



May 2019

# DRAFT BASIC ASSESSMENT REPORT

## GAUT 002/17-18/E2080

CHRIS HANI EXT 4 TO BE DEVELOPED ON A PORTION OF THE REMAINDER OF THE FARM MODDER EAST 71- IR, AND A SMALL PART OF THE REMAINDER OF PORTION 1 OF THE FARM MODDER EAST 72-I.R., EKURHULENI METRO

**Prepared on behalf of:**

GREENFIELDS GARDENS (PTY) LTD  
P.O Box 786  
Edenvale  
1610

Telephone: (011) 391 0039

**For review and approval by:**

GAUTENG DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT (GDARD)  
11 Diagonal Street Diamond Building Newtown Johannesburg 2000

Tel: (011) 240 2500

Fax: (011) 240 2700

**Report Compiled by:**

INDEX (Pty) Ltd  
P.O. Box 26275  
Monument Park 0105

Tel: (012) 346 5307

Fax: 086 644 1160

Date	May 2019	
Document Title	Chris Hani Ext 4 to be developed on a Portion of the Remainder of the Farm Modder East 71-IR, and a small part of the Remainder of Portion 1 of the Farm Modder East 72-IR., Ekurhuleni Metro.	
Proponent / Applicant	Greenfields Gardens (Pty) Ltd	Mr Barend Greyling P.O Box 786 Edenvale 1610  Telephone: +27 (0)11-607-8000 E-mail: barend@kironprop.co.za
The Competent Authority	Gauteng Department of Agriculture and Rural Development	56 Eloff Street Johannesburg 2000  Tel: 011 240 2500
Authority Reference Number		
Environmental Assessment Practitioner	INDEX (Pty) Ltd	P.O. Box 26275 Monument Park 0105  Tel: (012) 346 5307 Fax: 086 644 1160 E-mail: eugene@iafrica.com
Revision Number:	#0	
Checked by:	P De Lange	
Approved:	Dr E Gouws (ML (UP), PhD (Trinity))	
Signature:		

# Undertaking by the EAP

I, Eugene Gouws, EAP for INDEX (Integrated Rural and Urban Development Expertise (Pty) Ltd), declare that:

- All work undertaken relating to the proposed project was done as an independent consultant;
- I have the necessary expertise to conduct EIAs, including the required knowledge and understanding of any guidelines or policies that are relevant to the proposed activity;
- I have undertaken all the work and associated studies in an objective manner, even if the findings of these studies were not favourable to the project proponent;
- I have no vested interest, financial or otherwise, in the proposed project or the outcome thereof, apart from fair remuneration for the work undertaken;
- I have no vested interest, including any conflicts of interest, in either the proposed project or the studies conducted in respect of the proposed project, other than complying with the relevant required regulations;
- I have disclosed all material information in my possession that may have the potential to influence the competent authority's decision and/or objectivity in terms of any reports, plans or documents related to the proposed project as required by the regulations; and
- I have included all comments and inputs provided by the Interested and Affected Parties during the Public Participation Process in this Basic Assessment Report.



Eugene Gouws  
For Index (Pty) Ltd

Chris Hani Ext 4 to be developed on a Portion of the Remainder of the Farm Modder East 71-IR, and a small part of the Remainder of Portion 1 of the Farm Modder East 72-IR., Ekurhuleni Metro.

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## GLOSSARY OF TERMS

Environment	<p>The surroundings (biophysical, social and economic) within which humans exist and that are made up of:</p> <ol style="list-style-type: none"><li>the land, water and atmosphere of the earth;</li><li>micro-organisms, plant and animal life;</li><li>any part or combination of (i) and (ii) and the interrelationships among and between them; and</li><li>the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.</li></ol>
Environmental Aspects	<p>Elements of an organization's activities, products or services that can interact with the environment.</p>
Environmental Degradation	<p>Refers to pollution, disturbance, resource depletion, loss of biodiversity, and other kinds of environmental damage; usually refers to damage occurring accidentally or intentionally as a result of human activities.</p>
EIA	<p>A study of the environmental consequences of a proposed course of action</p>
Environmental Impact	<p>An environmental change caused by some human act.</p>
EMP	<p>A document that provides procedures for mitigating and monitoring environmental impacts, during the construction, operation and decommissioning phases.</p>
Land Use	<p>The various ways in which land may be employed or occupied. Planners compile, classify, study and analyse land use data for many purposes, including the identification of trends, the forecasting of space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.</p>
Public Participation Process	<p>A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.</p>
Registered IAP	<p>In relation to an application, means an interested and affected party whose name is recorded in the register opened for that application.</p> <ol style="list-style-type: none"><li>Watercourse</li><li>A river or spring;</li><li>A natural channel in which water flows regularly or intermittently; A wetland, lake or dam into which, or from which, water flows, and</li><li>Any collection of water which the Minister may, by notice in the Gazette, declare to be watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.</li></ol>
Wetland	<p>It is a land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem. Primarily, the factor that distinguishes wetlands from other land forms or water bodies is the characteristic vegetation that is adapted to its unique soil conditions. Wetlands consist primarily of hydric soil, which supports aquatic plants.</p>

## ABBREVIATIONS

BAR	Basic Assessment Report
BID	Background Information Document
CBA	Critical Biodiversity Area
CRR	Comments and Responses Report
DBAR	Draft Basic Assessment Report
DEA	Department of Environmental Affairs
DEIR	Draft Environmental Impact Report
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
EMS	Environmental Management System
FEIR	Final Environmental Impact Report
FSR	Final Scoping Report
GA	General Authorisation
GDARD	Gauteng Department of Agriculture and Rural Development
GIS	Geographical Information System
GN	Government Notice
ha	Hectare
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IWULA	Integrated Water Use License Application
MAR	Mean annual rainfall
MPRDA	Minerals & Petroleum Resources Development Act (Act 28 of 2002)
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:AQA	National Environmental Management Act: Air Quality Act, 2004 (Act 39 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act 25 of 1999)
NWA	National Water Act, 1998 (Act 36 of 1998)
PoS	Plan of Study
PPP	Public Participation Process
RSDF	Regional Spatial Development Framework
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SIA	Social Impact Assessment
SR	Scoping Report
TIA	Traffic Impact Assessment
ToR	Terms of Reference
VIA	Visual Impact Assessment
WML	Waste Management License
WWTW	Wastewater Treatment Works



## **Basic Assessment Report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014 (Version 1)**

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### **Kindly note that:**

This Basic Assessment Report is the standard report required by GDARD in terms of the EIA Regulations, 2014.

This application form is current as of 8 December 2014. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.

A draft Basic Assessment Report must be submitted, for purposes of comments within a period of thirty (30) days, to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken.

A draft Basic Assessment Report (1 hard copy and two CD's) must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application.

Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.

The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.

An incomplete report may lead to an application for environmental authorisation being refused.

Any report that does not contain a titled and dated full colour large scale layout plan of the proposed activities including a coherent legend, overlain with the sensitivities found on site may lead to an application for environmental authorisation being refused.

The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the application for environmental authorisation being refused.

No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.

Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.

Although pre-application meeting with the Competent Authority is optional, applicants are advised to have these meetings prior to submission of application to seek guidance from the Competent Authority.

**DEPARTMENTAL DETAILS**

Gauteng Department of Agriculture and Rural Development  
 Attention: Administrative Unit of the of the Environmental Affairs Branch  
 P.O. Box 8769, Johannesburg, 2000

Administrative Unit of the of the Environmental Affairs Branch  
 Ground floor Diamond Building  
 11 Diagonal Street, Johannesburg.

Administrative Unit telephone number: (011) 240 3377  
 Department central telephone number: (011) 240 2500

	(For official use only)					
<b>NEAS Reference Number:</b>						
<b>File Reference Number:</b>						
<b>Application Number:</b>						
<b>Date Received:</b>						

If this BAR has not been submitted within 90 days of receipt of the application by the competent authority and permission was not requested to submit within 140 days, please indicate the reasons for not submitting within time frame.

Not applicable
----------------

Is a closure plan applicable for this application and has it been included in this report?  No

If not, state reasons for not including the closure plan.

Not applicable
----------------

Has a draft report for this application been submitted to a competent authority and all State Departments administering a law relating to a matter likely to be affected as a result of this activity?  Yes

Is a list of the State Departments referred to above attached to this report including their full contact details and contact person?  Yes

If no, state reasons for not attaching the list.

Not applicable
----------------

Have State Departments including the competent authority commented?  No

# SECTION A: ACTIVITY INFORMATION

## 1 Proposal or Development Description

### 1.1 Project title (must be the same name as per application form):

Chris Hani Ext 4 to be developed on a Portion of the Remainder of the Farm Modder East 71-IR, and a small part of the Remainder of Portion 1 of the Farm Modder East 72-IR., Ekurhuleni Metro.

Select the appropriate box

The application is for an upgrade of an existing development

The application is for a new development

Other, specify

Does the activity also require any authorisation other than NEMA EIA authorisation?

YES  NO

If yes, describe the legislation and the Competent Authority administering such legislation

The National Water Act (No. 36 of 1998) (NWA)

The NWA describes the "regulated area of a watercourse" for section 21(c) or (i) of the Act water uses meaning:

- (a) The outer edge of the 1 in 100-year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- (b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or
- (c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

There is a pan, drainage lines and wetland located within the target area. The activity will take place within 500 metres of the pan, therefore a WUL or a General Authorisation will be required.

If yes, have you applied for the authorisation(s)?

YES / ~~NO~~

If yes, have you received approval(s)? (attach in appropriate appendix)

~~YES~~ / NO

## 2 Applicable legislation, policies and/or guidelines

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations:

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	1998
Government Notice No. R982 of 2014 EIA Regulations	National & Provincial	2014
Government Notice No. R983 of 2014 Listing Notice 1	National & Provincial	2014
Government Notice No. R985 of 2014 Listing Notice 3	National & Provincial	2014

<b>Title of legislation, policy or guideline:</b>	<b>Administering authority:</b>	<b>Promulgation Date:</b>
National Heritage Resources Act (Act No 25 of 1999)	SAHRA. Gauteng Provincial Heritage Resources Agency	1999
National Water Act (Act 36 of 1998)	National & Provincial	1998
National Environment Management: Air Quality Act (Act 39 of 2004)	DEA	2004
Occupational Health and Safety Act (Act 85 of 1993)	Department of Labour	1993
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	National & Provincial	2004
Ekurhuleni Integrated Development Plan	Local / Municipal	2013-16
Ekurhuleni Environmental Management Framework (EMF)	Municipal	2007
Gauteng Conservation Plan (version 3.3)	Provincial	2011 / 2014
GDARD Minimum requirements for Biodiversity Assessments Version 3	Provincial	2014

Description of compliance with the relevant legislation, policy or guideline:

<b>Title of legislation, policy or guideline:</b>	<b>Description of compliance:</b>
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	Application for environmental authorisation: Basic Assessment
Government Notice No. R982 of 2014 EIA Regulations	Application for environmental authorisation: Basic Assessment
Government Notice No. R983 of 2014 Listing Notice 1	Application for environmental authorisation: Basic Assessment
Government Notice No. R985 of 2014 Listing Notice 3	Application for environmental authorisation: Basic Assessment
National Heritage Resources Act (Act No 25 of 1999)	Registration with SAHRA
National Water Act (Act 36 of 1998)	Water Use License
National Environment Management: Air Quality Act (Act 39 of 2004)	EMP to comply with the Act
Occupational Health and Safety Act (Act 85 of 1993)	EMP to comply with the Act
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Conserve sensitive habitats
Gauteng Provincial Environmental Management Framework (EMF)	Development partially falls in Zone 2 of the GPEMF
Ekurhuleni Integrated Development Plan	SDP must comply to IDP
Ekurhuleni Environmental Management Framework (EMF)	SDP must comply to EMF
Gauteng Conservation Plan (Version 3.3)	Application for environmental authorisation: Basic Assessment
GDARD minimum requirements for Biodiversity Assessments Version 3	Specialist studies must comply with minimum requirements

### 3 Alternatives

*Describe the proposal and alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. Do not include the no go option into the alternative table below.*

Note: After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent. Provide a description of the alternatives considered.

The alternatives that were considered are:

No.	Alternative type, either alternative: site on property, properties, activity, design, technology, energy, operational or other (provide details of "other")	Description
1	Site alternative. None.	There is no alternative - site remains in its current state
2	Sewerage connection alternative	
	Water course crossing	The first alternative is to cross the wetland directly north of the development site. This will be either by means of a buried pipeline or a raised pipe on concrete pillars above the level of the 1:100-year floodline.
	Connection directly to the main outfall sewer line	This route will underpass Laris Road and follow the wetland eastwards to link into the main outfall sewer; 1 100 metres from the site, west of Blesbokspruit.

Figure 1 Sewer connection alternative



In the event that no alternative(s) has/have been provided, a motivation must be included in the table below.

### Discussion on the consideration of site alternatives:

Alternatives were considered for the sewer line and connection. No alternatives were considered for the township.

Motivation for considering alternatives: In terms of the definition for “alternatives” given above. The following can be said with regards to this development, in relation to each aspect of “alternatives”:

#### Township development alternatives

- a. **The property on which or location where it is proposed to undertake the activity:** This particular property is owned by the applicant. An alternative property cannot be assessed for this application, as there are no other properties in the direct area that the applicant is looking to develop for these specific purposes.
- b. **The type of activity to be undertaken:** Ekurhuleni’s current housing backlog is estimated to be in the region of 200 000 units and is still growing. This development will be instrumental in addressing this housing demand.
- c. **The design or layout of the activity:** The design and layout have to take into consideration the sensitive environments, specifically the pans that occur on the property. A buffer of 50 metres have been implemented around pans.
- d. **The technology to be used in the activity:** There is no “Technology” alternative that can be considered for this type of development.
- e. **The operational aspects of the activity:** The development will be operated as per a normal mixed-use development with associated services and amenities.
- f. **The option of not implementing the activity:** An informal settlement developed on this property in 2017. In 2018 the structures were removed. Due to the acute shortage of housing in the area, this threat is bound to remain. Development is therefore imperative.

Therefore, due to the above, the only feasible and workable alternative addressed for this site is for the mixed uses to be developed on the property.

## 4 Physical size of the activity

Indicate the total physical size (footprint) of the proposal as well as alternatives. Footprints are to include all new infrastructure (roads, services etc.), impermeable surfaces and landscaped areas:

### 4.1 Township development

Proposed activity (Total environmental (landscaping, parking, etc.) and the building footprint)

Alternatives:

Alternative 1 (if any)

Alternative 2 (if any)

Size of the activity:

Total area: 158,20 Ha
Building footprint: 126.63 Ha

Not applicable
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Not applicable
----------------

### 4.2 Sewerage line

Proposed activity

Alternatives:

Alternative 1 (if any)

Alternative 2 (if any)

Length of the activity:

290 metres
------------

1 100 metres
--------------

Not applicable
----------------

Indicate the size of the site(s) or servitudes (within which the above footprints will occur):

Proposed activity	Size of the site/servitude: 1 000m <sup>2</sup>
Alternatives:	
Alternative 1 (if any)	3 000m <sup>2</sup>
Alternative 2 (if any)	Not applicable

## 5 Site Access

### 5.1 Proposal

Does ready access to the site exist, or is access directly from an existing road?  
If NO, what is the distance over which a new access road will be built

YES	NO

Describe the type of access road planned:

The site is located next to Holfontein Road (Laris Road), from which access will be provided.

*Include the position of the access road on the site plan (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).*

### 5.2 Alternative 1

Does ready access to the site exist, or is access directly from an existing road?  
If NO, what is the distance over which a new access road will be built  
Describe the type of access road planned:

No alternative

No alternative access is possible due to distance constraints from the N12 highway.

