recommended that (where possible) only people from the local communities in and around the area are employed on the construction site.	People from local community employed	Contractor	Continuous	
Social	Impact on roads	Approval from authorises	Local Municipality, GDRT, and SANRAL to approve plan construction	Approval obtained	Developer	During construction	
Cultural heritage	Loss of or damage to cultural Resources	Preserve cultural historic sites and finds	Contractors to be trained in to report any cultural, historical finds. Recommendations of HIA	Heritage training provided	Contractor/ ESO/ ECO	Continuous	

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Construction Phase							
Hazardous substances	Hazardous substance spillage	Containment of hazardous substances	implemented. The proposed Urban Solar Farm Substation and transformers must be located at point furthest away from the wetland i.e. to the east. The bunding and storage facility of the transformers and hazardous substance containers must comply with applicable legislation as well as standards, as to prevent contamination of the wetland in case of spillage or emergency incident.	Legal compliance in terms of hazardous substance storage	Contractor/ ESO/ ECO	Continuous	

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Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Decommissioning/Rehabilitation Phase							
Legal compliance	Environmental rehabilitation	Sufficient funds available for rehabilitation	Developer to release funds required for environmental rehabilitation	Rehabilitation affected in accordance with Environmental Authorisation conditions	Developer	During Decommissioning Phase	
Geology and soils	Loss of soil	Ensure rehabilitation of disturbed areas	Compacted soils shall be ripped at least 200 mm deep. All clumps and rocks larger than 30 mm diameter shall be removed from the soil to be rehabilitated. The soil shall be levelled before seeding Hydro-seed the soil with grass species indigenous to the development area. Watering shall take place at least once per day for the first 14 days until germination of seeds have taken place. Thereafter watering should take place at least for 20 minutes every 4 days until grass have hardened off.	Natural grass have re-established	Contractor/ ESO	Prior to decommissioning	
Fauna and Flora	Destruction of protected vegetation	Rescued flora returned to development footprint or similar habitat	Comply with GDARD requirements	Replant rescued Orange Listed Plants	Contractor/ ESO	During rehabilitation	
	Spread of invasive and alien vegetation	To prevent the spread and occurrence of alien invaders	Prior to concluding decommissioning activities the contractor should eradicate all invaders visible on the construction site.	No alien and invasive species visible	Contractor ESO and ECO	At end of construction phase	
			Only indigenous or endemic plant species may be used for landscaping disturbed areas as well gardens and streets.	Only indigenous plants used in landscaping	Contractor ESO and ECO	At end of construction phase	
	Incomplete rehabilitation	To protect the existing indigenous flora and fauna	Upon completion of construction and rehabilitation the ECO should assess and approve the adequacy of the	Site rehabilitated	Contractor ESO and ECO	Until ECO satisfied	

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Decommissioning/Rehabilitation Phase							
			rehabilitation and ensure that sufficient levels of rehabilitation have been undertaken to allow re-establishment of the necessary vegetation. Rehabilitation works should be monitored until 80% of vegetation has been established.				
Aesthetic	Dumping of waste	All waste removed from construction site	All waste temporarily stored on the construction site during the operational phase has to be removed from the site during the decommissioning phase and prior to the project being regarded as closed.	No pollution of the environment	Contractor Site supervisor ECO	At end of construction phase	
Legal compliance	Compliance with EA/EMP/GA	ECO to conduct final site inspection and audit	ECO to conduct last inspection on site and sign off that the EMP has been complied with or identify breaches. Submit to GDARD for approval.	EMP compliance	ECO	At end of construction phase	

Environmental Management Plan (EMP) for Wheatlands Urban Solar Farm and Associated Infrastructure

Environmental Attribute	Environmental concern	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action	Applicable legislation reference
Operational Phase							
Hydrology	Surface water pollution	No surface water pollution due to hydrocarbons	Implement Stormwater Management Plan	Storm water Management Plan implemented	Developer	Throughout operational phase	4.1 and 4.2
Services	Insufficient services	Water available	Comply with WUL	WUL compliance	Developer/EAP	Throughout operational phase	4.1 and 4.2
		Sewerage system available	Operate and Maintain Package plant according to design. Procedure for operation and maintenance of package plant to be implemented.	Package plant functions properly	Developer	Throughout operational phase	4.1 and 4.2
Legal compliance	Environmental rehabilitation	Sufficient funds available for environmental management	Developer to release funds required for environmental management	Environmental management implemented during construction phase in accordance with EMP and other requirements	Developer	Once off	4.1-4.13
		Compliance with EA/EMP/GA etc.	Developer to appoint necessary specialist to ensure compliance with EA/EMP/GA etc.	Authorisation requirements met.	Developer	Throughout construction phase	4.1-4.13

6 Procedures for environmental incidents

6.1 Leakages & spills

- Identify source of problem.
- Stop goods leaking, if safe to do so.
- Contain spilt material, using spills kit or sand.
- Notify Environmental Control Officer
- Remove spilt material and place in sealed container for disposal (if possible).
- Environmental Control Officer to follow Incident Management Plan.

6.2 Failure of erosion/sediment control devices

- Prevent further escape of sediment.
- Contain escaped material using silt fence, hay bales, pipes, etc.
- Notify ECO.
- Repair or replace failed device as appropriate.
- Dig/scrape up escaped material; take care not to damage vegetation.
- Remove escaped material from site.
- ECO to follow Incident Management plan.
- Monitor for effectiveness until re-establishment.

6.3 Bank/slope failure

- Stabilize toe of slope to prevent sediment escape using aggregate bags, silt fence, logs, hay bales, pipes, etc.
- Notify ECO.
- ECO to follow Incident Management plan.

- Divert water upslope from failed fence.
- Protect area from further collapse as appropriate.
- Restore as advised by ECO.
- Monitor for effectiveness until stabilized.

6.4 Discovery of rare or endangered species

- Stop work.
- Notify ECO.
- If a plant is found, mark location of plants.
- If an animal, mark location where sighted.
- ECO to identify or arrange for identification of species and or the relocation of the species if possible.
- If confirmed significant, ECO to liaise with Endangered Wildlife Trust.
- Recommence work when cleared by ECO.

6.5 Discovery of archaeological or heritage items

- Stop work.
- Do not further disturb the area.
- Notify ECO.
- ECO to arrange appraisal of specimen.
- If confirmed significant, ECO to liaise with National, Cultural and History Museum.
Recommence work when cleared by ECO.

7 EMP review

- 7.1 Changes will be affected to this Draft EMP in accordance with GDARD comments.
- 7.2 The Contractor's Site Supervisor is responsible for ensuring that site workers comply with procedures, and for informing the site workers of any changes that may have been implemented by GDARD before starting any construction work.
- 7.3 If the contractor cannot comply with any of the mitigation measures as described in **Section 5.**, they should inform the ECO with reasons within 7 working days from receipt of the EMP.

APPENDIX H

DETAILS OF EAP



Bokamoso

**Landscape Architects &
Environmental consultants**

**P.O.BOX 11375
Maroelana
0161**

**Tel: (012) 346 3810
Fax: (086) 570 5559**

**E-mail: lizelle@bokamoso.net
reception@bokamoso.net
Website: www.bokamoso.net**

- 01** Executive Summary
- 02** Vision, Mission & Values
- 03** Human Resources
- 04** Services
- 05** Landscape Projects
- 06** Corporate Highlights
- 07** Environmental Projects
- 08** Indicative Clients
- 09** Tools