*Include the position of the access road on the site plan. (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).*

**PLEASE NOTE: Points 6 to 8 of Section A must be duplicated where relevant for alternatives**

Section A 6-8 has been duplicated 

0
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 Number of times

(only complete when applicable)

## 6 Layout or Route Plan

*A detailed site or route (for linear activities) plan(s) must be prepared for each alternative site or alternative activity. It must be attached to this document. The site or route plans must indicate the following:*

- the layout plan is printed in colour and is overlaid with a sensitivity map (if applicable);
- layout plan is of acceptable paper size and scale, e.g.
  - A4 size for activities with development footprint of 10sqm to 5 hectares;
  - A3 size for activities with development footprint of > 5 hectares to 20 hectares;
  - A2 size for activities with development footprint of >20 hectares to 50 hectares);
  - A1 size for activities with development footprint of >50 hectares);
- The following should serve as a guide for scale issues on the layout plan:
  - A0 = 1: 500

- A1 = 1: 1000
  - A2 = 1: 2000
  - A3 = 1: 4000
  - A4 = 1: 8000 ( $\pm 10\ 000$ )
- shapefiles of the activity must be included in the electronic submission on the CD's;
  - the property boundaries and Surveyor General numbers of all the properties within 50m of the site;
  - the exact position of each element of the activity as well as any other structures on the site;
  - the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure;
  - servitudes indicating the purpose of the servitude;
  - sensitive environmental elements on and within 100m of the site or sites (including the relevant buffers as prescribed by the competent authority) including (but not limited thereto):
    - Rivers and wetlands;
    - the 1:100 and 1:50 year flood line;
    - ridges;
    - cultural and historical features;
    - areas with indigenous vegetation (even if it is degraded or infested with alien species);
  - Where a watercourse is located on the site at least one cross section of the water course must be included (to allow the position of the relevant buffer from the bank to be clearly indicated)

*FOR LOCALITY MAP (NOTE THIS IS ALSO INCLUDED IN THE APPLICATION FORM REQUIREMENTS)*

- the scale of locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map;
- the locality map and all other maps must be in colour;
- locality map must show property boundaries and numbers within 100m of the site, and for poultry and/or piggery, locality map must show properties within 500m and prevailing or predominant wind direction;
- for gentle slopes, the 1m contour intervals must be indicated on the map and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the map;
- areas with indigenous vegetation (even if it is degraded or infested with alien species);
- locality map must show exact position of development site or sites;
- locality map showing and identifying (if possible) public and access roads; and
- the current land use as well as the land use zoning of each of the properties adjoining the site or sites.

## 7 Site photographs

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under the appropriate Appendix. It should be supplemented with additional photographs of relevant features on the site, where applicable.

## 8 Facility illustration

A detailed illustration of the activity must be provided at a scale of 1:200 for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity to be attached in the appropriate Appendix.



# SECTION B: DESCRIPTION OF RECEIVING ENVIRONMENT

**Note:** Complete Section B for the proposal and alternative(s) (if necessary)

## Instructions for completion of Section B for linear activities

1. For linear activities (pipelines etc.) it may be necessary to complete Section B for each section of the site that has a significantly different environment.
2. Indicate on a plan(s) the different environments identified
3. Complete Section B for each of the above areas identified
4. Attach to this form in a chronological order
5. Each copy of Section B must clearly indicate the corresponding sections of the route at the top of the next page.

Section B has been duplicated for sections of the route  times

## Instructions for completion of Section B for location/route alternatives

1. For each location/route alternative identified the entire Section B needs to be completed
2. Each alternative location/route needs to be clearly indicated at the top of the next page
3. Attach the above documents in a chronological order

Section B has been duplicated for location/route alternatives  Times (complete only when appropriate)

## Instructions for completion of Section B when both location/route alternatives and linear activities are applicable for the application

Section B is to be completed and attachments order in the following way

- All significantly different environments identified for Alternative 1 is to be completed and attached in a chronological order; then
- All significantly different environments identified for Alternative 2 is to be completed and attached in a chronological order, etc.

Section B - Section of Route  (complete only when appropriate for above)

Section B - Location/route Alternative No.  (complete only when appropriate for above)

## 1 Property description

Property description: (Including Physical Address and Farm name, portion etc.)

Chris Hani Ext 4 to be developed on a Portion of the Remainder of the Farm Modder East 71-IR, and a small part of the Remainder of Portion 1 of the Farm Modder East 72-IR., Ekurhuleni Metro.

## 2 Activity position

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to

ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Preferred alternative:

Latitude (S):	Longitude (E):
26° 09' 15,7017"	28° 26' 21,6332"

In the case of linear activities:

Alternative:

- Starting point of the activity
- Middle point of the activity
- End point of the activity

Latitude (S):	Longitude (E):
Not applicable	Not applicable
Not applicable	Not applicable
Not applicable	Not applicable

For route alternatives that are longer than 500m, please provide co-ordinates taken every 250 meters along the route and attached in the appropriate Appendix

Addendum of route alternatives attached

The 21-digit Surveyor General code of each cadastral land parcel

PROPOSAL	
Alternative 1	TOIR00000000007100000
	TOIR00000000007200001
Alternative 2 (No-Go)	Same as Alternative 1

### 3 Gradient of the site

Indicate the general gradient of the site.

Flat	1:50 – 1:20	<del>1:20 – 1:15</del>	<del>1:15 – 1:10</del>	<del>1:10 – 1:7,5</del>	<del>1:7,5 – 1:5</del>	Steeper than 1:5
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### 4 Location in landscape

Indicate the landform(s) that best describes the site.

Ridgeline	Plateau	Side slope of hill/ridge	Valley	Plain	Undulating plain/low hills	River front
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### 5 Groundwater, soil and geological stability of the site

a) Is the site located on any of the following?

- Shallow water table (less than 1.5m deep)
- Dolomite, sinkhole or doline areas
- Seasonally wet soils (often close to water bodies)
- Unstable rocky slopes or steep slopes with loose soil

YES	NO
YES	NO
YES	NO
YES	NO

Dispersive soils (soils that dissolve in water)	<del>YES</del>	NO
Soils with high clay content (clay fraction more than 40%)	<del>YES</del>	NO
Any other unstable soil or geological feature	<del>YES</del>	NO
An area sensitive to erosion	<del>YES</del>	NO

(Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

b) are any caves located on the site(s)  YES  NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S):	Longitude (E):
Not applicable	Not applicable

c) are any caves located within a 300m radius of the site(s)  YES  NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S):	Longitude (E):
Not applicable	Not applicable

d) are any sinkholes located within a 300m radius of the site(s)  YES  NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S):	Longitude (E):
Not applicable	Not applicable

If any of the answers to the above are "YES" or "unsure", specialist input may be requested by the Department

### 5.1 Wetland delineation

Was a specialist consulted to assist with completing this section  YES  NO

If yes complete specialist details

Name of the specialist:	Dr Andries Gouws		
Qualification(s) of the specialist:	Soil Scientist		
Postal address:	PO Box 26275, Monument Park		
Postal code:	0105		
Telephone:	012 346-5307	Cell:	082 807-6717
E-mail:	Index@iafrica.com	Fax:	086 644-1160

Are any further specialist studies recommended by the specialist?  YES  NO

If YES, specify: Not applicable

If YES, is such a report(s) attached?  YES  NO

Signature of specialist:  Date: 28 May 2019

**Extract from the Wetland and soil assessment**

### 5.1.1 Legislation

#### NATIONAL WATER ACT, 1998 – SECTION 21

The National Water Act (Act) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a freshwater resource unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Sections 21 (c) & (i).

In accordance with GN 509 of 2016, a regulated area of a watercourse for Section 21(c) and 21(i) of the NWA, 1998 is defined as:

- the outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or
- a 500 m buffer from the delineated boundary (extent) of any wetland or pan (regulated area)

This notice should be read together with the Risk Assessment provisions in the General Authorisation Notice in Relation to Section 21.

#### THE NATIONAL WATER ACT - WETLANDS

In the National Water Act, a wetland is described as ‘land which is transitional between terrestrial and aquatic systems where the water table is at or near the surface, or the land that is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.’

Riparian zones are 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 areas.”

According to DWS (2005), Wetlands must have one or more of the following attributes:

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation.
- The presence, at least occasionally, of water loving plants (hydrophytes).
- A high watertable that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50cm of the soil.

The following is quoted from the Department of Water Affairs: Wetland delineation guidelines (2005), and is a description of hydromorphic soils:

*“A hydromorphic soil displays unique characteristics resulting from its prolonged and repeated saturation. Once a soil becomes saturated for an extended time, roots and microorganisms gradually consume the oxygen present in pore spaces in the soil. In an unsaturated soil, oxygen consumed in this way would be replenished by diffusion from the air at the soil surface. However, since oxygen diffuses 10 000 times more slowly through water than through air, the process of replenishing depleted soil oxygen in a saturated soil is significantly slower. Thus, once the oxygen in a saturated soil has been depleted, the soil effectively remains anaerobic. These anaerobic conditions make wetlands highly efficient in removing many pollutants from water, since the chemical mechanisms by which this is done need to take place in the absence of oxygen.*”

Prolonged anaerobic soil conditions result in a change in the chemical characteristics of the soil. Certain soil components, such as iron and manganese, which are insoluble under aerobic conditions, become soluble when the soil becomes anaerobic, and can thus be leached out of the soil profile.

Iron is one of the most abundant elements in soils, and is responsible for the red and brown colours of many soils. Once most of the iron has been dissolved out of a soil as a result of prolonged anaerobic conditions, the soil matrix is left a greyish, greenish or bluish colour, and is said to be gleyed.

A fluctuating water table, common in wetlands that are seasonally or temporarily saturated, results in alternation between aerobic and anaerobic conditions in the soil. Lowering of the water table results in a switch from anaerobic to aerobic soil conditions, causing dissolved iron to return to an insoluble state and be deposited in the form of patches, or mottles, in the soil. Recurrence of this cycle of wetting and drying over many decades concentrates these bright, insoluble iron compounds”.

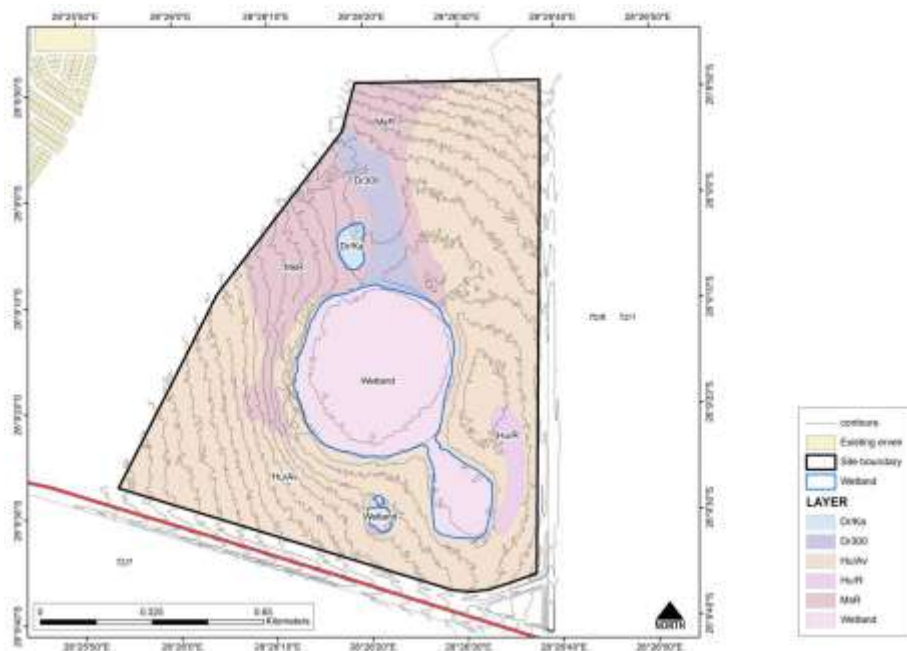
## NEMA - BUFFER

In terms of NEMA’s EIA Regulations and the National Water Act, any development within the 1:50 year floodline and 32m from the stream margin will trigger a water use licence as well as environmental authorisation.

### 5.1.2 Soil analysis

Observations were made through soil auger and probe. The underlying rock is dolomite, sandstone, tillite or quartzite and the soil is generally deep reddish and dark brown coloured with a clay loam texture.

The predominant soil found on the farm consists is Avalon form soils of different depths, ranging from 200mm to 800mm; which is an orthic, a-pedal topsoil, overlying yellow-brown a-pedal structured granular subsoil with some mottling, on soft plintite. The clay content varies between 18 to 25 % clay in the top soil and becomes slightly higher in clay content deeper in the subsoil.



Rocky outcrops occur in isolated areas, with shallow rocky soils surrounding the wet areas. In areas where rocks predominate have very little soil and was classified as Mispah. These are all yellow-brown in colour. Some rocky areas contain hard plintite, while others are predominantly soft plintite on the surface.

The entire area is covered in hydromorphic soils indicating seasonal wetness. The fluctuating water table caused plintite to form. The exceptions are areas with clearly defined pans with water and hard plintite verges. These areas are defined as wetland and are linked by wet areas to the stream on the northern boundary of the property.

Soils found in the wet areas are called Katspruit and may be as deep as 400mm before it becomes gleyed. It is grey brown in colour and more clay is found in the upper layers of some 30 to 40%.

### 5.1.3 Vegetation

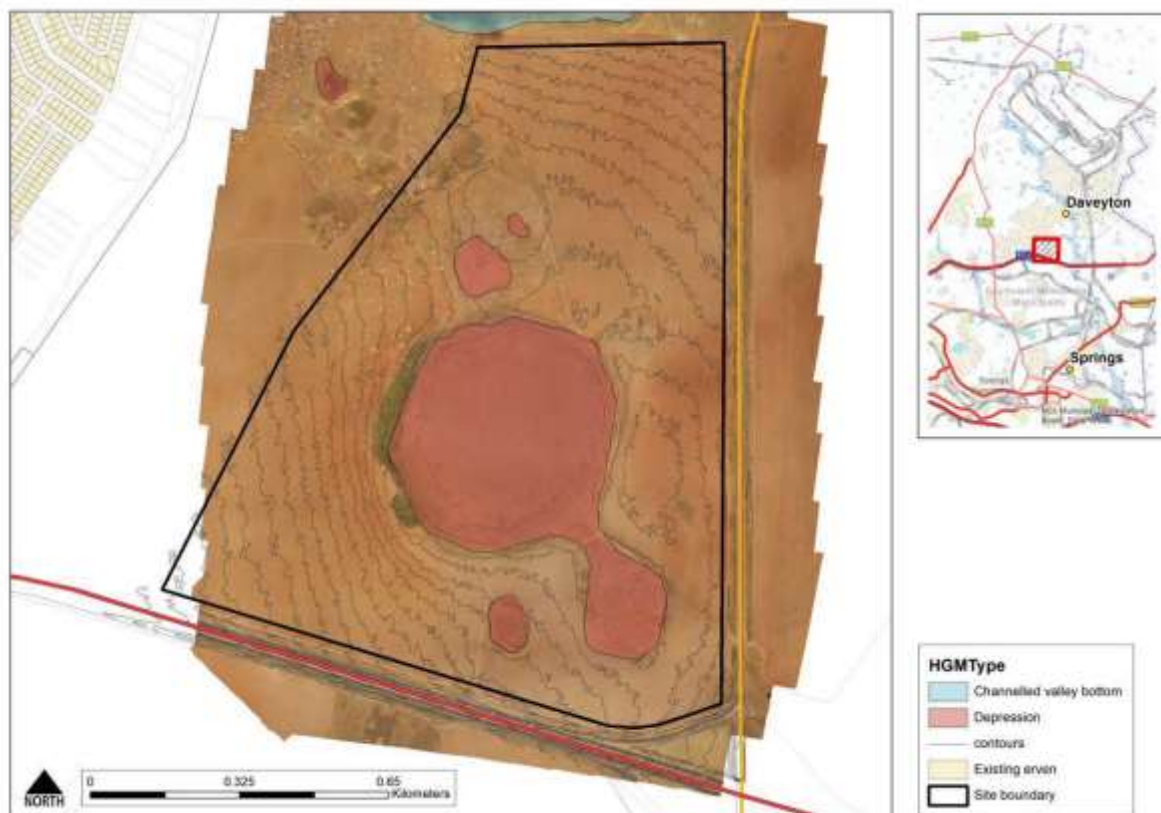
The vast majority of the area has been transformed and consists of cultivated areas or old quarries. Some cultivation has taken place within the areas delineated as wetland.

Dominant species that were found in the areas with shallow soil are typical grassland grasses such as *Cymbopogon pospischilii*, *Eragrostis curvula* and *Tristachya leucothri*.

The dominant wetland species found in the pan is *Phragmites australis* and *Typha capensis*; with a large number of other wetland species including *Imperata cylindrica*, *Paspalum urvillei*, *Paspalum dilatatum*, *Andropogon appendicularis*, *Leersia hexandra*, *Miscanthus capensis*, *Andropogon eucomus*, *Aristida congesta*, *Eragrostis gummiflua*, *Eragrostis plana*, *Hyparrhenia hirta*, *Schoenoplectus corymbosus*, and various *Cyperus species*. The vegetation is typical of a dry pan with seasonal inundation during wet spells.

### 5.1.4 Delineation of wetlands

Katspruit soils are permanently saturated and classified as wetland. The Avalon and Mispah soils are dry and used as boundary between the wetland and dryland conditions.



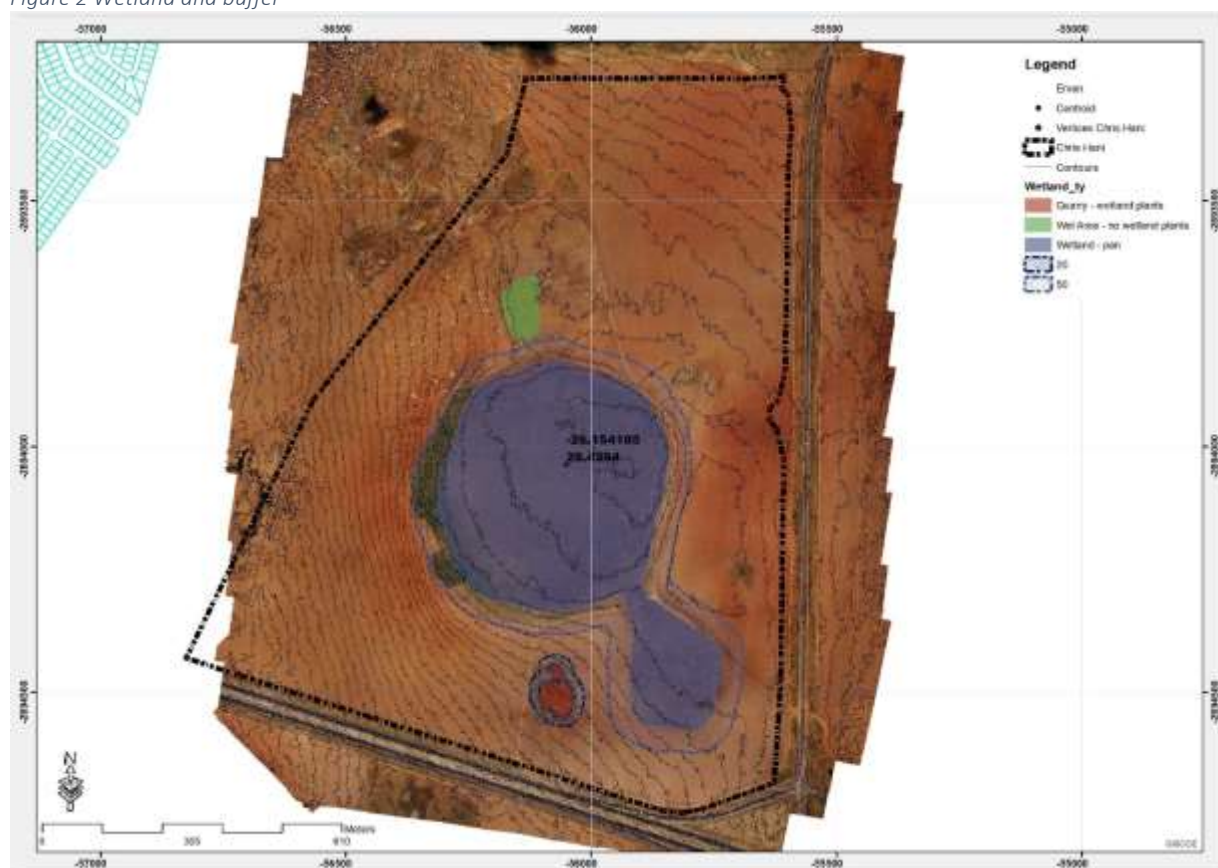
### 5.1.5 Buffer zone

In terms of legislation, wetlands and riparian zones are defined in the Water Act as a water resource and any activities that are contemplated that could affect the wetlands requires authorisation (Section 21 of the National Water Act of 1998).

GDARD, in the guidelines for biodiversity assessments required that wetland be indicated as sensitive habitats. In addition, GDARD also requires that an additional 30m inside the urban edge, or 50m outside the urban edge, beyond the wetland boundaries should be reserved as a buffer zone and regarded as sensitive. A buffer of 50

metres is required around pans. The buffer is presumed to protect the wetland and/or the biodiversity associated with the wetland.

Figure 2 Wetland and buffer



## 6 Agriculture potential

Does the site have high potential agriculture as contemplated in the Gauteng Agricultural Potential Atlas (GAPA 3)?

YES	<del>NO</del>
-----	---------------

GAPA 3 indicates that a portion of the land is High Potential whilst the remaining is moderate potential. The soil survey discussed above, confirms this.

### 6.1 Legislation

The Ekurhuleni EMDF discusses the requirements of Agricultural specialist studies. A summary is as follows:

*The Gauteng policy on the protection of high potential agricultural land (2006) defines high potential agricultural land as "Having the soil and terrain quality, growing season and available moisture supply needed to produce sustained high yields of crops economically when treated and managed according to best possible farming practices". Applying this definition, a land capability mapping study was completed during 2006 for Gauteng Province with the objective to identify and protect areas of high agricultural potential. The result of this study was subsequently classified and grouped into the following 5 classes:*

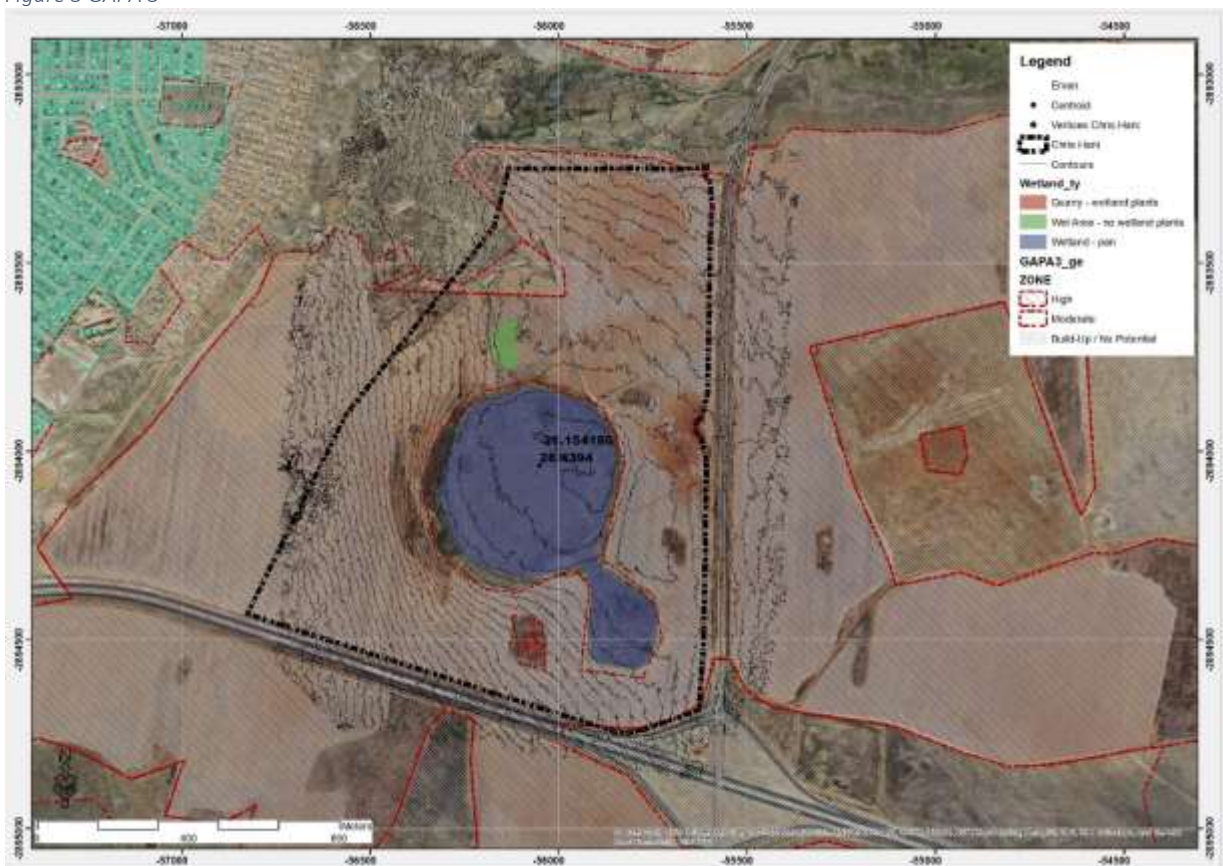
1. *Agricultural hubs: High potential agricultural land that resides outside the urban edge. Seven hubs have been identified in the Gauteng Province.*

2. *Important agricultural sites: All land identified as high agricultural potential land and located outside the urban edge but not within an identified Agricultural hub. A complete agricultural specialist study is required for any proposed development on these areas.*
3. *Incorporated within the urban edge: All land identified and classified as high potential agricultural land but incorporated completely within the boundaries of the urban edge will not be regarded as viable land for future agricultural development.*
4. *Overlapping the urban edge: High potential agricultural land that is located in close proximity and /or overlapping the urban edge boundary is regarded as agricultural land that could be utilized for agricultural production purposes. A complete agricultural specialist study is required for any proposed development on these areas.*
5. *Protected area: High potential agricultural land within protected areas will not be used for agricultural purposes.*

Where a provincial department decides to approve an application (e.g. Housing) which does not comply with the criteria, then that department has to write a memorandum and draft recommendation and submit this for comment to all relevant provincial departments and the EMM before making a final decision.

The subject property falls in its entirety within the Urban Edge, and per the definitions above, is exempt from specialist agricultural assessment. However, an agricultural potential scan was undertaken; of which a summary is discussed below.

Figure 3 GAPA 3



## 6.2 Extract from the Agricultural potential scan

### 6.2.1 Soil

Observations were made through soil auger and probe. The underlying rock is sandstone, tillite or quartzite. The soil is generally moderately deep yellowish, reddish and dark brown coloured with a sandy, clay loam texture. The dominant soil found on the farm is Avalon.



Figure 4 Soil



Av800	Deep dark brown sandy topsoil that overlies yellowish brown subsoil. The deeper subsoil is soft plinthite, with an abundance of brown nodules.
Av600	Moderately deep dark brown sandy topsoil that overlies yellowish brown subsoil. The deeper subsoil is soft plinthite, with an abundance of brown nodules.
MsR and Hu/R	Shallow and rocky soils that has severe mechanical limitation on cultivation.
Dr/Ka	The soil consists of orthic topsoil on hard plinthite. Soil depth shallower than 300 mm. The soil is greyish brown with a texture of clay loam (18 - 24% clay) and has a moderately developed blocky structure. This subsoil is gleyed. Course fragments are abundant and consists of hard ferricrete nodules, that surfaces on large areas.
Dr300	Classified as Dresden and Katspruit The soil consists of orthic topsoil on hard plinthite. It is not arable and should remain under veld. Soil depth shallower than 300 mm. The soil is greyish brown with a texture of clay loam (18 - 24% clay) and has a moderately developed blocky structure. Course fragments are abundant and consists of hard ferricrete nodules, that surfaces on large areas.
Wetland / Excavations	Pans and excavations. The soils are shallow and waterlogged.

### 6.2.2 Agricultural potential

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Classification involves consideration of:

- Difficulties in land use owing to physical land characteristics,
- The risks of land damage from erosion and other causes; and
- Climate.

The classic eight-class land capability system (Klingebiel & Montgomery, 1961) was adapted for use with Agriculture Geographic Information System (AGIS) in South Africa. Land Capability is determined by the collective effects of soil, terrain and climate features and shows the most intensive long-term use of land for rain-fed agriculture. At the same time, it indicates the permanent limitations associated with the different land-use classes.

- Class ii (high potential land) is deeper than 800mm and is now cultivated.
- Class iii (Moderate potential land) has a depth on 600mm.
- Class iv - vi are non-arable land and was classified as Mispah, shallow Hutton and Dresden.
- Class vii is the pan and the excavation. These are not arable or suitable for grazing.

Figure 5 Land use capability



### 6.2.3 Conclusions

- The north-western portion was invaded by informal settlers, but they have since been removed. The area is now vacant but not no longer arable because of the pits dug for latrines.
- Most of the arable land consists of moderately deep Avalon, Clovelly and Hutton soils that vary in depth between 500mm and 800mm.
- Rocky outcrops and excavated land are found in the northern portions.

There is severe pressure for housing land in this specific area, as is testament by land invasions that have already taken place in the north-western part of the property. Coupled with large unemployment and poverty in the Chris Hani Informal settlement, crop production is no longer a viable proposition.

## 7 Groundcover

To be noted that the location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Indicate the types of groundcover present on the site and include the estimated percentage found on site

Natural veld - good condition % = 20	Natural veld with scattered aliens % =0	Natural veld with heavy alien infestation % =0	Veld dominated by alien species % =0	Landscaped (vegetation) % =0
Sport field % =0	Cultivated land % =80	Paved surface (hard landscaping) % =0	Building or other structure % =0	Bare soil % =0

**Please note:** The Department may request specialist input/studies depending on the nature of the groundcover and potential impact(s) of the proposed activity/ies.

Are there any rare or endangered flora or fauna species (including red list species) present on the site

<del>YES</del>	NO
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If YES, specify and explain:

Not applicable

Are there any rare or endangered flora or fauna species (including red list species) present within a 200m (if within urban area as defined in the Regulations) or within 600m (if outside the urban area as defined in the Regulations) radius of the site.

YES	NO
-----	----

If YES, specify and explain:

Not applicable

Are there any special or sensitive habitats or other natural features present on the site?

YES	NO
-----	----

If YES, specify and explain:

There is a pan on the property. The wetland assessment was done to delineate the boundary of the pan and the buffer.

Was a specialist consulted to assist with completing this section

YES	<del>NO</del>
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If yes complete specialist details

Name of the specialist:

Dr JA Gouws

Qualification(s) of the specialist:

Soil Scientist

Postal address:

PO Box 26275, Monument Park

Postal code:

0105

Telephone:

012 346-5307

Cell:

012 346-5307

E-mail:

Index@iafrica.com

Fax

086 644-1160

Are any further specialist studies recommended by the specialist?

YES	NO
-----	----

If YES, specify:

Not applicable

If YES, is such a report(s) attached?

YES	NO
-----	----

If YES list the specialist reports attached below

Not applicable

Signature of specialist:



Date: 28 May 2019

## 8 Land use character of surrounding area

Using the associated number of the relevant current land use or prominent feature from the table below, fill in the position of these land-uses in the vacant blocks below which represent a 500m radius around the site

1. Vacant land	2. River, stream, wetland	3. Nature conservation area	4. Public open space	5. Koppie or ridge
6. Dam or reservoir	7. Agriculture	8. Low density residential	9. Medium to high density residential	10. Informal residential
11. Old age home	12. Retail	13. Offices	14. Commercial & warehousing	15. Light industrial
16. Heavy industrial <sup>AN</sup>	17. Hospitality facility	18. Church	19. Education facilities	20. Sport facilities
21. Golf course/polo fields	22. Airport <sup>N</sup>	23. Train station or shunting yard <sup>N</sup>	24. Railway line <sup>N</sup>	25. Major road (4 lanes or more) <sup>N</sup>
26. Sewage treatment plant <sup>A</sup>	27. Landfill or waste treatment site <sup>A</sup>	28. Historical building	29. Graveyard	30. Archaeological site
31. Open cast mine	32. Underground mine	33. Spoil heap or slimes dam <sup>A</sup>	34. Small Holdings	
Other land uses (describe):	35. Borrow area left unrehabilitated			

**NOTE:** Each block represents an area of 250m X 250m, if your proposed development is larger than this please use the appropriate number and orientation of hashed blocks

NORTH						
	10	9	9	9	1	
WEST	10	35	2	2	2	
	10	7	SITE	7	7	EAST
	7	25	25	25	25	
	7	7	7	7	7	
	SOUTH					

**Note:** More than one (1) Land-use may be indicated in a block

**Please note:** The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed activity/ies. Specialist reports that look at health & air quality and noise impacts may be required for any feature above and in particular those features marked with an "A" and with an "N" respectively.

Have specialist reports been attached

YES	NO
-----	----

If yes indicate the type of reports below

Wetland delineation assessment
Agricultural potential

## 9 Socio-economic context

Describe the existing social and economic characteristics of the area and the community condition as baseline information to assess the potential social, economic and community impacts.

The site is surrounded by housing:

- To the west: Daveyton Township.
- To the north and northeast: Daveyton, Etwatwa/Holfontein Townships, informal settlement directly north of the site.
- To the east: Laris Street (proposed K173), vacant land and the Blesbokspruit wetland.
- To the south and southwest: N12 freeway, vacant old mining land.
- The north-western portion of the property was recently invaded but the informal settlement has now been removed.

Ekurhuleni's current housing backlog is estimated to be in the region of 200 000 units and is still growing. This development will be instrumental in addressing this housing shortage.

The site and the immediate surrounding areas are in the process of change and transition, from their historic agricultural use to mixed forms of urban development and infrastructure. The area has been earmarked by the Ekurhuleni Metropolitan Council as a mixed-use development corridor.

## 10 Cultural/Historical Features

Please be advised that if section 38 of the National Heritage Resources Act 25 of 1999 is applicable to your proposal or alternatives, then you are requested to furnish this Department with written comment from the South African Heritage Resource Agency (SAHRA) – Attach comment in appropriate annexure.

Are there any signs of culturally (aesthetic, social, spiritual, environmental) or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close (within 20m) to the site?

YES	NO
-----	----

If YES, explain:

There are no cultural resources in the development area as the development footprint is cultivated.

If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist if one was already appointed:

No specialist was appointed as it is not applicable for this application.

Will any building or structure older than 60 years be affected in any way?  
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

YES	NO
YES	NO

If yes, please attached the comments from SAHRA in the appropriate Appendix. Not applicable.