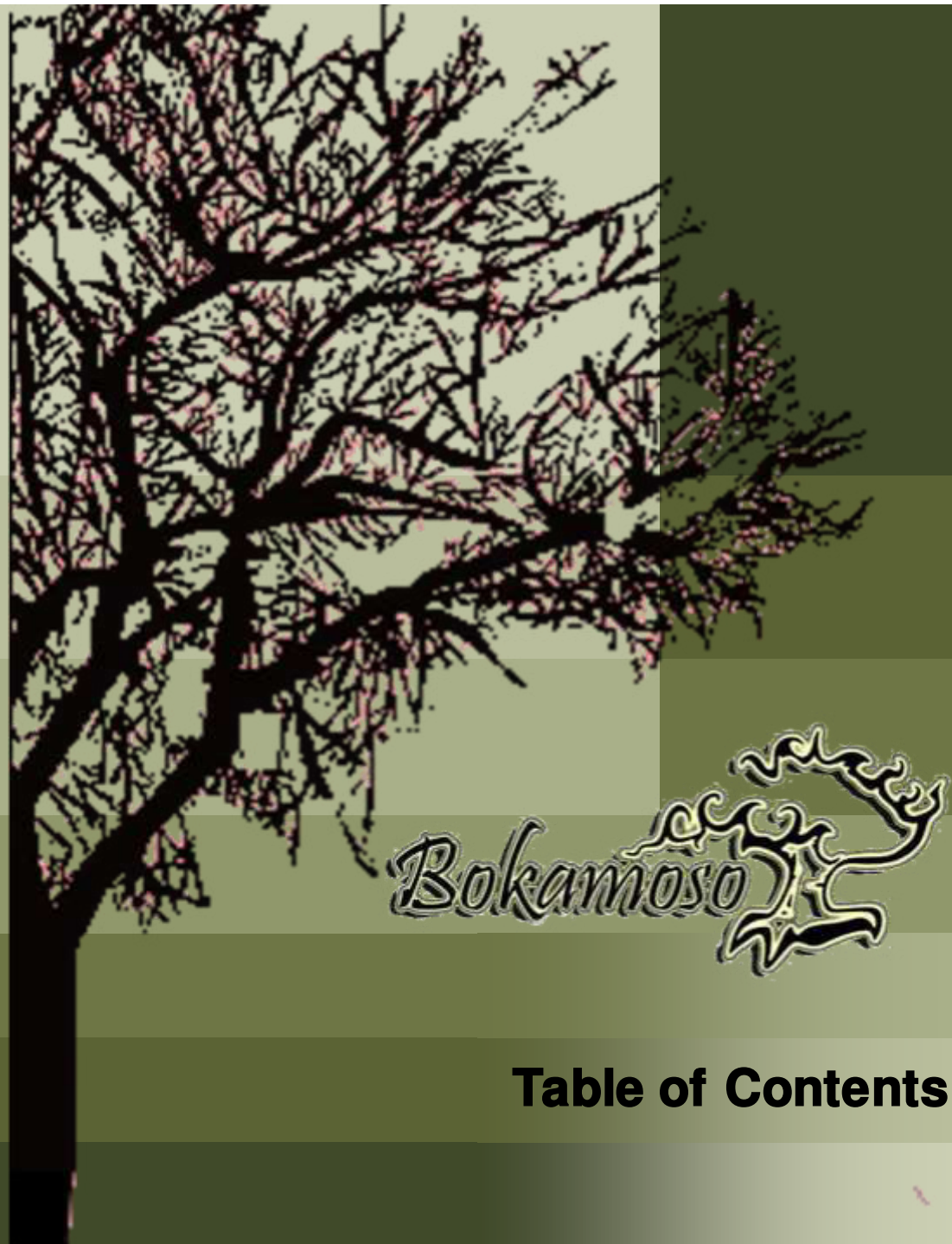


Table of Contents

Bokamoso specialises in the fields of Landscape Architecture and all aspects of Environmental Management and Planning. Bokamoso was founded in 1992 and has shown growth by continually meeting the needs of our clients. Our area of expertise stretches throughout the whole of South Africa. Our projects reflect the competence of our well compiled team. The diversity of our members enables us to tend to a variety of needs. Our integrated approach establishes a basis for outstanding quality. We are well known to clients in the private, commercial as well as governmental sector.

At Bokamoso we stand on a firm basis of environmental investigation in order to find unique solutions to the requirements of our clients and add value to their operations.



01 Executive Summary

011 Company Overview



Vision:

At Bokamoso we strive to find the best planning solutions by taking into account the functions of a healthy ecosystem. Man and nature should be in balance with each other.

Mission:

We design according to our ethical responsibility, take responsibility for successful completion of projects and constitute a landscape that contributes to a sustainable environment. We add value to the operations of our clients and build long term relationships that are mutually beneficial.

Values:

Integrity

Respect



Bokamoso stands on the basis of fairness. This include respect within our multicultural team and equal opportunities in terms of gender, nationality and race.

We have a wide variety of projects to tend to, from complicated reports to landscape installation. This wide range of projects enables us to combine a variety of professionals and skilled employees in our team.

Bokamoso further aids in the development of proficiency within the working environment. Each project, whether in need of skilled or unskilled tasks has its own variety of facets to bring to the table.

We are currently in the process of receiving our BEE scorecard. We support transformation in all areas of our company dynamics.



03 Human Resources

031 Employment Equity

Lizelle Gregory (100% interest)

Lizelle Gregory obtained a degree in Landscape Architecture from the University of Pretoria in 1992 and passed her board exam in 1995.

Her professional practice number is PrLArch 97078.

Ms. Gregory has been a member of both the Institute for Landscape Architecture in South Africa (ILASA) and South African Council for the Landscape Architecture Profession (SACLAP), since 1995.

Although the existing Environmental Legislation doesn't yet stipulate the academic requirements of an Environmental Assessment Practitioner (EAP), it is recommended that the Environmental Consultant be registered at the International Association of Impact Assessments (IAIA). Ms. Gregory has been registered as a member of IAIA in 2007.

Ms. Gregory attended and passed an International Environmental Auditing course in 2008. She is a registered member of the International Environmental Management and Assessment Council (IEMA).

She has lectured at the Tshwane University of Technology (TUT) and the University of Pretoria (UP). The lecturing included fields of Landscape Architecture and Environmental Management.

Ms. Gregory has more than 25 years experience in the compilation of Environmental Evaluation Reports:

Environmental Management Plans (EMP);

Strategic Environmental Assessments;

All stages of Environmental input ;

EIA under ECA and the new and amended NEMA regulations and various other Environmental reports and documents.

Ms. Gregory has compiled and submitted more than 600 Impact Assessments within the last 5-6 years. Furthermore, Ms. L. Gregory is also familiar with all the GDARD/Provincial Environmental policies and guidelines. She assisted and supplied GAUTRANS/former PWV Consortium with Environmental input and reports regarding road network plans, road determinations, preliminary and detailed designs for the past 12 years.



03 Human Resources

032 Members

Qualifications And Experience In The Field Of Environmental Planning And Management (Lizelle Gregory (Member Bokamoso)):

Qualifications:

- Qualified as **Landscape Architect** at UP 1991;
- Qualified as **Professional Landscape Architect in 1997**;
- A Registered Member at The **South African Council for the Landscape Architect Profession (SACLAP)** with Practise Number: **PrLArch97078**;
- A Registered Member at the **International Association for Impact Assessment Practitioners (IAIA)**;
- Qualified as an **Environmental Auditor in July 2008** and also became a Member of the International Environmental Management Association (IEMAS) in 2008.

Working Experience:

- Worked part time at Eco-Consult – 1988-1990;
- Worked part time at **Plan Associates as Landscape Architect in training** – 1990-1991;
- Worked as Landscape Architect at **Environmental Design Partnership (EDP)** from 1992 - 1994
- Practised under **Lizelle Gregory Landscape Architects** from 1994 until 1999;
- Lectured** at Part-Time at **UP** (1999) – Landscape Architecture and **TUT** (1998- 1999)- Environmental Planning and Plant Material Studies;
- Worked as **part time Landscape Architect and Environmental Consultant at Plan Associates** and **managed their environmental division for more than 10 years** – 1993 – 2008 (assisted the **PWV Consortium** with various road planning matters which amongst others included environmental Scans, EIA's, Scoping reports etc.)
- Renamed business as **Bokamoso in 2000** and is the only member of Bokamoso Landscape Architects and Environmental Consultants CC;
- More than 25 years experience in the compilation of Environmental Reports**, which amongst others included the compilation of various **DFA Regulation 31 Scoping Reports**, EIA's for EIA applications in terms of the applicable environmental legislation, Environmental Management Plans, Inputs for Spatial Development Frameworks, DP's, EMF's etc. Also included EIA Application on and adjacent to mining land and slimes dams (i.e. Brahm Fisherville, Doornkop)

Qualifications And Experience In The Field Of Landscape Architecture (Lizelle Gregory (Member Bokamoso)):

Landscape Architecture:

-Compiled landscape and rehabilitation plans for more than 22 years.

The most significant landscaping projects are as follows:

-Designed the Gardens of the Witbank Technicon (a branch of TUT). Also supervised the implementation of the campus gardens (2004);

-Lizelle Gregory was the Landscape Architect responsible for the paving and landscape design at the UNISA Sunnyside Campus and received a Corobrick Golden Award for the paving design at the campus (1998-2004);

-Bokamoso assisted with the design and implementation of a park for the City of Johannesburg in Tembisa (2010);

-The design and implementation of the landscape gardens (indigenous garden) at the new Coca-Cola Valpre Plant (2012-2013);

-Responsible for the rehabilitation and landscaping of Juksei River area at the Norwood Shopping Mall (Johannesburg) (2012-2013);

-Designed and implemented a garden of more than 3,5ha in Randburg (Mc Arthurpark). Bokamoso also seeded the lawn for the project (more than 2,5 ha of lawn successfully seeded) (1999);

-Bokamoso designed and implemented more than 800 townhouse complex gardens and submitted more than 500 Landscape Development Plans to CTMM for approval (1995 – 2013);

-Assisted with Landscape Designs and the Masterplan at Eco-Park (M&T Developments) (2005-2011);

-Bokamoso designed and implemented an indigenous garden at an office park adjacent to the Bronberg. In this garden it was also necessary to establish a special garden for the Juliana Golden Mole. During a recent site visit it was established that the moles are thriving in this garden. Special sandy soils had to be imported and special indigenous plants had to be established in the natural section of the garden.

-Lizelle Gregory also owns her own landscape contracting business. **For the past 20 years she trained more than 40 PDI jobless people (sourced from a church in Mamelodi)** to become landscape contracting workers. All the workers are (on a continuous basis) placed out to work at nurseries and other associated industries;

-Over the past 20 years the Bokamoso team compiled more than 800 landscape development plans and also implemented most of the gardens. Bokamoso also designed and implemented the irrigation for the gardens (in cases where irrigation was required). Lizelle regarded it as important to also obtain practical experience in the field of landscape implementation.