## 11 Need and Desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

Ekurhuleni's current housing backlog is estimated to be in the region of 200 000 units and is still growing. The obvious need and huge demand for formal housing is an indisputable fact. This development will be instrumental in addressing this housing demand.

The proposed commercial node at the main entrance to the township from Laris Road is aimed at serving not only the township, but the wider sub-region. The location of this node abutting one of the main entrance routes into Etwata/Holfontein contributes to its viability as a potential sub-regional node. A flexible zoning is required for this node as the aim is to develop a mixed-use area, including a substantial high-density housing component. In addition, the development is next to/ or close to existing residential areas with existing community facilities and urban amenities such as community centres and clinics.

The site abuts a major arterial route (Laris Street/K173) at its intersection with the N12 freeway and is therefore very accessible in terms of linkages with the wider sub-region. Laris Street is one of the main entrances into Etwatwa/Holfontein and as such it is one of the major public transport routes in the area. Furthermore, the site is located only approximately 1 km east of the closest commuter train station, which is therefore relatively easily accessible by foot.

With the exception of the pans, the site is not environmentally sensitive – the pans/wetlands will be excluded from the development and are earmarked as public open space.

# SECTION C: PUBLIC PARTICIPATION (SECTION 41)

Note: The Environmental Assessment Practitioner must conduct public participation process in accordance with the requirement of the EIA Regulations, 2014.

## 1 Advertisement

The Environmental Assessment Practitioner must follow any relevant guidelines adopted by the competent authority in respect of public participation and must at least –

- a. Fix a site notice at a conspicuous place, on the boundary of a property where it is intended to undertake the activity which states that an application will be submitted to the competent authority in terms of these regulations and which provides information on the proposed nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations on the application may be made;
- b. inform landowners and occupiers of adjacent land of the applicant's intention to submit an application to the competent authority;
- c. inform landowners and occupiers of land within 100 metres of the boundary of the property where it is proposed to undertake the activity and whom may be directly affected by the proposed activity of the applicant's intention to submit an application to the competent authority;
- d. inform the ward councillor and any organisation that represents the community in the area of the applicant's intention to submit an application to the competent authority;
- e. inform the municipality which has jurisdiction over the area in which the proposed activity will be undertaken of the applicant's intention to submit an application to the competent authority; and
- f. inform any organ of state that may have jurisdiction over any aspect of the activity of the applicant's intention to submit an application to the competent authority; and
- g. place an advertisement in one local newspaper and any Gazette that is published specifically for the purpose of providing notice to the public of applications made in terms of these regulations.

### 1.1 Notices

A site notice was placed along Laris Street which site notice stated the activities for which application was made for authorisation in terms of these regulations; information on the proposed nature of the activity; a locality plan indicating the extent of the activity, contact details of where further information of the proposed activity can be obtained; and how comments on the application may be made.

An advertisement to notify the public of the submission of the Mining Right Application (MRA) as well as the process to be followed; and requesting I&APs to register their comments, will be placed in the Ekurhuleni News Newspaper, in accordance with regulation 41(2)(c) and (d) of the EIA Regulations of 2014.

### 1.2 I&APs Database

An IAP's database will be compiled that will include those parties listed in the NEMA Regulations and guidelines. The database will be enlarged to also include other parties identified as a result of the newspaper and on-site notices. This database will also include landowners and occupiers of adjacent land; ward councillor and any organisation that represents the community in the area; the municipality which has jurisdiction over the area; any organ of state that may have jurisdiction over any aspect of the activity.

### 1.3 I&APs Consultation

This will consist of one-on-one consultation. A public meeting is not anticipated, but will be held if major concerns are raised. A draft Basic Assessment will be sent to all parties listed in the IAP database.

A draft Basic Assessment Report will be made available to all registered I&APs for a period of 30 days. The comments and concerns will then be incorporated into the final Basic Assessment Report; which will then be submitted to the competent authority for consideration.

## 2 Local Authority participation

Local authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least thirty (30) calendar days before the submission of the application to the competent authority.

Was the draft report submitted to the local authority for comment?

YES	NO
-----	----

If yes, has any comments been received from the local authority?

YES	NO
-----	----

If "YES", briefly describe the comment below (also attach any correspondence to and from the local authority to this application):

The local authority (Ekurhuleni) is party to this application. There is an agreement that Greenfields Gardens would undertake the town planning and obtain the environmental authorisation and make the land available to the Metro for development.

A copy of the Draft BAR was hand delivered to the Metro for review and comment. All comments will be incorporated into the final BAR.

If "NO" briefly explain why no comments have been received or why the report was not submitted if that is the case.

All comments will be incorporated into the final BAR.

## 3 Consultation with other stakeholders

Any stakeholder that has a direct interest in the activity, site or property, such as servitude holders and service providers, should be informed of the application at least thirty (30) calendar days before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?

YES	NO
-----	----

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

A copy of the Draft BAR is available to all interested parties at the HP Makoka Library at 8220 Eiselen Street, Chris Hani, Daveyton. All comments will be incorporated into the final BAR.

If "NO" briefly explain why no comments have been received

Not applicable.



## 4 General Public Participation requirements

*The Environmental Assessment Practitioner must ensure that the public participation process is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees and ratepayers associations. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was flawed.*

*The EAP must record all comments and respond to each comment of the public / interested and affected party before the application report is submitted. The comments and responses must be captured in a Comments and Responses Report as prescribed in the regulations and be attached to this application.*

## 5 Appendices for Public Participation

All public participation information is to be attached in the appropriate Appendix. The information in this Appendix is to be ordered as detailed below:

Appendix 1 – Proof of site notice

Appendix 2 – Written notices issued as required in terms of the regulations

Appendix 3 – Proof of newspaper advertisements

Appendix 4 – Communications to and from interested and affected parties

Appendix 5 – Minutes of any public and/or stakeholder meetings

Appendix 6 - Comments and Responses Report

Appendix 7 –Comments from I&APs on Basic Assessment (BA) Report

Appendix 8 –Comments from I&APs on amendments to the BA Report

Appendix 9 – Copy of the register of I&APs

# SECTION D: RESOURCE USE AND PROCESS DETAILS

**Note:** Section D is to be completed for the proposal and alternative(s) (if necessary)

## Instructions for completion of Section D for alternatives

1. For each alternative under investigation, where such alternatives will have different resource and process details (e.g. technology alternative), the entire Section D needs to be completed
2. Each alternative needs to be clearly indicated in the box below
3. Attach the above documents in a chronological order

Section D has been duplicated for alternatives  Times  
(complete only when appropriate)

Section D Alternative No. 1  (complete only when appropriate for above)

## 1 Waste, effluent, and emission management

### 1.1 Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES	<del>NO</del>
-----	---------------

If yes, what estimated quantity will be produced per month?

Uncertain
-----------

How will the construction solid waste be disposed of (describe)?

Construction waste will be managed through the EMP and through the conditions of contract of contractors appointed for the installation of services.

Where will the construction solid waste be disposed of (describe)?

Solid construction waste will be disposed of at approved landfill sites. The closest is the Enviroserv Holfontein Landfill and the Rietfontein Landfill at Springs.

Will the activity produce solid waste during its operational phase?

YES	<del>NO</del>
-----	---------------

If yes, what estimated quantity will be produced per month?

Uncertain
-----------

How will the solid waste be disposed of (describe)?

The waste produced during the operational phase will be domestic waste. The removal of this waste will be the responsibility of the Metro and will be funded by rates and taxes due to the Metro.

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity?

YES	<del>NO</del>
-----	---------------

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

Solid waste will feed into the be disposed of into a municipal waste stream.

**Note:** If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?

YES	<del>NO</del>
-----	---------------

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?

YES	NO
-----	----

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

Not applicable

### 1.2 Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

YES	NO
-----	----

If yes, what estimated quantity will be produced per month?

Not applicable	
----------------	--

If yes, has the municipality confirmed that sufficient capacity exists for treating / disposing of the liquid effluent to be generated by this activity(ies)?

YES	NO
-----	----

Will the activity produce any effluent that will be treated and/or disposed of onsite?

Yes	NO
-----	----

If yes, what estimated quantity will be produced per month?

Not applicable	
----------------	--

If yes describe the nature of the effluent and how it will be disposed.

Not applicable

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA

Will the activity produce effluent that will be treated and/or disposed of at another facility?

YES	NO
-----	----

If yes, provide the particulars of the facility:

Facility name:

Not applicable

Contact person:

Postal address:

Postal code:

Telephone:

Cell:

E-mail:

Fax:

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Not applicable

### 1.3 Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?

YES	NO
-----	----

If yes, what estimated quantity will be produced per month?

33 000 kilo-litres per month	
------------------------------	--

If yes, has the municipality confirmed that sufficient capacity exists for treating / disposing of the domestic effluent to be generated by this activity(ies)?

YES	NO
-----	----

Will the activity produce any effluent that will be treated and/or disposed of on-site?

YES	NO
-----	----

If yes describe how it will be treated and disposed of.

There is a 500mm diameter sewer pipe that traverses from west to east just north of the development, linking to the main outfall sewer (1200m diameter) running south, west of the Blesbok Spruit. The impact of the proposed development on the existing regional water and sewer supply systems is addressed by the appointed Ekurhuleni master planners, GLS Consulting Engineers

## 1.4 Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

YES	NO

If yes, is it controlled by any legislation of any sphere of government?

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

Not applicable

## 2 Water Use

Indicate the source(s) of water that will be used for the activity

Municipal	Directly from water board	groundwater	river, stream, dam or lake	other	the activity will not use water
X					

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:

Not applicable

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix

Does the activity require a water use permit from the Department of Water Affairs?

YES NO

If yes, list the permits required

Not applicable

If yes, have you applied for the water use permit(s)?

YES NO

If yes, have you received approval(s)? (attached in appropriate appendix)

## 3 Power Supply

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

The power will be supplied by the Ekurhuleni Metro. The proposed township will require  $\pm 7,8$ MVA. No spare capacity is currently available on the bulk network. Spare capacity will be created by the upgrading of Daveyton substation.

If power supply is not available, where will power be sourced from?

Not applicable

## 4 Energy Efficiency

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Energy efficient street lighting, where possible, will be used.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

No Alternative energy sources have been incorporated into the design at this stage

# SECTION E: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts as well as the impacts of not implementing the activity (Section 24(4)(b)(i)).

## 1 Issues raised by interested and affected parties

Summarise the issues raised by interested and affected parties.

Issues raised as a result of this Draft BAR will be included in the Final BAR.

Summary of response from the practitioner to the issues raised by the interested and affected parties (including the manner in which the public comments are incorporated or why they were not included) (A full response must be provided in the Comments and Response Report that must be attached to this report):

Response will be addressed in the Final BAR.

## 2 Impacts that may result from the construction and the operational phase

Briefly describe the methodology utilised in the rating of significance of impacts.

To ensure uniformity, the assessment of potential impacts will be addressed in a standard manner so that a wide range of impacts is comparable. For this reason, a clearly defined rating scale will be utilised to assess the impacts. Each impact identified will be assessed in terms of, **Nature, Extent, Duration, Intensity, probability, mitigation, enhancement (for a positive impact) and reversibility**. To enable a scientific approach to the determination of the impact significance (importance), a numerical value will be linked to each rating scale. The sum of the numerical values will define the significance by the use of formulae. More details on the scoring system used in this impact rating procedure are provided in Appendix I.

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the construction phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

### Preferred Proposal

Potential impacts:	Significance rating of impacts	Proposed mitigation:	Significance rating of impacts after mitigation:
Traffic – noise and disturbance during construction and operational phases	High	There is no doubt that there will be additional noise and disturbance in the immediate adjacent areas surrounding the site during the construction phase. There are residential areas 500 metres to the west of the site. However, most construction related traffic will enter from Laris Street.  Mitigation includes:	Moderate

Potential impacts:	Significance rating of impacts	Proposed mitigation:	Significance rating of impacts after mitigation:
		<ul style="list-style-type: none"> <li>➤ Schedule all deliveries during normal working hours.</li> <li>➤ No work is to be undertaken on Sunday's and normal working hours between 7am to 5pm must be adhered to.</li> <li>➤ Trucks and delivery vehicles must strictly obey speed limits within a 400m radius of the site to not cause additional noise from driving at high speed.</li> </ul>	
Petrol, diesel and oil spills from construction vehicles - caused by potential inadequate maintenance	High	<ul style="list-style-type: none"> <li>➤ Fence the pan area and prohibit any access thereto.</li> <li>➤ Regularly inspect and check all vehicles for leaks.</li> <li>➤ Only minor maintenance may be done on the site; all major maintenance must be done at the construction contractor's workshop.</li> <li>➤ Temporary fuel storage tanks at contractor laydown yards must be located on a hardened surface (concrete) to contain any spillages, and be within a bunded area.</li> <li>➤ Fuel and oil "spill kits" to be visible and close to the fuel storage tanks at all times</li> </ul>	Moderate
Impact on or loss to any potential Cultural, Historic and Archaeological Features	Not applicable	<ul style="list-style-type: none"> <li>➤ There are no cultural or historical features on this site.</li> </ul>	Not applicable
General noise disturbance – construction and operational noise	High	<ul style="list-style-type: none"> <li>➤ Schedule all deliveries during normal working hours.</li> <li>➤ No construction work is to be undertaken on Sunday's and normal working hours between 7am and 5pm.</li> </ul>	Moderate
Soils and geology - Changes to soil structure as a result of disturbance - Loss of topsoil due to erosion.	Moderate	<ul style="list-style-type: none"> <li>➤ All geological and structural engineering standards must be adhered to in accordance with the NHBRC and Regulations pertaining to the construction industry, as well as the requirements for temporary fuel tanks at contractor laydown yards.</li> <li>➤ During construction, erosion control measures must be put in place and maintained; including berms and temporary retention ponds to prevent stormwater containing silt from entering the pan.</li> </ul>	Low
Groundwater – quantity and quality	Low	<ul style="list-style-type: none"> <li>➤ There is no major impact on groundwater quantity or quality expected.</li> <li>➤ No water will be drawn from groundwater sources for use by the development (during either construction or operation phases)</li> </ul>	Low

Potential impacts:	Significance rating of impacts	Proposed mitigation:	Significance rating of impacts after mitigation:
Surface water – quantity and stormwater management	Moderate	<ul style="list-style-type: none"> <li>➤ During construction, erosion control measures must be put in place; including berms and temporary retention ponds to prevent stormwater containing silt from entering the pan. Retention ponds must be constructed to temporary contain stormwater and allow fines to settle before release of stormwater into the environment.</li> <li>➤ A stormwater management plan (SWMP) must be developed for the development and implemented.</li> <li>➤ The proposed attenuation ponds and the old quarry on the site will be the primary attenuation features on the property. Stormwater will be managed to sustain the functioning of the pan.</li> <li>➤ No water will be drawn from surface water for use by the development (during either construction or operation phases).</li> </ul>	Low
Air pollution due to dust and odours – construction and operational phases	Moderate	<ul style="list-style-type: none"> <li>➤ The only impact envisaged is dust from construction vehicles on site.</li> <li>➤ All roads on the construction site are to be kept moist to prevent excessive dust pollution at all times.</li> </ul>	
Impacts on safety and security. Danger from earthmoving equipment, labourers on site, localized crime.	Moderate	<ul style="list-style-type: none"> <li>➤ The developer is responsible to control access to the site and guard the site to reduce theft and vandalism.</li> <li>➤ No construction personnel must be allowed to live on the site.</li> </ul>	Moderate
Waste management – general disposal of waste (including sewerage)	Moderate	<ul style="list-style-type: none"> <li>➤ All waste must be disposed of by the municipality, as agreed by the service agreements and bulk service contributions.</li> <li>➤ General waste generated by the development must be disposed of at a registered landfill site as agreed to by the Metro.</li> <li>➤ Sewerage must connect into the 500mm diameter sewer pipe that traverses from west to east north of the development, linking to the main outfall sewer running west of the Blesbok Spruit. A Water Use License (WUL) must be applied for with the Department of Water and Sanitation.</li> </ul>	Low
Visual - Decrease in aesthetic appeal of the area, and increase in visual obtrusiveness	Low	<ul style="list-style-type: none"> <li>➤ There is no doubt that the visual nature of the site will completely change, mostly due to vacant land now becoming developed.</li> <li>➤ No mitigation is possible</li> </ul>	Low