Consulting

Anè Agenbacht

Introduction to Sustainable Environmental Management—An overview of Principles, Tools, & Issues (Potch 2006)
Leadership Training School (Lewende Woord 2010)
BA Environmental Management (UNISA 2011)
PGCE Education (Unisa 2013) - CUM LAUDE
Project Manager
More than 10 years experience in the compilation of various environmental reports

Mary-Lee Van Zyl

MSc Plant Science (UP)
BSc (Hons) Plant Science (UP)
BSc Ecology (UP)
More than 5 years working experience in the Environmental field
Specialises in ECO works, Basic Assessments, EIA's, and Flora Reports
Compilation of various Environmental Reports

Dashentha Moodley

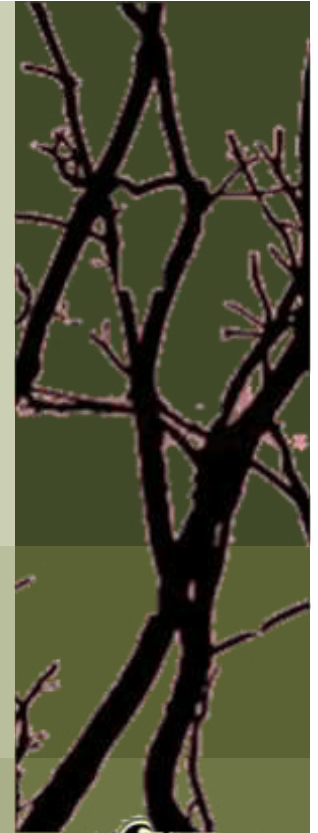
BA (Hons) Degree in Environmental Management (UNISA) - CUM LAUDE
Bachelor of Social Science in Geography & Environmental Management (UKZN)
More than 6 years experience in WUL Applications & Integrated Environmental Management within water resource management.
Senior Environmental Practitioner & Water Use Licence Consultant
Specialises in Water Use License & Compilation of various Env. Reports

Adèle Drake

BA Geography & History (UP)
NQF Level 7 Air Quality Management (UJ)
More than 15 years experience in the field of Environmental Management within Mining Industry (surface and underground), Forestry Industry, Renewable Energy Industry (WEF), and Environmental Consulting. Also ISO 14000, ISO 9000, and Safety Management Auditor.

Ronell Kuppen

BSc (Hons) in Geography (UNISA)
BA Environmental and Development (UKZN)
More than 5 years experience in Environmental Consulting
Specializing in WUL Applications, Waste License Applications, EIAs, Basic Assessments, Public Participations, Borrow Pits



03 Human Resources

033 Personnel

Ben Bhukwana

BSc Landscape Architecture (UP)

More than 8 years experience in the field of Landscape Architecture (Design, Construction, Implementation, and Management).

Specialises in landscape design, ECO, rehabilitation plans and compilation various environmental reports and compilation of tender documents

Juanita de Beer

Diploma Events Management and Marketing (Damelin)

Specializes in Public relations and Public Participation Processes (4 years experience)

Specialises in compiling various environmental reports

Alfred Thomas

CIW Foundation& Internet Marketing (IT Academy)

12 years experience in GIS and IT in general.

GIS Operator and Multimedia Specialist.

Lizette Delport

MSc. In Aquatic Health (UJ)

BSc. Hons. Environmental Management

Environmental Assessment Practitioner and Wetland Specialist

Registered with the South African Wetland Society (SAWS)

A.E. van Wyk

BSc Environmental Sciences (Zoology and Geography)

Environmental Control Officer

Junior avifauna specialist

Juan Gregory

LLB (UP)

BA Law (UP)

Junior Environmental Impact Practitioner

Environmental Control Officer



03 Human Resources

034 Person-

Elsa Viviers

Interior Decorating (Centurion College)

(Accounting/ Receptionist) and Secretary to Lizelle Gregory

Loura du Toit

N. Dip. Professional Teacher (Heidelberg Teachers Training College)

Librarian and PA to the Project Manager

Merriam Mogalaki

Administration Assistant with in-house training in bookkeeping

Landscape Contracting

Elias Maloka

Assisting with Public Participations and Office Admin

Site manager overseeing landscape installations.

Irrigation design and implementation.

Landscape maintenance

More than 18 years experience in landscape construction works.

The contracting section comprises of six permanently employed black male workers. In many cases the team consists of up to 12 workers, depending on the quantity of work.



03 Human Resources

035 Personnel

In-house Specialists

Corné Niemandt

MSc Plant Science (UP 2015) – Cum Laude

BSc (Hons) Zoology (UP 2012)

BSc Ecology (UP 2011)

Specialises in ecological surveys and report writing

Compilation of fauna and flora specialist reports

GIS: Generating maps



03 Human Resources

036 Personnel



01 Environmental Management Services

- Basic Assessment Reports
- EIA & Scoping Reports
- Environmental Management Plans
- Environmental Scans
- Strategic Environmental Assessments
- EMP for Mines
- Environmental Input and Evaluation of Spatial Development Frameworks
- State of Environmental Reports
- Compilation of Environmental Legislation and Policy Documents
- Environmental Auditing and Monitoring
- Environmental Control Officer (ECO)
- Visual Impact assessments
- Specialist Assistance with Environmental Legislation Issues and Appeals
- Development Process Management
- Water Use License applications to DWA
- Waste License Application



04 Services

041 Consulting Services

02 Landscape Architecture

- Master Planning
- Sketch Plans
- Planting Plans
- Working Drawings
- Furniture Design
- Detail Design
- Landscape Development Frameworks
- Landscape Development Plans (LDP)
- Contract and Tender Documentation
- Landscape Rehabilitation Works

03 Landscape Contracting

Implementation of Plans for:

- Office Parks
- Commercial/ Retail / Recreational Development
- Residential Complexes
- Private Residential Gardens
- Implementation of irrigation systems



Bokamoso 

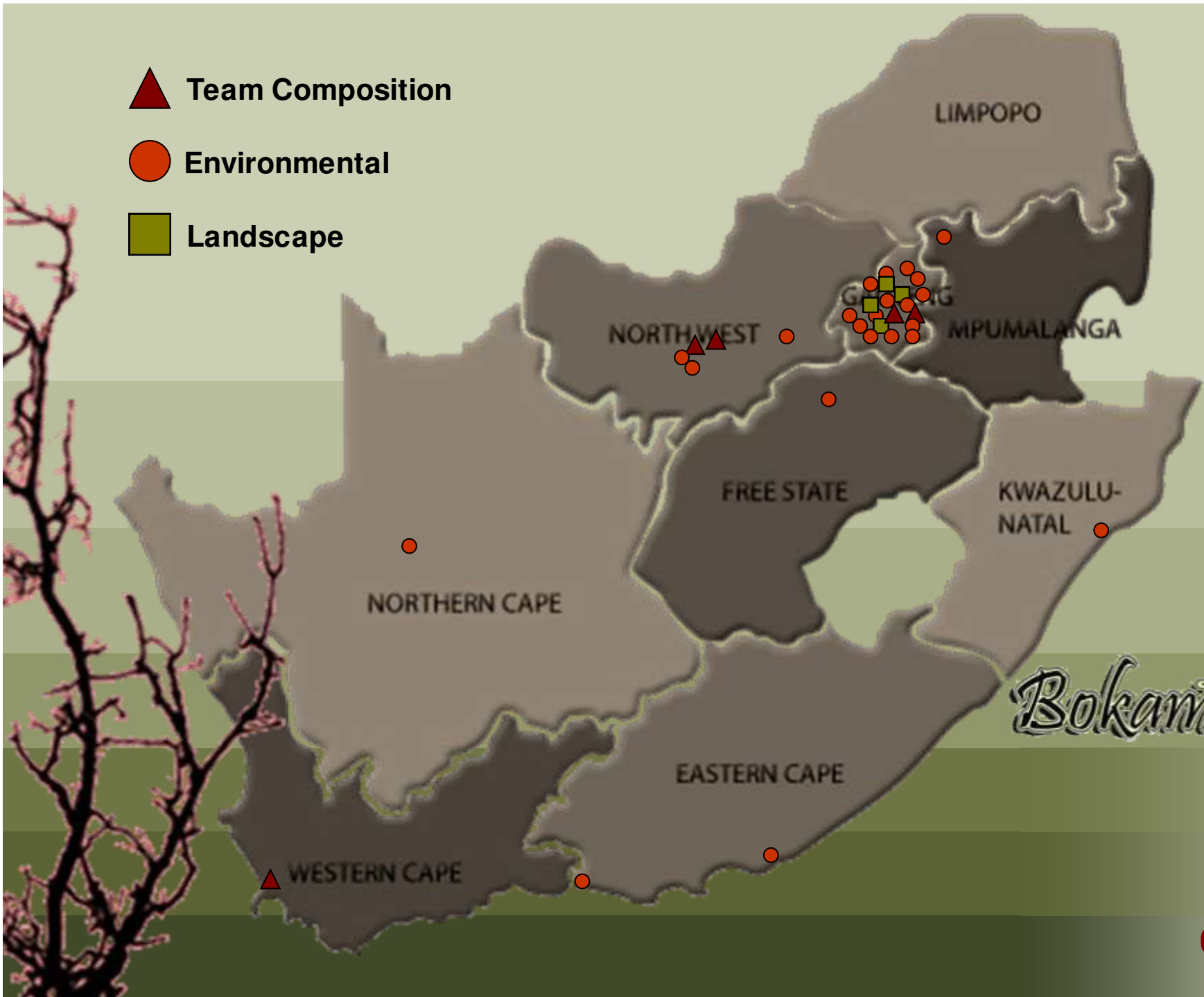
04 Services

042 Contracting Services

▲ Team Composition

● Environmental

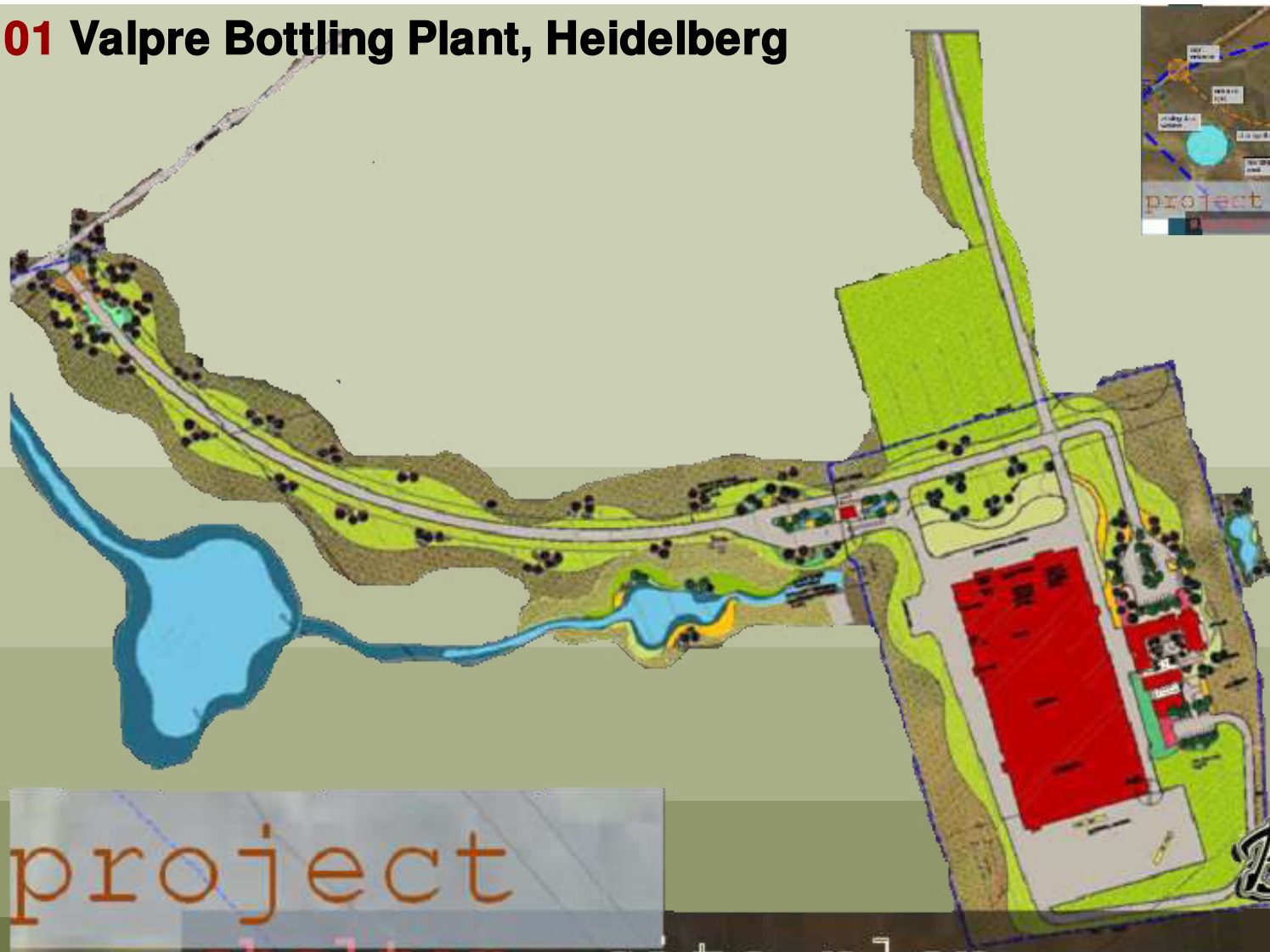
■ Landscape



04 Services

043 Orientation

01 Valpre Bottling Plant, Heidelberg



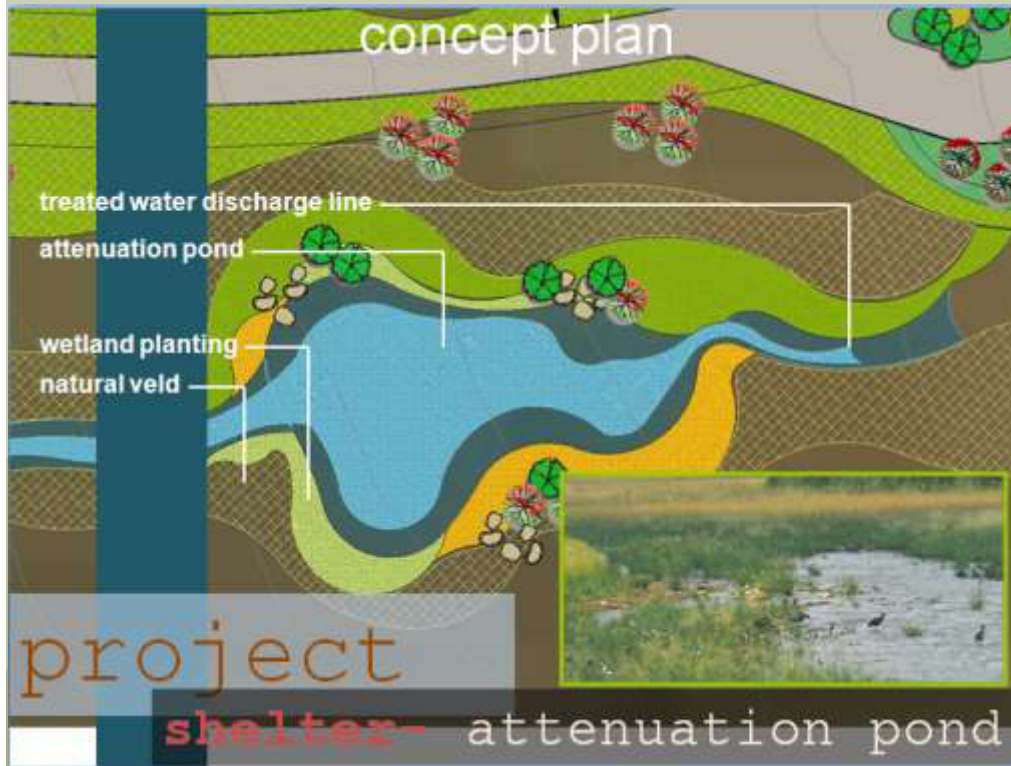
project
shelter-site plan

05 Landscape Projects- Current

051 Commercial



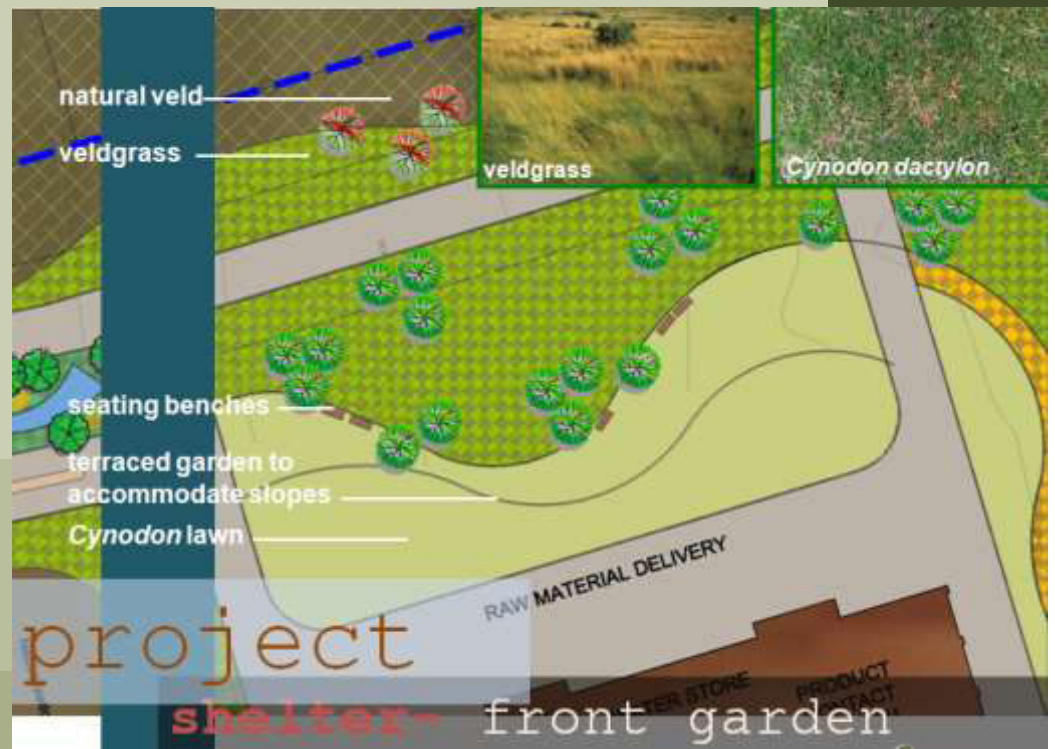
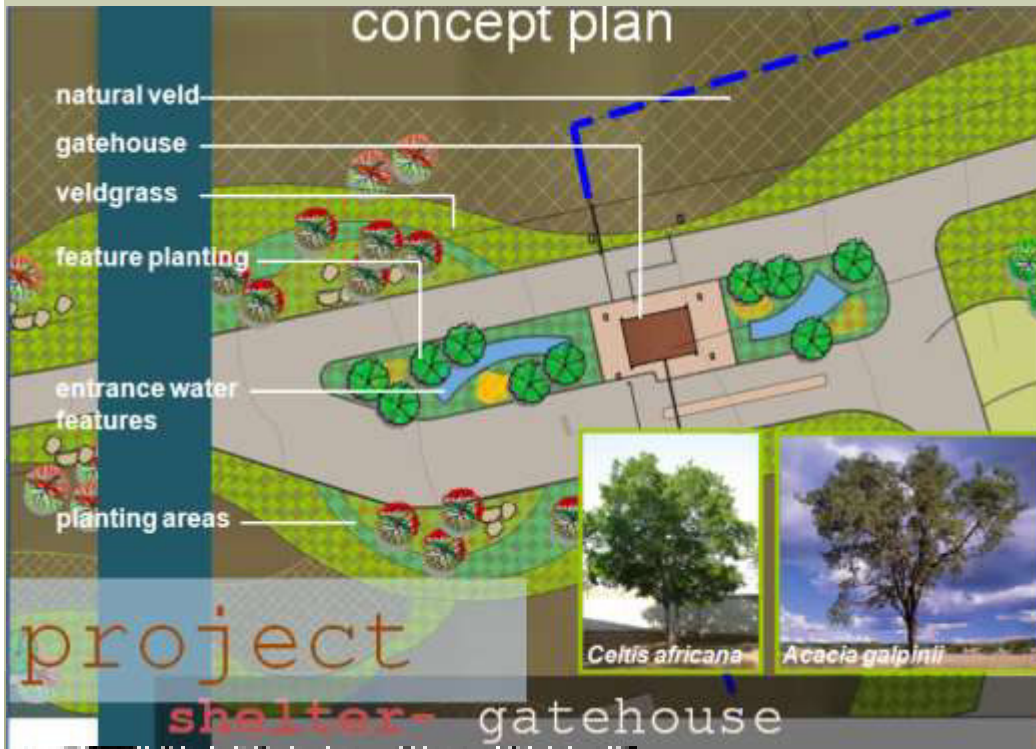
01 Valpre Bottling Plant, Heidelberg