Potential impacts:	Significance rating of impacts	Proposed mitigation:	Significance rating of impacts after mitigation:
Fire - Destruction of veld and properties due to fire emanating from the construction site	Moderate	<ul style="list-style-type: none"> <li>➤ Firefighting equipment must be available on site at all times, as per the prescribed standards for all construction sites.</li> <li>➤ Any fire started intentionally or unintentionally from the site during construction will be the responsibility of the contractors and site developers.</li> <li>➤ Fuel and oil “spill kits” to be visible and close to the temporary fuel tanks in contractor’s laydown yard at all times.</li> <li>➤ The site was cultivated, with the exception of the pan. Access to the pan must be prevented and accidental fired extinguished immediately.</li> </ul>	Low
Service (impact to existing services – mainly during operational phase).	Low	<ul style="list-style-type: none"> <li>➤ The various upgrades and connections to service infrastructure in and around the site must be implemented before the construction of houses and other buildings can commence.</li> <li>➤ All service agreements and bulk service contributions are to be paid before any connections are made as per normal municipal agreements and servicing standards.</li> </ul>	Low
<p>Economic impact.</p> <p>The overall development will be a large job creator during both construction and operational phases</p> <p>This phase also includes schools and a church which are major social nodes and public amenities.</p>	HIGH (Positive)	<ul style="list-style-type: none"> <li>➤ Jobs will be created during the construction and operation phase of the development – for formal skilled jobs and informal jobs.</li> </ul> <p>Additional actions to enhance the positive socio-economic impact are as follows:</p> <ul style="list-style-type: none"> <li>➤ Utilise local labour - The labour force should be recruited from the local communities, wherever possible; including skilled and semi- skilled positions. The contractors must indicate which recruitment will take place through formal procurement procedures and which will be implemented in conjunction with the local community.</li> <li>➤ Training and education - In order to facilitate training and education, it is recommended that the contractors, where possible, recruit its employees from previously disadvantaged groups and from surrounding low income areas; and if inexperienced, initiate mentorship processes.</li> <li>➤ Labour intensive construction methods - Where appropriate, labour intensive construction methods should be utilised to maximize the potential number of employment opportunities.</li> </ul>	High



Potential impacts:	Significance rating of impacts	Proposed mitigation:	Significance rating of impacts after mitigation:
Increased soil erosion where the sewer line crosses the water course	Moderate	<ul style="list-style-type: none"> <li>➤ Undertake construction activities in the dry season where possible.</li> <li>➤ Limit the extent of the construction servitude to as small an area as possible.</li> <li>➤ Excavated soils should be stockpiled on the upslope side of the excavated trench / foundation footing so that eroded sediments are washed back into the excavation and not into the water course.</li> <li>➤ Closure and rehabilitation of the sewer pipeline servitude should commence as soon as the pipe is installed.</li> <li>➤ Soil should be landscaped to the natural landscape profile with care taken to ensure that no preferential flow paths or berms remain.</li> <li>➤ Silt traps, sand bags or silt fencing must be used to stop sediments from being transported to the wetland/ stream areas.</li> </ul>	Low
Disturbance of habitat (flora) and fauna – sewer line	Moderate	<ul style="list-style-type: none"> <li>➤ The construction servitude should be kept as small as possible.</li> <li>➤ Construction activities should take place during dry season, and in low flow times if possible.</li> <li>➤ Topsoil should be excavated and stockpiled separately from the underlying subsoil material, and not stockpiled in the river or any wet areas.</li> <li>➤ The disturbed area should be re-vegetated as soon as the construction work is completed.</li> <li>➤ Monitoring of the rehabilitated area should be undertaken to ensure no surface subsidence occurs along the pipeline route following backfilling and settling of soil.</li> <li>➤ Any rubble and waste materials must be removed from site as soon as possible, and under no circumstances dumped in the stream or in the 1:100-year floodline.</li> <li>➤ The alignment of the alternative route directly to the outfall sewer falls primarily in areas previously cultivated; which is not considered to have high biodiversity value.</li> </ul>	Moderate

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

1. Wetland delineation assessment
2. Agricultural potential assessment

## Alternative 1 – No-go alternative

Potential impacts:	Significance rating of impacts	Proposed mitigation:	Significance rating of impacts after mitigation:
Traffic – noise and disturbance.	Negligible	➤ If the no-go option is realized, the current status quo will remain.	Negligible
Petrol, diesel and oil spills	Negligible	➤ If the no-go option is realized, the current status quo will remain and there will be no further possibility of hydrocarbon spills	Negligible
Impact on or loss to any potential cultural, historic and archaeological features	Negligible	➤ If the no-go option is realized, the current status quo will remain.	Negligible
General noise disturbance	Moderate	➤ If the no-go option is realized, the current status quo will remain.	Moderate
Soils and geology - changes to soil structure as a result of disturbance - Loss of topsoil due to erosion	Moderate	➤ If the no-go option is realized, the current status quo will remain.	Moderate
Surface and groundwater pollution (quality)	Negligible	➤ If the no-go option is realized, the current status quo will remain.	Negligible
Groundwater - quantity	Negligible	➤ If the no-go option is realized, the current status quo will remain.	Negligible
Surface water – quantity and stormwater management	Moderate	➤ If the no-go option is realized, the current status quo will remain.	Moderate
Air pollution due to dust and odours	Moderate	➤ If the no-go option is realized, the current status quo will remain.	Moderate
Impacts on safety and security	Moderate	<ul style="list-style-type: none"> <li>➤ If the no-go option is realized, the current status quo will remain</li> <li>➤ No additional security forces will be brought into the area if the no-go alternative is realized</li> </ul>	Moderate
Waste management – general disposal of waste (including sewerage)	Not applicable	➤ If the no-go option is realized, the current status quo will remain.	Not applicable
Visual - Decrease in aesthetic appeal of the area, and increase in visual obtrusiveness	Not applicable	➤ If the no-go option is realized, the current status quo will remain.	Not applicable

Potential impacts:	Significance rating of impacts	Proposed mitigation:	Significance rating of impacts after mitigation:
Fire - Destruction of veld and properties due to fire	Moderate	<ul style="list-style-type: none"> <li>➤ If the no-go option is realized, the current status quo will remain.</li> <li>➤ The site will be subjected to annual burning to improve the grazing.</li> </ul>	Moderate
Vegetation (Flora) Loss of vegetation / biodiversity	Moderate	<ul style="list-style-type: none"> <li>➤ If the no-go option is realized, the current status quo will remain and no vegetation will be removed</li> </ul>	Moderate
Wildlife (fauna) - Disturbance to natural wildlife and/or loss of natural wildlife/ loss of habitat	Moderate	<ul style="list-style-type: none"> <li>➤ If the no-go option is realized, the current status quo will remain.</li> </ul>	Moderate
Services	Not applicable	<ul style="list-style-type: none"> <li>➤ If the no-go option is realized, the current status quo will remain.</li> </ul>	Not applicable
Economic and social impacts	Not applicable	<ul style="list-style-type: none"> <li>➤ For the no-go option, there will be no infrastructure or service development.</li> <li>➤ There will be continual pressure for development of housing in the area and the possibility of land invasions, similar to that which occurred in the past will remain.</li> <li>➤ The no- go alternative is not a preferred alternative.</li> </ul>	Not applicable

Describe any gaps in knowledge or assumptions made in the assessment of the environment and the impacts associated with the proposed development.

No gaps were identified

### 3 Impacts that may result from the decommissioning and closure phase

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Not applicable. This is a long-term residential development with no closure possible.

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

1. None

## 4 Impacts that may result from decommissioning and closure phase

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase for the various alternatives of the proposed development.

Not applicable. This is a long-term residential development with no closure possible.

## 5 Cumulative impacts

Describe potential impacts that, on their own may not be significant, but is significant when added to the impact of other activities or existing impacts in the environment. Substantiate response:

### Cumulative Impacts of the construction phase of the township

A total of single residential stands and higher density residential land and the whole range of urban amenities and community facilities, (shopping centre, schools, churches, clinics, parks/playgrounds, etc.) will be developed. During construction, the site will be totally transformed from its current state.

Potential impacts mainly relate to:

- Traffic – noise and disturbance
- Petrol, diesel and oil spills from vehicles caused by potential inadequate maintenance
- Soils and geology - Changes to soil structure as a result of disturbance - Loss of topsoil due to erosion
- Groundwater – quantity and quality
- Disturbance of habitat (flora) and fauna during the construction of the sewer line; and the functioning of the pan during construction
- Surface water – quantity and stormwater management from site
- Impacts on safety and security - danger from earthmoving equipment, labourers on site, localized crime
- Fire - Destruction of veld and property due to fire emanating from the construction site and from accidental or deliberate burning of the vegetation of the pan
- Economic impact in terms of job creation during construction

The cumulative impacts are indicated below:

Aspect	CUMULATIVE IMPACT OF THE CONSTRUCTION PHASE					
	Criteria Scoring					
	Probability (P)	Duration (D)	Scale(S)	Magnitude (m)	Significance score	SIGNIFICANCE DESCRIPTION
Positive Impact	5	1	1	2	20	Negligible
Negative Impact	2	3	1	2	10	Negligible
Score Calculation	Significance Score - (Duration, Scale, Magnitude) x Probability					

The cumulative impact of the development during the operational will be positive; providing mitigation measured are put in place.

### Cumulative Impacts – operational phase of township development

The residential development would have been completed; as well as a whole range of urban amenities and community facilities, (shopping centre, schools, churches, clinics, parks/playgrounds, etc.) constructed.

Potential impacts mainly relate to:

- Traffic – noise and disturbance
- Accidental petrol, diesel and oil spills from vehicles
- Disturbance of habitat (flora) and fauna and the functioning of the pan
- Surface water – quantity and stormwater management from site
- Fire - destruction of veld and property due to fire emanating from accidental or deliberate burning of the vegetation of the pan
- Economic impact in terms of rates and taxes during the operational phase
- Improvement of service delivery and provision of social and public amenities.

The cumulative impacts are indicated below:

Aspect	CUMULATIVE IMPACT OF THE OPERATIONAL PHASE					
	Criteria Scoring					
	Probability (P)	Duration (D)	Scale(S)	Magnitude (m)	Significance score	SIGNIFICANCE DESCRIPTION
Positive Impact	5	5	2	6	65	High
Negative Impact	1	3	2	6	11	Negligible
Score Calculation	Significance Score - (Duration, Scale, Magnitude) x Probability					

The cumulative impact of the development during the operational will be positive.

#### No-go alternative (compulsory)

The site was used for agricultural purposes; cultivation and the pan used as grazing by cattle. The no-go alternative will be to retain current land use practices. The sustainability of crop production, according to the agricultural potential study, is questionable due to possible theft and the possibility of informal settlers occupying the site again; if left undeveloped.

Potential impacts mainly relate to:

- Land will remain available for grazing by cattle. Some informal cultivated fields will remain. Further large-scale cultivation is unlikely
- Disturbance of habitat (flora) and fauna and the functioning of the pan due to grazing by cattle
- Destruction of veld and property due to fire emanating from accidental or deliberate burning of the vegetation of the pan
- Illegal occupation of the land by squatters due to the fact that the land is not utilised and due to a shortage of housing

The cumulative impacts are indicated below:

Aspect	CUMULATIVE IMPACT OF THE OPERATIONAL PHASE					
	Criteria Scoring					
	Probability (P)	Duration (D)	Scale(S)	Magnitude (m)	Significance score	SIGNIFICANCE DESCRIPTION
Positive Impact	2	5	1	1	14	Negligible
Negative Impact	4	5	1	1	28	Negligible
Score Calculation	Significance Score - (Duration, Scale, Magnitude) x Probability					

The cumulative impact of the development for the no-go alternative is negligible. Potential positive benefits will be lost.

## 6 Environmental impact statement

Taking the assessment of potential impacts into account, please provide an environmental impact statement that sums up the impact that the proposal and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

### Summary of predicted impacts during construction and the operational phase – The development of Chris Hani X4; and sewer line and connection.

Potential impacts:	Significance rating of impacts	Significance rating of impacts after mitigation:
Traffic – noise and disturbance, both during construction and during operational phase of proposed development	High	Moderate
Petrol, diesel and oil spills from construction vehicles - caused by potential inadequate maintenance	High	Moderate
Impact on or loss to any potential Cultural, Historic and Archaeological Features	Not applicable	Not applicable
General noise disturbance – construction and operational noise	High	Moderate
Soils and geology - Changes to soil structure as a result of disturbance - Loss of topsoil due to erosion.	Moderate	Low
Groundwater – quantity and quality	Low	Low
Surface water – quantity and stormwater management from site	Moderate	Low
Air pollution due to dust and odours – construction and operational phases	Moderate	
Impacts on safety and security. Danger from earthmoving equipment, laborers on site, localized crime.	Moderate	Moderate
Waste management – general disposal of waste (including sewerage)	Moderate	Low
Visual - Decrease in aesthetic appeal of the area, and increase in visual obtrusiveness	Low	Low
Fire - Destruction of veld and properties due to fire emanating from the construction site or from the pan	Moderate	Low
Service (impact to existing services – mainly during operational phase).	Low	Low
Economic impact. <ul style="list-style-type: none"> <li>The overall development will be a large job creator during both construction and operational phases</li> <li>This phase also includes schools and a church which are major social nodes and public amenities.</li> </ul>	High (Positive)	High (Positive)

### Summary of predicted impacts during construction and operational phases – No-go alternative

Potential impacts:	Significance rating of impacts	Significance rating of impacts after mitigation:
Traffic – noise and disturbance.	Negligible	Negligible
Petrol, diesel and oil spills	Negligible	Negligible

Potential impacts:	Significance rating of impacts	Significance rating of impacts after mitigation:
Impact on or loss to any potential cultural, historic and archaeological features	Not applicable	Not applicable
General noise disturbance	Not applicable	Not applicable
Soils and geology - Changes to Soil Structure as a Result of Disturbance - Loss of topsoil due to erosion on cultivated fields	Moderate	Moderate
Surface and groundwater pollution (quality)	Negligible	Negligible
Surface water – quantity and stormwater management	Moderate	Moderate
Air pollution due to dust and odours	Moderate	Moderate
Impacts on safety and security	Moderate	Moderate
Visual - Decrease in aesthetic appeal of the area, and increase in visual obtrusiveness	Not applicable	Not applicable
Fire - Destruction of veld and properties due to fire	Moderate	Moderate
Vegetation (Flora) Loss of vegetation / biodiversity	Moderate	Moderate
Wildlife (fauna) - Disturbance to natural wildlife and/or loss of natural wildlife/ loss of habitat	Moderate	Moderate
Economic and social impacts	Not applicable	Not applicable

## 7 Impact summary of the proposal or preferred alternative

For proposal:

<b>For proposal – development of Chris Hani X4 and sewer line and connection</b>
<p>The development of the proposed site will not have any major long-term physical environmental impacts, and where these occur, can and will be adequately mitigated.</p> <p>The main impacts during the construction phase will be limited to:</p> <ul style="list-style-type: none"> <li>• Traffic – noise and disturbance</li> <li>• Petrol, diesel and oil spills from vehicles caused by potential inadequate maintenance</li> <li>• Soils and geology – Siltation of the pan and wetlands due to stormwater flow during construction</li> <li>• Groundwater – quantity and quality due to accidental spills of lubricants and fuel</li> <li>• Disturbance of habitat (flora) and fauna during the construction of the sewer line and the unauthorised access to the pan</li> <li>• Surface water – quantity and stormwater management of the pan and wetlands downstream on the development</li> <li>• Impacts on safety and security - danger from earthmoving equipment, labourers on site, localized crime</li> <li>• Fire - Destruction of veld and property due to fire emanating from the construction site or from accidental or deliberate burning of the vegetation of the pan</li> <li>• Economic impact in terms of job creation during construction.</li> </ul> <p>These impacts can be adequately mitigated by measures included in the conditions of contract of contractors and the Environmental Management Plan (EMP) of the development. Measures in the EMP should include the use of sand bags to curb erosion and soil loss, wetting of roads to limit dust from construction vehicles on the site, storage of fluids in bunded impervious areas and fencing of sensitive environments (wetlands and pans).</p>

During the operational phase the main impact will be that of stormwater control and the management of the possible change to the fauna and flora and functioning of the pan. These impacts can be adequately mitigated by implementing the stormwater management plan and the fencing the pan and limiting access thereto.

The positive aspects of this development will undoubtedly be that of job creation and availability of additional amenities (like schools, churches and open spaces) for residents of the area. Jobs will be created during the construction phase of the development – formal skilled and informal jobs. The commercial components will need skilled staff, cleaners, security staff, gardeners and many other ancillary services.

**For alternative – No-Go option:**

The site will retain its status quo and nothing will change.

Having assessed the significance of impacts of the proposal and alternative(s), please provide an overall summary and reasons for selecting the proposal or preferred alternative.

The preferred alternative has been selected on the following grounds:

1. The site is surrounded on 2 sides by development
2. The site is on a main road and at a main intersection
3. The site forms a phase of the overall Daveyton Development
4. The site has very little biodiversity value with the exception of the wetland and pans; which will remain conserved as public open space
5. The No-Go alternative will retain the use of agriculture. However, this use is unsustainable
6. The development will be an economically viable use of the land
7. The development of the property will have positive social and economic impacts on the area and provide job opportunities
8. The mitigation measures put in place for the proposed development and the sewer pipeline are deemed to be sufficient to adequately negate any major foreseeable impacts

## 8 Spatial development tools

Indicate the application of any spatial development tool protocols on the proposed development and the outcome thereof.

Not applicable

## 9 Recommendation of the practitioner

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the Environmental Assessment Practitioner as bound by professional ethical standards and the code of conduct of EAPASA).

YES	NO
-----	----

If “NO”, indicate the aspects that require further assessment before a decision can be made (list the aspects that require further assessment):

Not applicable

If “YES”, please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:



1. All conditions of the EMPr must be strictly adhered to
2. All proposed service upgrades and traffic upgrades must be upgraded in accordance with the Outline Scheme Report
3. The sewer line should follow the preferred route alignment as this alignment is more cost effective and has less environmental impact than the alternative
4. An onsite ECO must be appointed to oversee all construction related activities, and audit the site in terms of the EMPr
5. The pan and wetlands must be fenced and access by contractors and workers prohibited during construction and the management thereof be done in accordance with the EMP and the SWMP
6. Sand bags and/or diversion berms and trenches must be used to control stormwater during the construction phase
7. The existing attenuation dam should be kept in place to assist with the attenuation of stormwater as per the SWMP

## 10 The needs and desirability of the proposed development

The Chris Hani X4 development has significant desirability in terms of the implications of a major economic investment into the area, together with the required infrastructure improvements which will be of benefit not only to the development, but to the wider community generally. The development of residential, commercial and retail is much needed in an area that is expanding rapidly.

The area is a development node in terms of the local municipal Spatial Development Framework (SDF). The EMF also encourages development within this area. All of these factors and policies point to the fact that this development is indeed desirable.

## 11 The period for which the environmental authorisation is required

10 Years

## 12 Environmental Management Programme (EMPr)

If the EAP answers "Yes" to Point 8 above then an EMP is to be attached to this report as an Appendix

EMPr attached

Yes

## SECTION F: APPENDICES

The following appendixes must be attached as appropriate (this list is inclusive, but not exhaustive):

It is required that if more than one item is enclosed that a table of contents is included in the appendix

Appendix A	A: Plan(s) A 01 Locality Plan A 02 CBA and ESA A 03 Sensitivity plan and layout overlay
Appendix B	Photographs
Appendix C	Facility illustrations
Appendix D	D: Route position information D 01 Outfall sewer connection route plan
Appendix E	Public Participation Information
Appendix F	Water use license(s), service letters from municipalities, water supply information
Appendix G	G: Specialist reports G.01: Wetland Delineation report G.02: Agricultural potential G.03: Stormwater Management Plan G.04: Engineering Outline Scheme Report
Appendix H	EMP
Appendix I	Impact assessment Methodology
Appendix J	INDEX profile and EAPs CV's;

## APPENDICES

# Appendix A: Site plan(s)

A: Plan(s)

A 01 Locality Plan

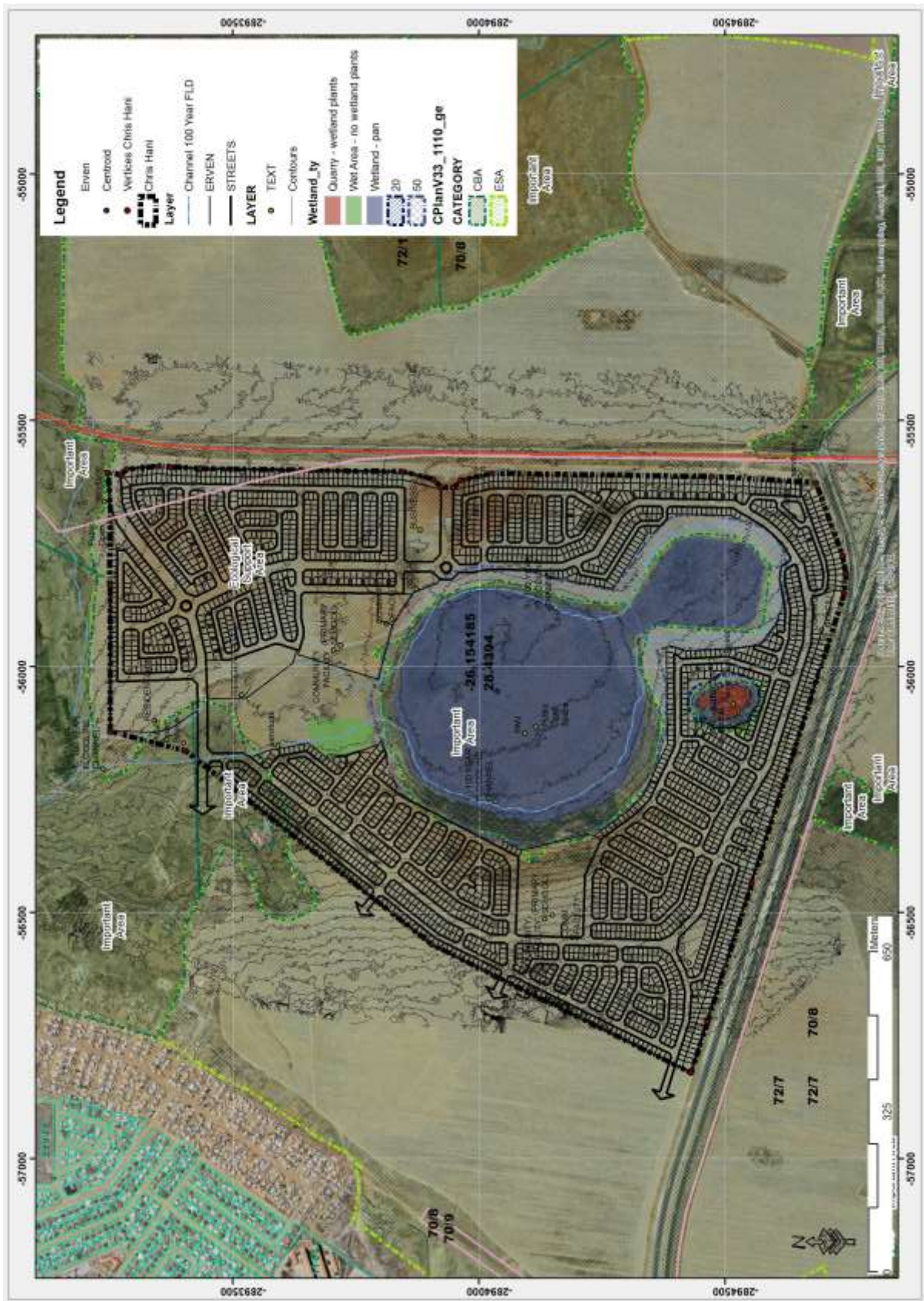
A 02 CBA and ESA

A 03 Sensitivity plan and layout overlay

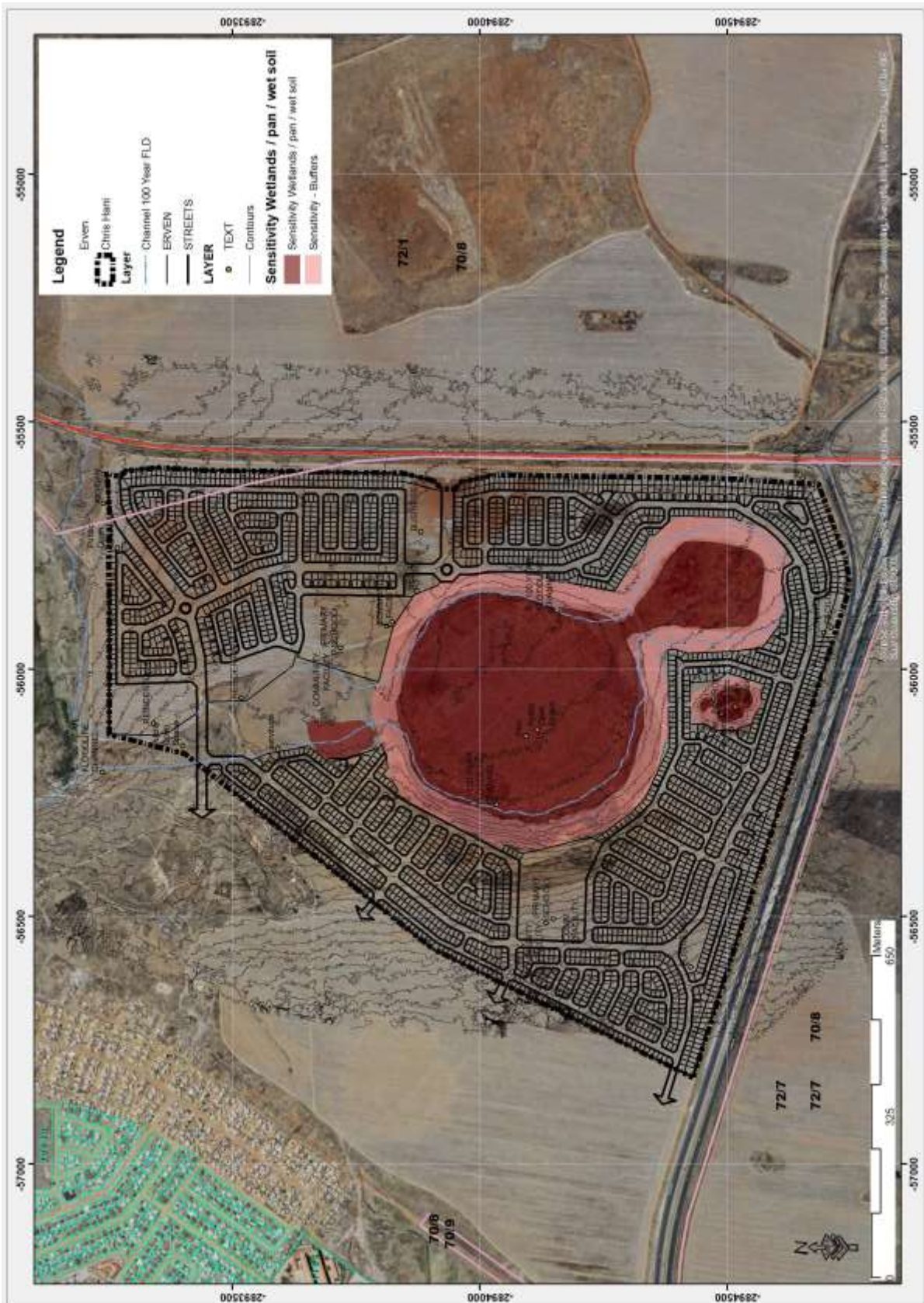
# A 01 Locality Plan



# A 02 CBA and ESA overlain on layout plan



# A 03 Sensitivity plan and layout overlay



## Appendix B: Photographs

*Figure 6 North*



*Figure 7 North-west view*





Figure 8 View to the west



Figure 9 View to the south-west



Figure 10. View to the south



Figure 11. View to the south-east



Figure 12. View to the east



Figure 13. View to the north-east



# Appendix C: Facility illustration(s) - Site Precinct Plans



ANNEXURE 1				
TYPE OF ZONE	AREA (m²)	AREA (ha)	AREA (%)	AREA (ha)
RESIDENTIAL (R1)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R2)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R3)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R4)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R5)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R6)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R7)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R8)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R9)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R10)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R11)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R12)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R13)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R14)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R15)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R16)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R17)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R18)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R19)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R20)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R21)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R22)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R23)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R24)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R25)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R26)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R27)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R28)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R29)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R30)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R31)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R32)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R33)	1 235 235	123,535	12,35	123,535
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RESIDENTIAL (R35)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R36)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R37)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R38)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R39)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R40)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R41)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R42)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R43)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R44)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R45)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R46)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R47)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R48)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R49)	1 235 235	123,535	12,35	123,535
RESIDENTIAL (R50)	1 235 235	123,535	12,35	123,535

ANNEXURE 2 GENERAL NOTES	
1. ALL USES OF RESIDENTIAL ZONES - ZONED	
2. ALL USES OF RESIDENTIAL ZONES - ZONED	
3. ALL USES OF RESIDENTIAL ZONES - ZONED	
4. CO-ORDINATE SYSTEM - SOUTH AFRICAN	
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49. CO-ORDINATE SYSTEM - SOUTH AFRICAN	
50. CO-ORDINATE SYSTEM - SOUTH AFRICAN	

PROJECT: PROPOSED TOWNSHIP CHRIS HANI EXT. 4  
 SITUATED ON PARTS OF THE REMAINING EXTENT OF THE FARM MODDERKLOP EAST 1234 AND THE PORTION OF THE FARM MODDERKLOP EAST 1234.

CLIENT: MODDERKLOP BOERDERY (PTY) LTD. J & F BOERDERY (PTY) LTD.

DATE: \_\_\_\_\_

APPLICATION DATE: NOVEMBER 2014 REF: PLAN 2014/00000043

# Appendix D: Route position information - Outfall sewer connection route plan



# Appendix E: Public participation information

Public participation information and responses report will be included in the Final BAR

## Appendix F: Water use license(s) authorisation, SAHRA information, etc.

This will be included in the Final BAR.

## Appendix G: Specialist reports

G.01: Wetland Delineation report

G.02: Agricultural potential

G.03: Stormwater Management Plan (TO BE INCLUDED IN THE FINAL BAR)

G.04: Engineering Outline Scheme Report (TO BE INCLUDED IN THE FINAL BAR)



## **G.01: Wetland Delineation report**

# DRAFT REPORT

Proposed township establishment on the Remainder of the farm Modder East 27-IR

## WETLAND DELINEATION

### **INDEX (PTY) LTD**

Compiled by Dr A Gouws, Dr E Gouws  
TEL (012) 346 5307, FAX: (012) 460 4045, [INDEX@IAFRICA.COM](mailto:INDEX@IAFRICA.COM)

December 12, 2018

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# WETLAND EVALUATION

## 2 BACKGROUND

### 2.1 INTRODUCTION

Index was asked to do a wetland investigation on a portion of land east of Daveyton, adjacent to the N12 highway between Johannesburg and Emhaleleni. This report was prepared based on site visits in October 2018.

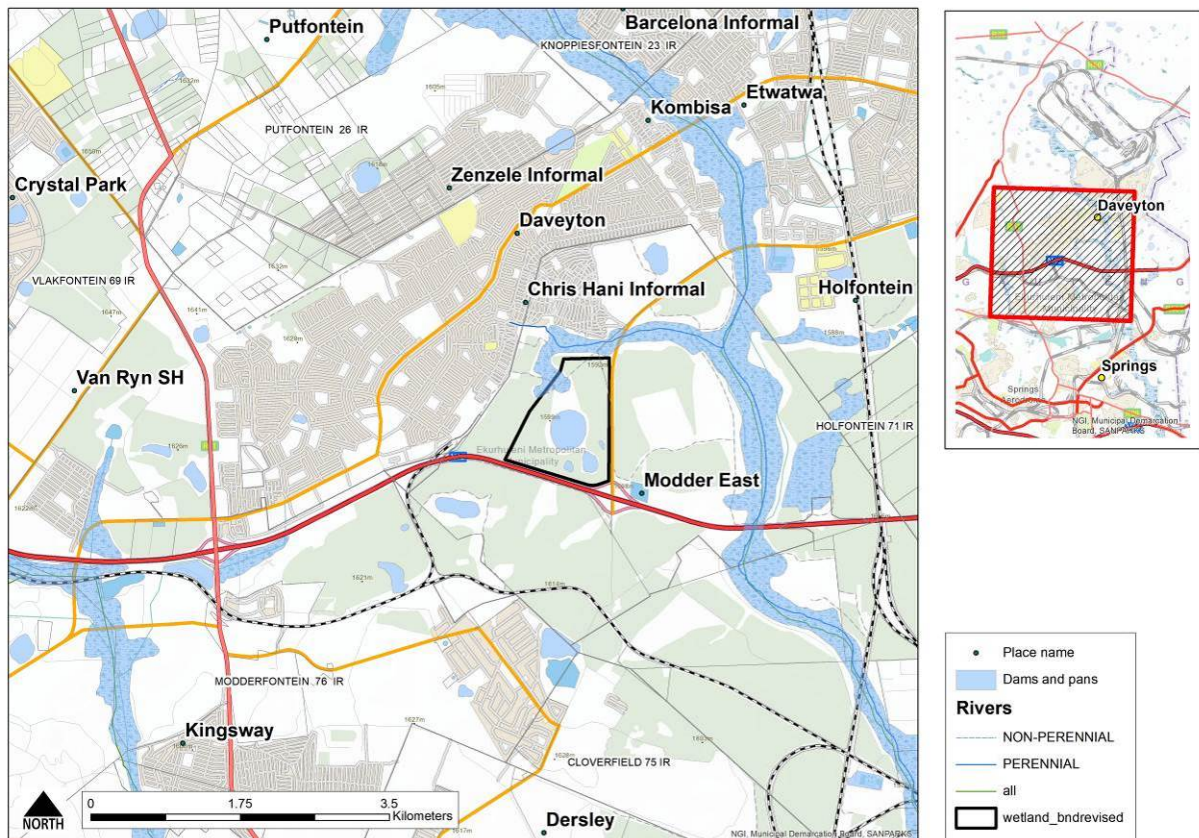


Figure 1. Locality of the site

### 2.2 TERMS OF REFERENCE

The terms of reference were that the report should conform to all the requirements of the Department of Water Affairs and Forestry and the Gauteng Department of Agriculture and Rural Development and include the following:

- Brief description of the natural environment that has an impact on wetland formation; Climate, rainfall and temperature, soil conditions and vegetation;
- Description of the soil conditions;
- Discussion of aspects determining wetland formation;
- Wetland delineation and
- Conclusions and findings.