05 Landscape Projects- Current

051 Commercial

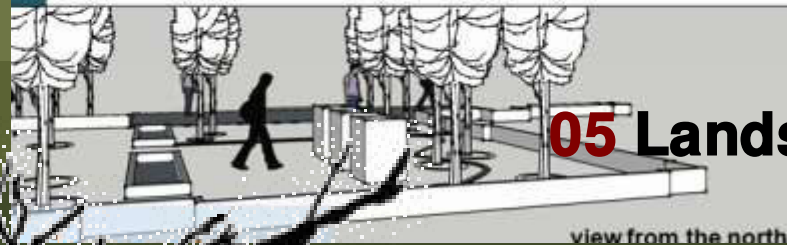
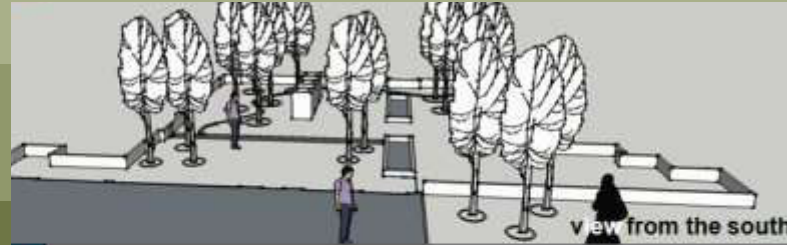
01 Valpre Bottling Plant, Heidelberg



05 Landscape Projects– Current

051 Commercial

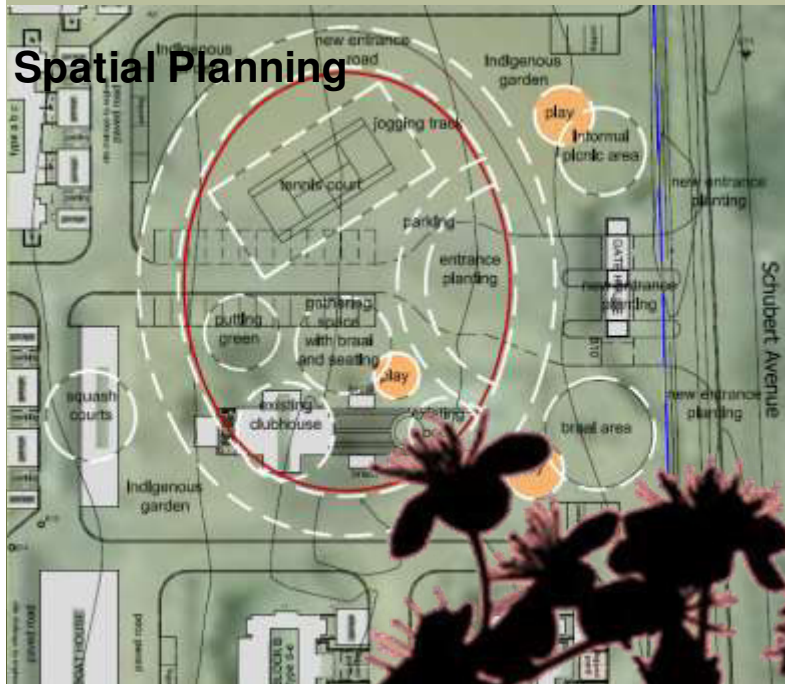
01 Valpre Bottling Plant, Heidelberg



05 Landscape Projects- Current

051 Commercial

02 Melodie Waters, Hartebeespoortedam



Streetscape

Indigenous Planting

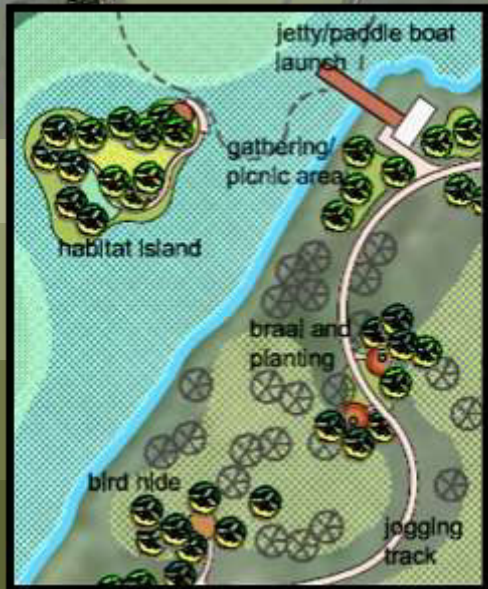
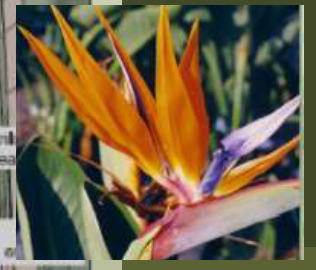