# 3 LEGISLATION

## 3.1 NATIONAL WATER ACT, 1998

The National Water Act (Act) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a freshwater resource unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Sections 21 (c) & (i).

### GENERAL NOTICE 509 AS PUBLISHED IN THE GOVERNMENT GAZETTE 40229 OF 2016 AS IT RELATES TO THE NWA (ACT 36 OF 1998)

In accordance with GN 509 of 2016, a regulated area of a watercourse for Section 21(c) and 21(i) of the NWA, 1998 is defined as:

- the outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or
- a 500 m buffer from the delineated boundary (extent) of any wetland or pan (regulated area)

This notice should be read together with the Risk Assessment provisions in the General Authorisation Notice in Relation to Section 21.

## 3.2 THE NATIONAL WATER ACT - WETLANDS

In the National Water Act, a wetland is described as *'land which is transitional between terrestrial and aquatic systems where the water table is at or near the surface, or the land that is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.'*

Riparian zones are 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 areas."

According to DWS (2005), Wetlands must have one or more of the following attributes:

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation.
- The presence, at least occasionally, of water loving plants (hydrophytes).
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50cm of the soil.

The following is quoted from the Department of Water Affairs: Wetland delineation guidelines (2005), and is a description of hydromorphic soils:

*"A hydromorphic soil displays unique characteristics resulting from its prolonged and repeated saturation. Once a soil becomes saturated for an extended time, roots and microorganisms gradually consume the oxygen present in pore spaces in the soil. In an unsaturated soil, oxygen consumed in this way would be replenished by diffusion from the air at the soil surface. However, since oxygen diffuses 10 000 times more slowly through water than through air, the process of replenishing depleted soil oxygen in a saturated soil is significantly slower. Thus, once the oxygen in a saturated soil has been depleted, the soil effectively remains anaerobic. These anaerobic conditions make wetlands highly efficient in removing many pollutants from water, since the chemical mechanisms by which this is done need to take place in the absence of oxygen.*

*Prolonged anaerobic soil conditions result in a change in the chemical characteristics of the soil. Certain soil components, such as iron and manganese, which are insoluble under aerobic conditions, become soluble when the soil becomes anaerobic, and can thus be leached out of the soil profile.*

*Iron is one of the most abundant elements in soils, and is responsible for the red and brown colours of many soils. Once most of the iron has been dissolved out of a soil as a result of prolonged anaerobic conditions, the soil matrix is left a greyish, greenish or bluish colour, and is said to be gleyed.*

*A fluctuating water table, common in wetlands that are seasonally or temporarily saturated, results in alternation between aerobic and anaerobic conditions in the soil. Lowering of the water table results in a switch from anaerobic to aerobic soil conditions, causing dissolved iron to return to an insoluble state and be deposited in the form of patches, or mottles, in the soil. Recurrence of this cycle of wetting and drying over many decades concentrates these bright, insoluble iron compounds”.*

### **3.3 NEMA - BUFFER**

In terms of NEMA's EIA Regulations and the National Water Act, any development within the 1:50 year floodline and 32m from the stream margin will trigger the authorisation need of a water licence as well as a basic assessment or full environmental impact assessment.

### **3.4 REGULATED ZONE IN TERMS OF SECTION 21 OF THE WATER ACT**

General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the NWA (Act 36 of 1998): in accordance with GN 509 of 2016, a regulated area of a watercourse for Section 21(c) and 21(i) of the NWA, 1998 is defined as:

- the outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or
- a 500 m radius from the delineated boundary (extent) of any wetland or pan.

This notice should be read together with the Risk Assessment provisions in the General Authorisation Notice in Relation to Section 21.

*Figure 2. Regulated zone on 500 metres from a watercourse buffer*

## **4 DESCRIPTION OF THE ENVIRONMENT**

### **4.1 NATURAL RESOURCES**

#### **4.1.1 CLIMATE**

##### **4.1.1.1 RAINFALL**

The rainfall is typical of the Highveld's summer rainfall pattern, where more than 80% falls from October through to April. An average of 715 mm rains per year in the area, of which 585mm are considered as effective rainfall during the active growing period that spans from October to March.

**Table 1. Average annual rainfall**

Annual Cycles of Derived Variables														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave	
Ground Frost Frequency [%]	0	0	0	0	3	15	15	6	0	0	0	0	3	?
Effective Rain [mm]	107	68	68	51	13	8	3	6	19	65	87	88	583	?
Effective Rain Ratio [%]	78	88	88	91	98	99	100	99	97	88	83	83	85	?
Rainy Days	14	9	9	8	2	1	1	1	3	9	12	12	81	?
Solid Precipitation Ratio [%]	0	0	0	0	1	2	2	1	0	0	0	0	0	?

#### 4.1.1.2 TEMPERATURE

The area experiences severe frost, which occurs frequently from mid-April to as late as September. Occurrence of frost has to be considered in crop selection. The summers are mild where temperatures above 32°C are seldom reached. The highest average maximum temperature of 25.3°C occurs in December. The average minimum temperature of 10,5°C occurs in June and July.

#### 4.1.2 GEOLOGY

Geomorphologically, the site falls within the Highveld Geomorphic Province and almost always consists of pans on top of the "African" erosion cycle with extremely broad valley forms incised below this surface. The incised pediments are ubiquitous and the soil layer is thin, inclined to be poor and are, as a result of the shallow slope, often removed to the stream by sheet wash.

The geological map of the study area shows that the majority of the site is underlain by dolomite and chert, quartzite, tillite and sandstone.

#### 4.1.3 TOPOGRAPHY AND DRAINAGE

The site generally drains towards the north-west with a central lower lying portion - the wetland – that receives water from its directly surrounding area. There are two depressions and an excavation on the development zone. A stream occurs just north of the site.

#### 4.1.4 SOIL

Observations were made through soil auger and probe. The underlying rock is dolomite, sandstone, tillite or quartzite and the soil is generally deep reddish and dark brown coloured with a clay loam texture. The predominant soil found on the farm consists is Avalon form soils of different depths, ranging from 800mm to 200mm.

The entire area is covered in hydromorphic soils indicating seasonal wetness. The water table fluctuates and caused plintite to form. The exceptions are areas with clearly defined pans with water and hard plintite verges. These areas are defined as wetland areas and are linked by wet areas to the stream on the northern boundary of the farm. This area in total qualifies as wetland, due to gleyed sub-soil with reeds, and sedges as vegetation.

Rocky outcrops also occur, spread around the area, with shallow rocky soils surrounding the wet areas.

The Avalon soils vary in depth between 800mm and 200mm and are described as an orthic, a-pedal topsoil, overlying yellow-brown a-pedal structured granular subsoil with some mottling, on soft plintite. The clay content varies between 18 to 25 % clay in the top soil and becomes slightly higher in clay content deeper in the subsoil.

In areas where rocks predominate have very little soil and was classified as Mispah. These are all yellow-brown in color. Some rocky areas contain hard plintite, while others are predominantly soft plintite on the surface.

Soils found in the wet areas are called Katspruit and may be as deep as 400mm before it becomes gleyed. It is grey brown in color and more clay is found in the upper layers of some 30 to 40%.

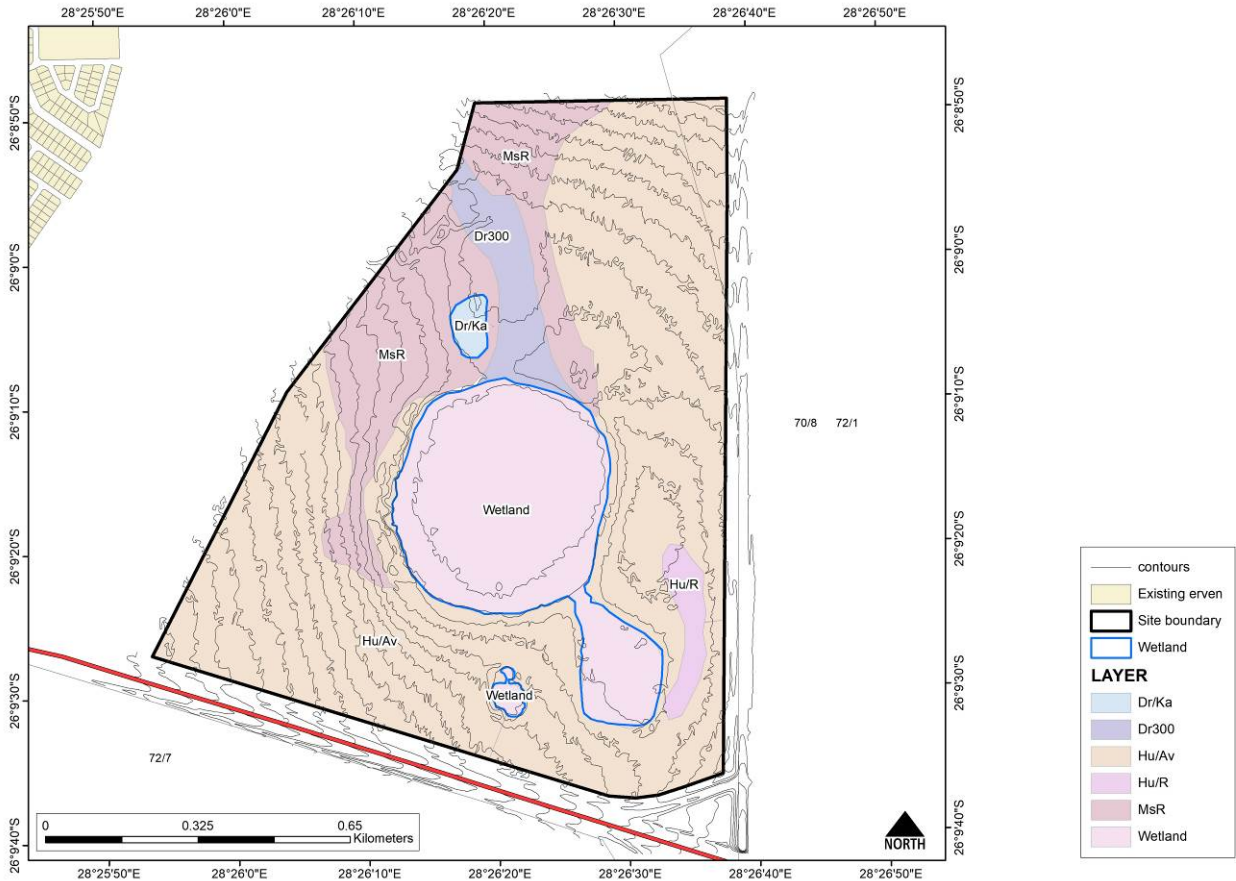


Figure 3. Soil map

#### 4.1.5 VEGETATION

##### REGIONAL VEGETATION PATTERNS

The regional vegetation according to Mucina and Rutherford is Eastern Highveld Grassland: Gm12.

Table 2 Vegetation according to Mucina and Rutherford

Name of vegetation type	Carletonville Dolomite Grassland
Name of vegetation type	Eastern Highveld Grassland
Conservation Target (percent of area) from NSBA	24%
Protected (percent of area) from NSBA	0.3%
Remaining (percent of area) from NSBA	56%
Description of conservation status from NSBA	Endangered
Description of the Protection Status from NSBA	Hardly protected
Area (sqkm) of the full extent of the Vegetation Type	1 2669.04
Name of the Biome	Grassland Biome
Name of Group and bioregion	Mesic Highveld Grassland Bioregion

##### DISTRIBUTION

Mpumalanga and Gauteng Provinces: Plains between Belfast in the east and the eastern side of Johannesburg in the west and extending southwards to Bethal, Ermelo and west of Piet Retief. Altitude 1 520–1 780 m, but also as low as 1 300 m.



## SITE SPECIFIC VEGETATION

The vast majority of the area has been transformed and consists of cultivated areas or old quarries. Some cultivation has taken place within the areas delineated as wetland.

Dominant species that were found in the areas with shallow soil are typical grassland grasses such as *Cymbopogon pospischilii*, *Eragrostis curvula* and *Tristachya leucothri*. Please refer to the Galago Report for the full list of species.

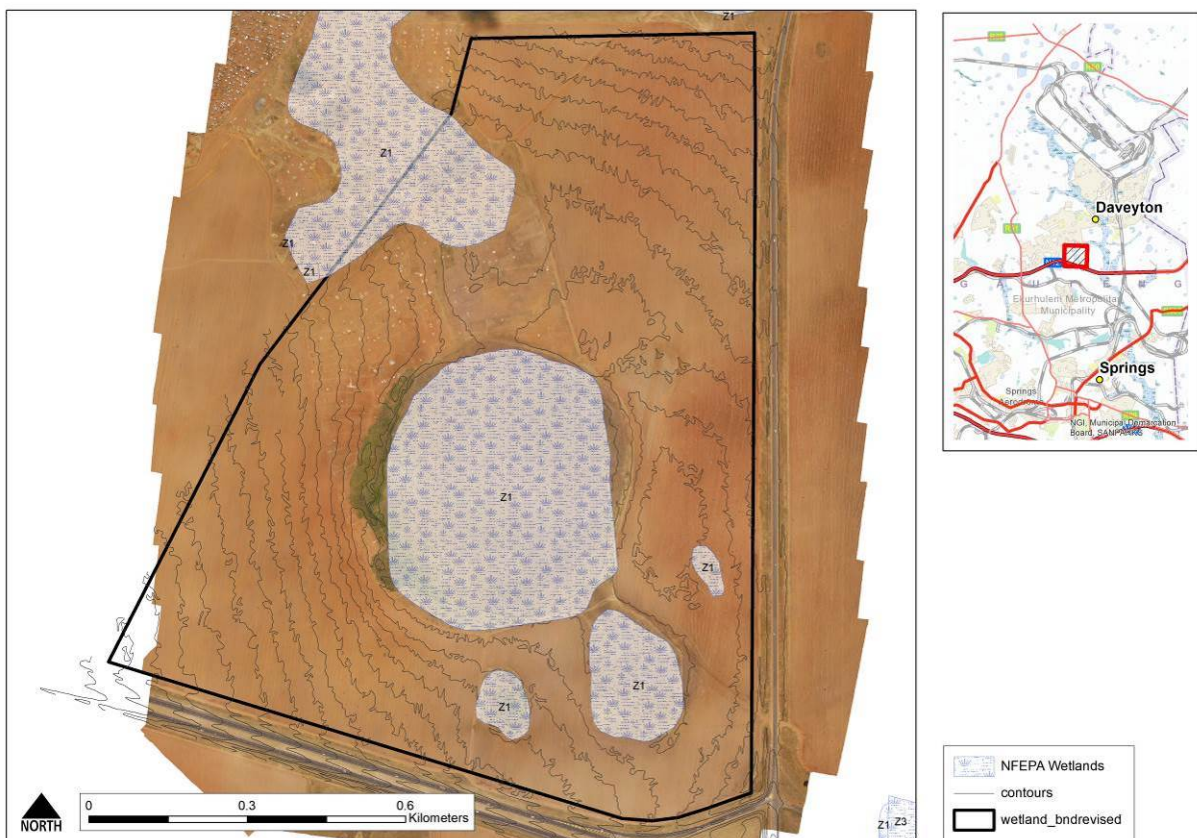
The dominant wetland species found in the drainage ditch is *Phragmites australis* and *Typha capensis*. A large number of other species occur.

### 4.1.6 NFEPA WETLANDS

National Freshwater Ecosystem Priority Areas for South Africa (or the 'NFEPA project') is a data set developed in 2011 and is now under the administration of Working for Water of DWS to indicate 'wetland ecosystem types and wetland condition on a national scale. The delineations were based largely on remotely-sensed imagery and therefore did not include historic wetlands lost through drainage, ploughing and concreting.'<sup>1</sup>

Because of the regional nature of the dataset, NFEPA provides a general indication of the status wetlands. According to NFEPA classification, the dams on the neighbouring properties are the only wetlands of significance. These are outside of the site but within the 500m regulated zone.

The wetland condition is graded as 'Z3' which indicates wetlands that are heavily modified. It is also indicated as artificial.



<sup>1</sup> Extracted from SANBI GIS metadata.

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# 5 WETLAND DELINEATION

## 5.1 BACKGROUND

'Wetland' denotes a variety of ecosystems, ranging from rivers, springs, seeps and mires in the upper catchment, to midlands marshes, pans and floodplains, to coastal lakes, mangrove swamps and estuaries at the bottom of the catchment. In common they experience prolonged water saturated conditions that in turn manifests in specific soil characteristics and plant and animal species composition.