05 Landscape Projects – Current

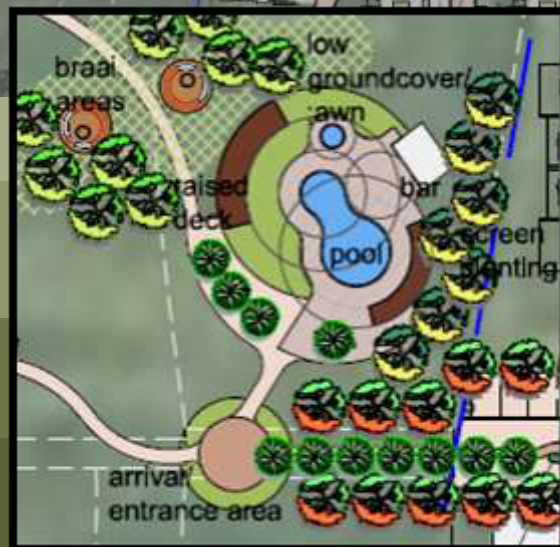
052 Commercial/Recreational



02 Melodie waters, Hartebeestpoortdam



Rehabilitation



Area Layout



05 Landscape Projects– Current

052 Commercial/Recreational

03 Grain Building, Pretoria



Bokamoso

05 Landscape Projects– Completed

053 Offices

04 Ismail Dawson offices, Pretoria



Bokamoso

05 Landscape Projects – Conceptual

053 Offices

05 Celtic Manor, Pretoria

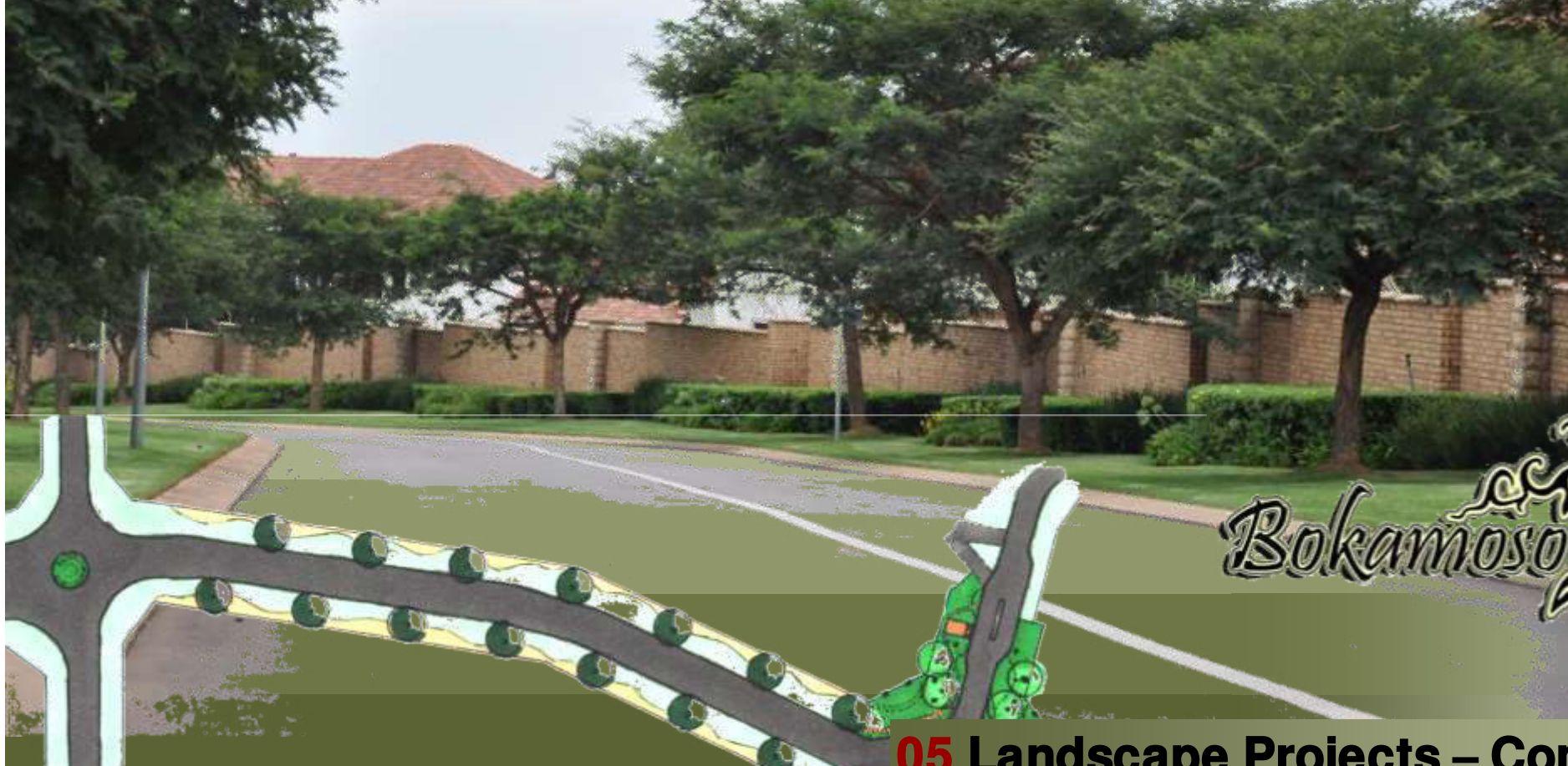


Bokamoso

05 Landscape Projects - Completed

054 Complex Development

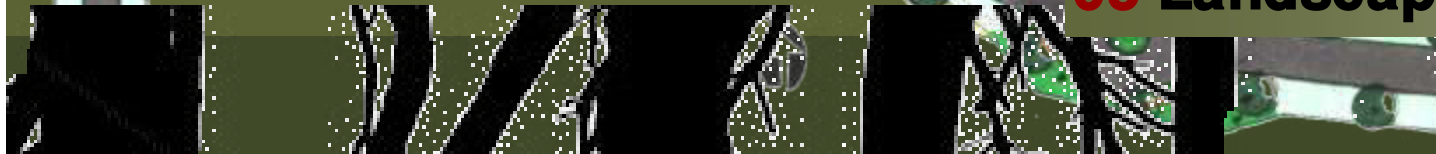
06 The Wilds, Pretoria



Bokamoso

05 Landscape Projects – Completed

054 Complex Development



07 The Wilds, Pretoria

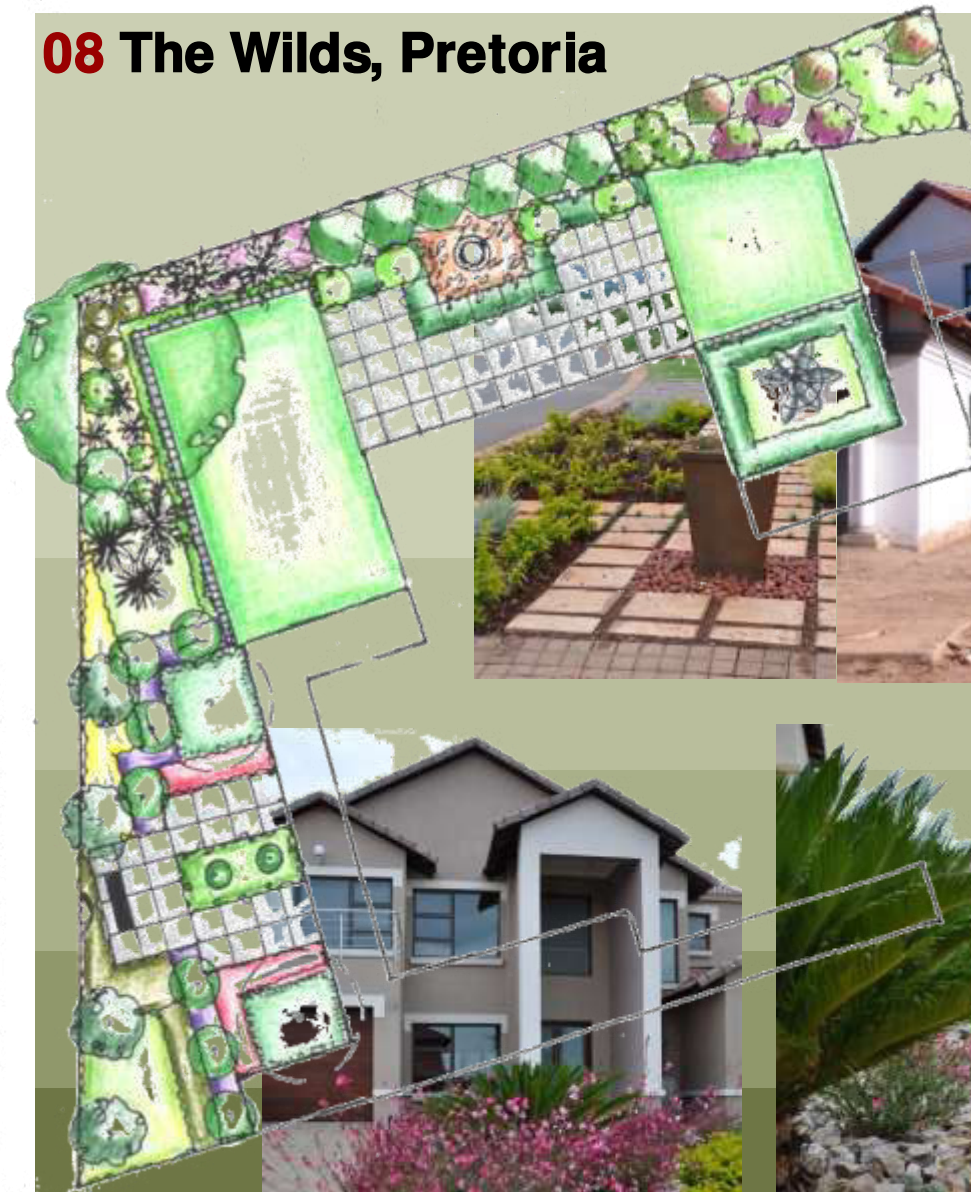


Bokamoso

05 Landscape Projects – Completed

055 Residential

08 The Wilds, Pretoria



Bokamoso

05 Landscape Projects – Completed

055 Residential

09 The Wilds, Pretoria

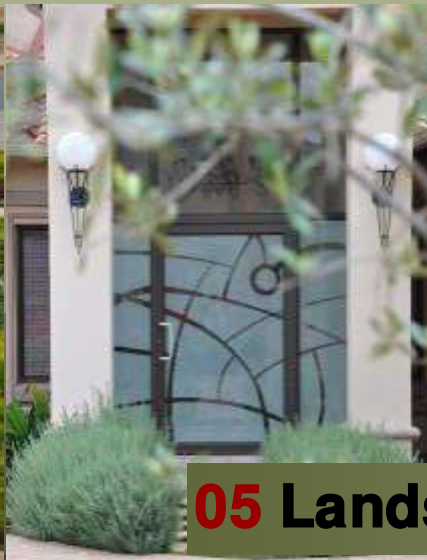


Bokamoso

05 Landscape Projects – Completed

055 Residential

010 The Wilds, Pretoria



Bokamoso

05 Landscape Projects – Completed

055 Residential

011 Governor of Reserve Bank's Residence, Pretoria



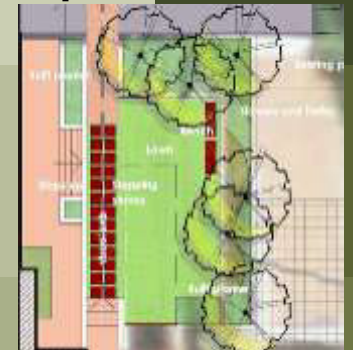
Plant Palette



Option 1



Option 2



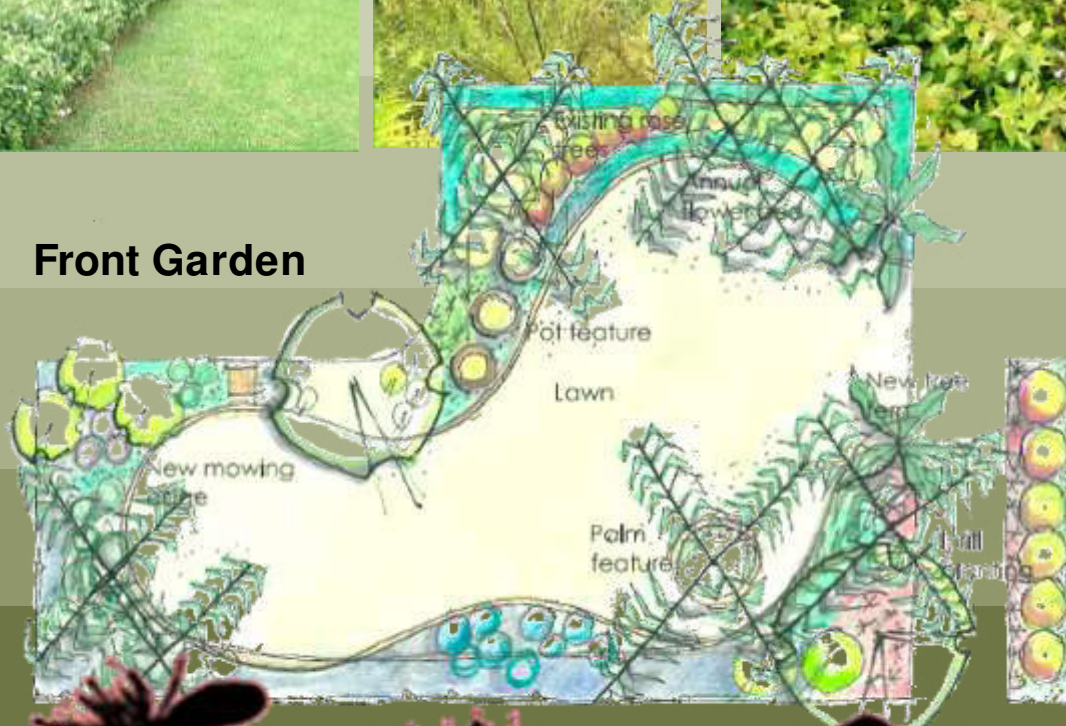
05 Landscape Projects – Conceptual

055 Residential

012 House Ismail, Pretoria



Front Garden



Back Garden



013 Forest Garden, Pretoria

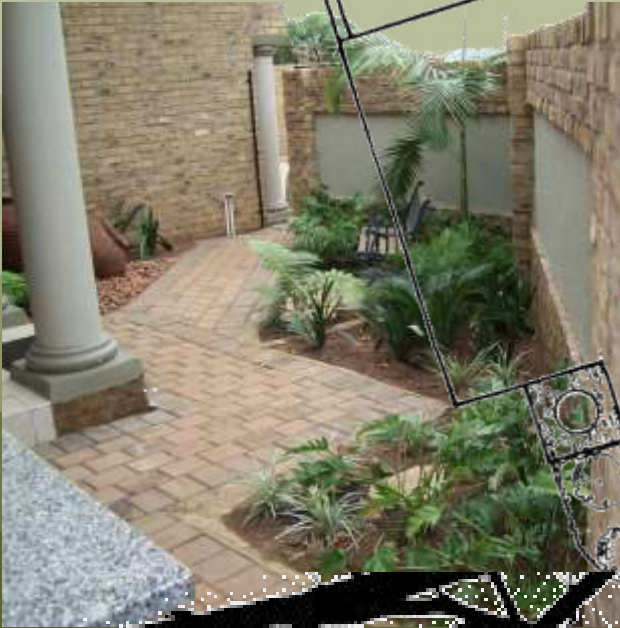


Bokamoso

05 Landscape Projects – Completed

055 Residential

015 Forest Garden, Pretoria



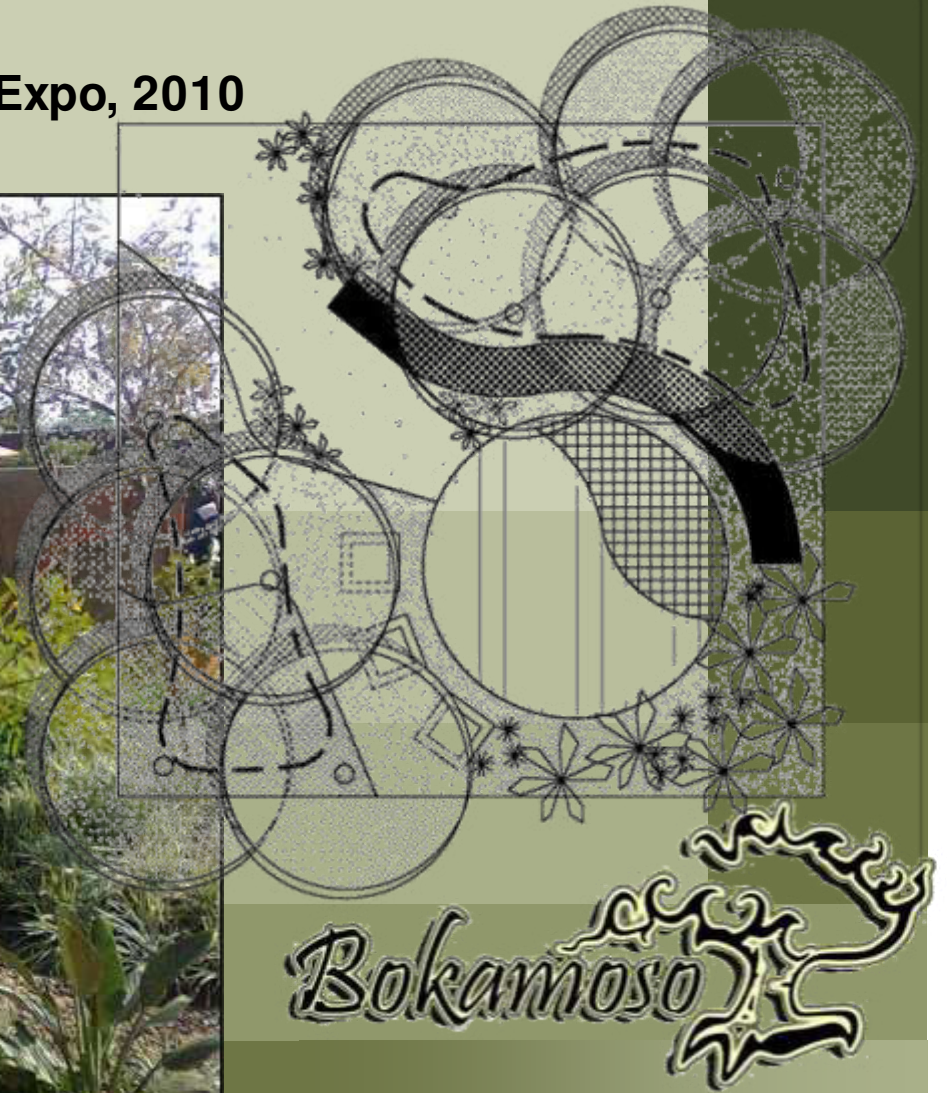
Bokamoso

05 Landscape Projects - Completed

055 Residential

01 Safari Garden Expo

Received a Silver Certificate at the Safari Garden Expo, 2010



06 Corporate Highlights

061 Awards

02 UNISA Sunnyside Campus, Pretoria

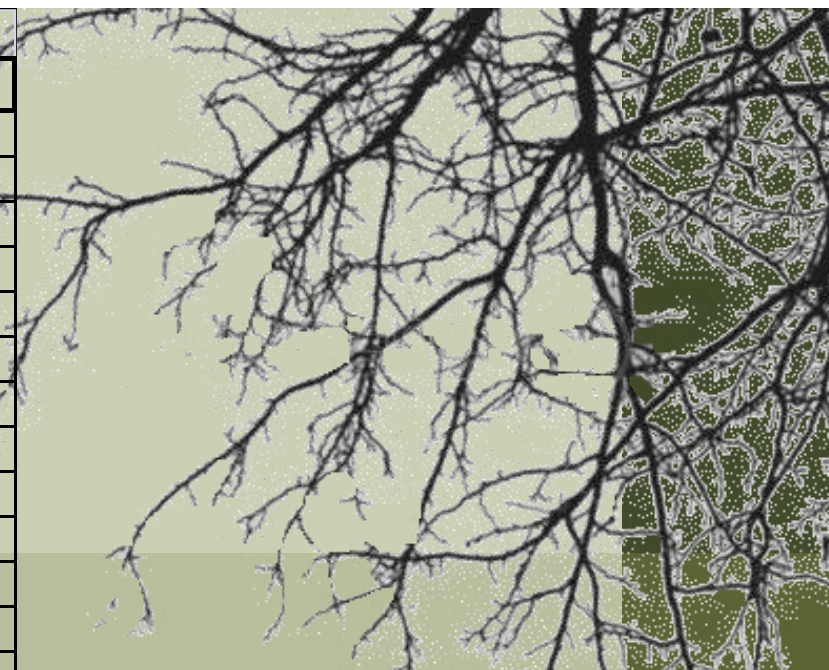
Best Commercial Paving Plan in Gauteng, 1997



06 Corporate Highlights

061 Awards

Project Name	Status	Project
Environmental Impact Assessment(EIA) and Scoping Report		
Junction 21	ROD	EIA
5 O'clock site access	In Progress	EIA
Bokamoso X 1	In Progress	Scoping & EIA
Doornvallei Phase 6 & 7	In Progress	EIA
Engen Interchange	In Progress	Scoping & EIA
Erasmia X15	In Progress	EIA
Franschkloof	In Progress	EIA
K113	Amendment of ROD	EIA
K220 East	ROD	EIA
K220 West	ROD	EIA
K54 ROD conditions	In Progress	EIA
Knopjeslaagte 95/Peachtree	ROD	EIA
Knopjeslaagte portion 20 & 21	ROD	EIA
Lillieslief/Nooitgedacht	In Progress	EIA
Mooiplaats 70 (Sutherland)	In Progress	EIA
Naauwpoort 1 - 12/Valley View	In Progress	EIA
PeachTree X5	In Progress	EIA
Strydfontein 60	In Progress	EIA
Thabe Motswere	In Progress	Scoping & EIA
Vlakplaats	In Progress	EIA
Waterval Valley	In Progress	EIA
Environmental Opinion		
Doornkloof 68 (Ross)	In Progress	Opinion
Monavoni X 53	In Progress	BA & Opinion
Mooikloof (USN)	In Progress	Opinion
Norwood Mall/Sandspruit	In Progress	Opinion
Riversong X 9	In Progress	Opinion
Sud Chemie	In Progress	Opinion
USN Benjoh Fishing Resort	In Progress	Opinion



The adjacent list host the status of our current projects. Only a selected amount of projects are displayed.



07 Current Environmental Projects

071 EIA, Scoping & Opinion

Project Name	Status	Project
Basic Assessment(BA)		
Annlin X 138	In Progress	BA
Clubview X 29	ROD	BA
Darrenwood Dam	In Progress	BA
Durley Holding 90 & 91	In Progress	BA
Elim	In Progress	BA
Fochville X 3	In Progress	BA
Hartebeeshoek 251	In Progress	BA
Klerksdorp (Matlosana Mall)	In Progress	BA
Monavoni External Services	ROD	BA
Monavoni X 45	Amendment of ROD	BA
Montana X 146	In Progress	BA
Rooihuiskraal X29	In Progress	BA
Thorntree Mall	In Progress	BA

Environmental control officer (ECO)		
Grace Point Church	In Progress	ECO
R 81	In Progress	ECO
Highveld X 61	In Progress	ECO
Mall of the North	In Progress	ECO
Olievenhoutbosch Road	In Progress	ECO
Orchards 39	In Progress	ECO
Pierre van Ryneveld Reservoir	In Progress	ECO
Project Shelter	In Progress	ECO

S24 G		
Wonderboom	In Progress	S24 G
Mogwasi Guest houses	Completed	S24 G



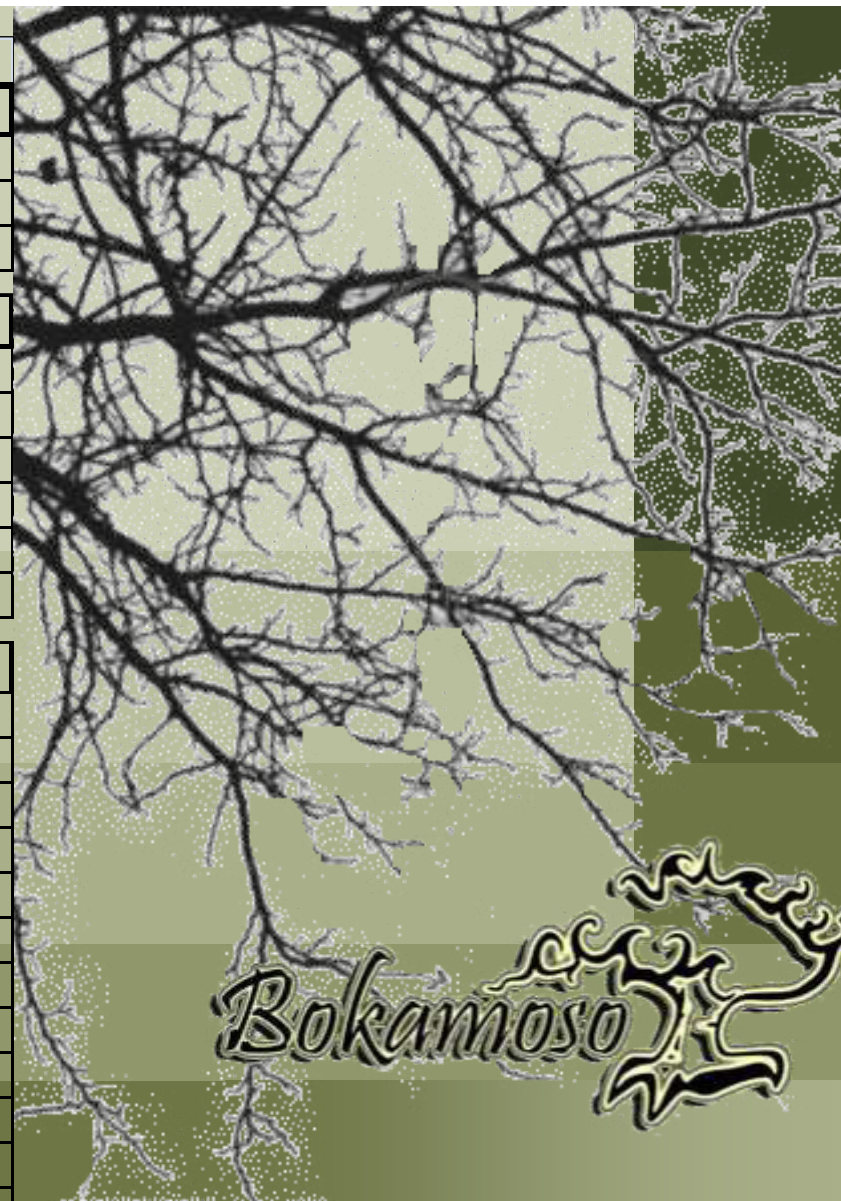
07 Current Environmental Projects

072 BA, ECO & S24 G

Project Name	Status	Project
Objection		
Colesberg WWTW	In Progress	Objection
Nigel Steelmill	Completed	Objection
Chantilly Waters	Completed	Objection

Development facilitation Act- Input (DFA)		
Burgersfort	In Progress	DFA & BA
Doornpoort Filling Station	In Progress	DFA & EIA & Scoping
Eastwood Junction	In Progress	DFA
Ingersol Road (Erf 78, 81 - 83)	In Progress	DFA
Roos Senekal	In Progress	DFA & EIA & Scoping
Thaba Meetse 1	In Progress	DFA & EIA & Scoping

Water Use License Act (WULA)		
Britstown Bulk Water Supply	In Progress	WULA
Celery Road / Green Channel	In Progress	WULA
Clayville X 46	In Progress	WULA
Dindingwe Lodge	In Progress	WULA
Doornpoort Filling Station	In Progress	WULA+DFA+EIA+SC
Eco Park Dam	In Progress	WULA
Groote Drift Potch	In Progress	WULA
Jozini Shopping Centre	In Progress	WULA+BA
K60	Completed	WULA
Maloto Roads	In Progress	WULA
Kwazele Sewage Works	In Progress	WULA
Monavoni External Services	In Progress	WULA+BA
Nyathi Eco Estate	In Progress	WULA
Prairie Giants X 3	In Progress	WULA
Waveside Water Bottling Plant	Completed	WULA



07 Current Environmental Projects

073 Objection, DFA & WULA

Project Name	Status	Project
Environmental Management Plan(EMP)		
Heidelberg X 12	ROD	EMP
Monavoni Shopping Centre	Completed	EMP
Forest Hill Development	Completed	EMP
Weltevreden Farm 105KQ	Completed	EMP+EIA
Raslouw Holding 93	Completed	EMP+BA
Durley Development	Completed	EMP+BA
Rooihuiskraal North X 28	Completed	EMP

Rehabilitation Plan		
Norwood Mall/Sandspruit	In Progress	Rehabilitation
Project Shelter Heidelberg	In Progress	Rehabilitation
Sagewood Attenuation Pond	ROD	Rehabilitation
Velmore Hotel	Completed	Rehabilitation
Grace Point Church	Completed	Rehabilitation
Mmamelodi Pipeline	Completed	Rehabilitation

Visual Impact Assessment		
Swatzkop Industrial Developme	Completed	Assessment +DFA
Erasmia	Completed	Assessment

Signage Application		
Menlyn Advertising	Completed	Signage
The Villa Mall	Completed	Signage+EMP+BA



07 Current Environmental Projects

074 EMP, Rehabilitation , Waste Management & Signage Application

- Billion Property Group
- Cavaleros Developments
- Centro Developers
- Chaimberlains
- Chieftain
- Century Property Group
- Coca Cola
- Elmado Property Development
- Flanagan & Gerard
- Gautrans
- Hartland Property Group
- Moolman Group
- MTN
- M&T Development
- Old Mutual
- Property Investment Company
- Petroland Developments
- RSD Construction
- SAND
- Stephan Parsons
- Twin City Developments
- Urban Construction
- USN



08 Indicative Clients



- Adobe Illustrator CS3
- Adobe Photoshop CS3
- Adobe InDesign CS3
- AutoCAD
- Google SketchUP
- GIS
- Microsoft Office Word
- Microsoft Office Excel
- Microsoft Office Publisher
- Microsoft Office Power Point

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