Wetlands is defined by the National Water Act 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.'

Accordingly, a wetland must have one or more of the following attributes:

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation
- The presence, at least occasionally, of water-loving plants (hydrophytes)
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil.

The object of the delineation procedure is to identify the outer edge of the temporary zone. This outer edge marks the boundary between the wetland and adjacent terrestrial areas. Occurrence of standing water and hydrophilic plants and finally, soil conditions were used as the determinant for this assessment. In more detail, the following:

## 5.2 CRITERIA

Soil condition is the primary criterion that signifies waterlogged conditions. These conditions manifest itself through plant communities that can tolerate hydromorphic soils. These plants are hydrophytes that are adapted to stresses imposed on plants through temporary or permanent waterlogged conditions.

The importance of retaining and maintaining functional wetlands are well established - the process of establishing the boundaries less so. The following criteria discussed in *A Practical Field Guide for the Identification and Delineation of Wetlands and Riparian Areas*, published by DWAF are used as baseline information. According to these guidelines the main indicators are the following:

### 5.2.1 TERRAIN MORPHOLOGY

- Wetlands predominantly occur on valley bottoms and on seep in other terrain forms.

### 5.2.2 SOIL FORM

- Soil that are gleyed or organic soils indicate permanently saturated zones, Forms that are heavily mottled and that have a grey matrix in the subsoil indicate seasonally and temporary waterlogged conditions.

### 5.2.3 SOIL WETNESS

- Soil colour is markedly influenced by the oxidation statues of manganese and iron. Yellow, red and reddish brown soil form under well-oxidised conditions and greyish colours when aeration is poorer. Prolonged periods of water saturation producing gleysation, where grey and blue mottles are formed and are a condition in which hydrophilic plants flourish.
- Qualifying colours, according to the Munsell colour chart are indicated in the addenda.

## 5.2.4 VEGETATION

- Vegetation is normally a reflection of the soil conditions and is, therefore, an important visual method of finding areas where a wetland can occur;
- Large proportion of hydrophytes; emergent plants: reeds, sedges, and floating or submerged aquatic plants indicate permanently saturated wetlands;
- Hydrophilic sedges and a variety of grass and hydrophilic woody plants are dominant on seasonally waterlogged soils;
- A variety of water tolerant grasses and woody species that may also occur on non-wetland areas can be indicative of temporarily waterlogged conditions.

Detail of the criteria is provided in the addenda.

## 5.3 PROCESS USED FOR THE DELINEATION OF WETLANDS

The procedure followed was as follows:

- The site was flown by UAV equipped with an RGB camera. From the photo sequence a DEM and orthophotos was generated by photogrammetry. The former was used to determine possible wetlands. This photo and satellite images were used as backdrop for digitizing features;
- River and streams were delineated in different components, i.e., base flow and riparian areas as well as the valley-bottoms with no distinct channel banks;
- Identification of hydromorphic (wetland) soils, soil form and wetness indicators are then used to establish permanent, seasonal, and temporary wetland zones;
- Soils are classified in accordance with the Binomial Classification System for Southern Africa (Soil Classification Working Group, 1991, revised 2016). Initial delineation of the soil forms took into account the following: vegetation type, terrain form, colour and texture of the soil. The boundaries are then refined through soil auger and or soil probe. All qualifying soil forms are then investigated in more detail;
- Vegetation indicators were used to delineate the wetland boundaries of the Poonaspruit;
- The final boundary of the wetland was then delineated.

## 5.4 RESEARCH FINDINGS

### 5.4.1 TERRAIN MORPHOLOGY

- The property is flat and slopes towards the east with portions draining directly into the pan before it drains into the wetland on the northern periphery of the subject property. Most of the land has a slope of less than 5%. Stormwater flow is in the form of sheet flow and consequently there is no defined stream, except the vlei draining the pan.

### 5.4.2 SOIL FORM

- The underlying rock is dolomite and the soil is generally deep reddish and dark brown coloured with a clay loam texture. The clay content is 18 to 25% and increases to around 40% nearer to the wetland. The soil was classified as Avalon and Mispah in the arable areas. These soil forms are typical of oxidised soils and do not qualify as wetlands.
- The areas around the pan and the drainage line towards the north and northeast are Katspruit and considered as wetland.
- A small portion of land was identified by NFEPA as wetland in the eastern portion of the site. From satellite images the portion is darker in colour, much the same as the wetland directly west. However, closed inspection found that the patch is rocky and greyish brown in colour. The reason the portion was not cultivated is because of the rocky and shallow soils. This land was also erroneously classified as wetland in C-PLAN.



Figure 5. Location of photos



Photo 1. IMG 5026

Photo 2. IMG 5027

Photo 3. IMG 5028

### 5.4.3 SOIL WETNESS

- The Avalon soil has no red and brown mottles that signify that it has not been subjected to prolonged waterlogged conditions. It further has no or properties of wetlands, like olive or blue matrix colours and low chroma matrix colours. According to the guidelines, the soils do not qualify as wetlands.
- The Katspruit soils delineated as wetlands have matrix colours in the subsoil of 7.5YR6/2 and higher values. These permanently saturated soils were found all around the pan and the drainage lines. The subsoil is gleyed and is identified as wetland.

### 5.4.4 VEGETATION

- Vegetation is a normally a reflection of the soil conditions and is, therefore, an important visual method of finding areas where a wetland can occur;
- The vlei contains hydrophytes; emergent plants: reeds, sedges, and floating or submerged aquatic plants that indicate permanently saturated wet areas. This also applies to the drainage line and wetland on the northern periphery of the property.

## 5.5 DELINEATION OF WETLANDS

Katspruit soils are permanently saturated and classified as wetland. The Avalon and Mispah soils are dry and used as boundary between the wetland and dryland conditions.

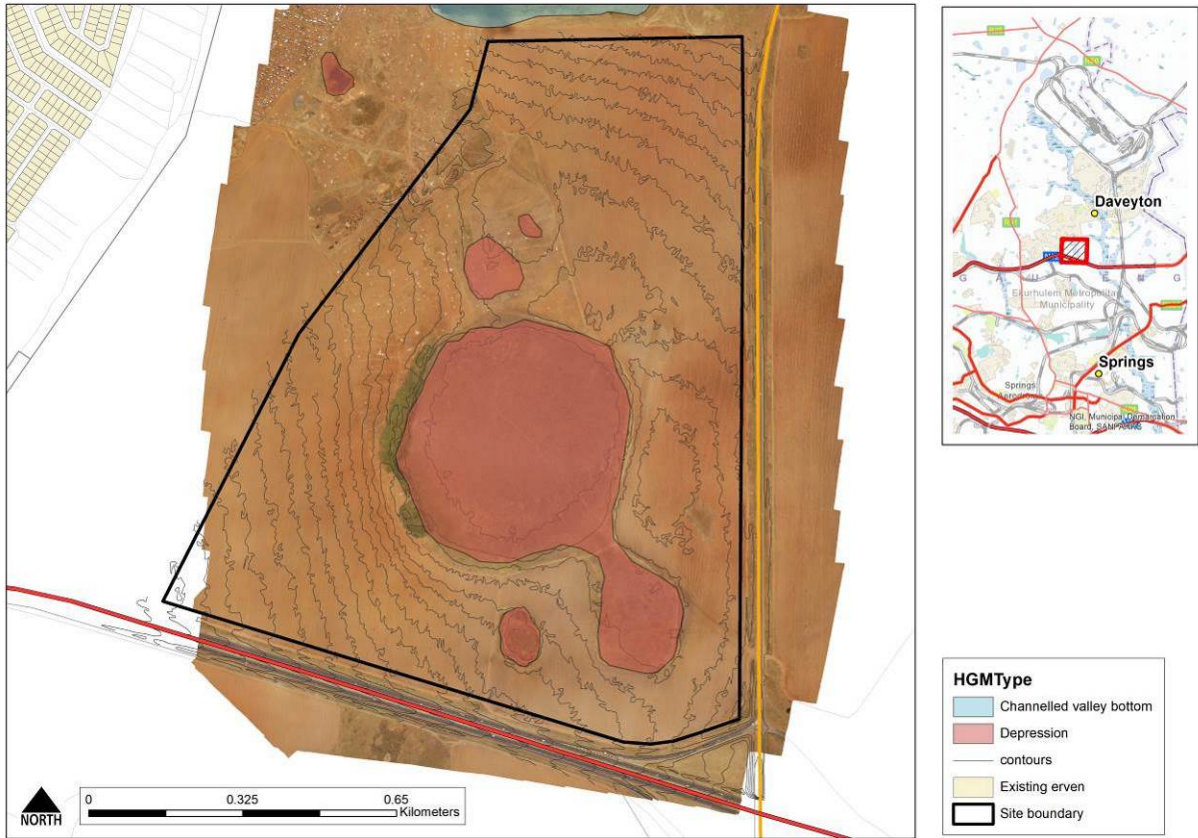


Figure 6. Wetland types

## 6 BUFFER ZONE

In terms of legislation, wetlands and riparian zones are defined in the Water Act as a water resource and any activities that are contemplated that could affect the wetlands requires authorisation (Section 21 of the National Water Act of 1998).

GDACE, in the guidelines for biodiversity assessments required that wetland be indicated as sensitive habitats. In addition, GDACE also requires that an additional 30m inside the urban edge, or 50m outside the urban edge, beyond the wetland boundaries should be reserved as a buffer zone and regarded as sensitive. The buffer is presumed to protect the wetland and/or the biodiversity associated with the wetland. The application site falls within the urban edge.

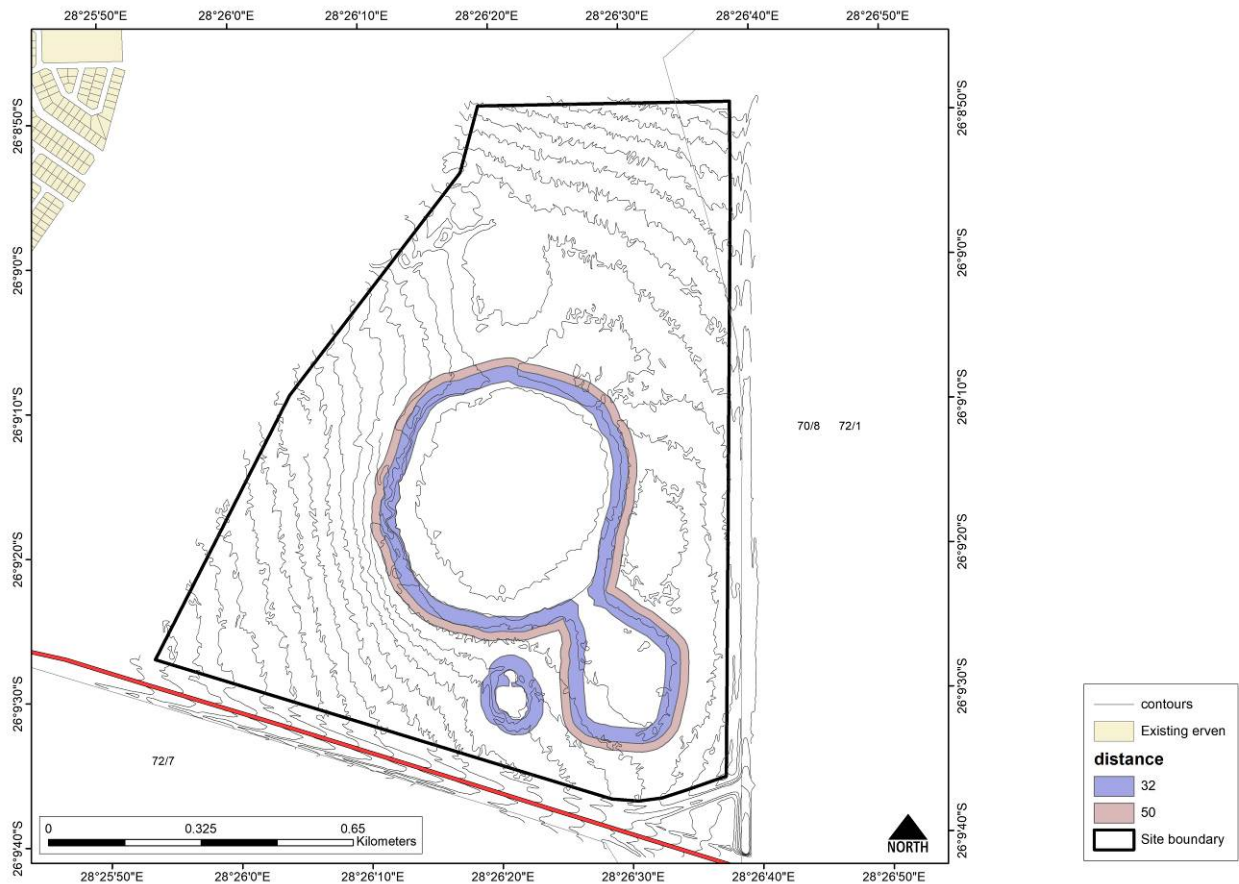


Figure 7: Wetland and buffer

## 7 REFERENCES

Department of Water Affairs and Forestry, 2005. A practical field procedure for identification and delineation of wetland and riparian areas. DWAF, Pretoria.

Mucina, L. & Rutherford, M. C. (Eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Dlamini, B. & Batchelor, 2008. Wetland assessment on various portions of the Farm Olievenhoutbosch 398-JR (Portions 322, 325, 326 and 243), Wetland Consulting Services (Pty) Ltd.

# ADDENDA

## Criteria for the delineation of wetlands

Soil condition is the primary criterion that signifies waterlogged conditions. These conditions manifest itself through plants communities that can tolerate hydromorphic soils. These plants are hydrophytes that are adapted to stresses imposed on plants through temporary or permanent waterlogged conditions.

The importance of retaining and maintaining functional wetlands are well established - the process of establishing the boundaries less so. The following criteria discussed in *A Practical Field Guide for the Identification and Delineation of Wetlands and Riparian Areas*, published by DWAF are used as baseline information.

### CRITERIA FOR THE IDENTIFICATION OF WETLANDS

According to DWAF, the main indicators are:

- 1) Terrain – Valley bottom and seep on slopes
- 2) Soil form indicator –
- 3) Soil wetness indicator
  - a. Hue 2.5YR
    - i. >5 value and <2 chroma, or
    - ii. >6 value and <4 chroma
  - b. Hue 10YR
    - i. 4 value and <2 chroma, or
    - ii. 5 value and <3 chroma, or
    - iii. 6 value and <4 chroma
  - c. Hue 7.5YR
    - i. 5 value and <2 chroma, or
    - ii. >6 value and <4 chroma
  - d. Hue 5YR
    - i. 5 value and <2 chroma, or
    - ii. >6 value and <4 chroma
  - e. Hue 5Y
    - i. >5 value and <2 chroma, or
- 4) Vegetation indicator – Will contain hydrophyte plants

There are three wetland vegetation indicators, each associated with specific soil properties.

#### **Permanently waterlogged conditions are grey coloured or organic soils.**

- Valley bottom terrain morphology;
- Champagne, Katspruit, Willowbrook and Rensburg soil form – all forms have gleyed subsoil;
- Wetness - prominent grey matrix, few to no high chromas within 500 mm.
- Vegetation
  - Large proportion of hydrophytes
  - Emergent plants: reeds, sedges, etc;
  - Floating or submerged aquatic plants.

#### **Seasonally waterlogged soils have a grey matrix with many mottles.**

They usually occur just outside the area of normal base flow and are saturated for a significant portion of the rainy season.

- Valley bottom terrain morphology;
- Kroonstad, Longlands, Wasbank, Lamotte, Escourt, Klapmuts, Vilafontes, Kinkelbos, Cartref, Fernwood, Westleigh, Dresden, Avalon, Glencoe, Pinedene, Bainsvlei, Bloemdal, Witfontein, Sepane, Tukulu, Montagu
- Wetness
  - Grey matrix (>10%)
  - Many high chroma mottles
- Vegetation
  - Hydrophilic sedges that are restricted to wetland areas

**Temporary waterlogged soils are normally grey-brown on colour with few mottles.**

- Valley bottom terrain morphology;
- Inhoek, Tstetsikamma, Houwhoek, Molopo, Kimberley, Jonkersberg, Groenkop, Etosha, Addo, Brandvlei, Glenrosa or Dundee.
- Wetness
  - Minimal grey matrix (>10%)
  - Few high chroma mottles
- Vegetation
  - Predominantly grasses which occur on non-wetland areas and hydrotropic species.
  - Predominantly woody species which occur on non-wetland areas and hydrotropic species.

Outside this zone is the adjacent terrestrial area that is not classified as wetlands.

**Process used for the delineation of wetlands**

- 1) Soils are classified in accordance with the Binomial classification system for southern Africa (Soil Classification Working Group, 1991). Initial delineation of the soil forms will take into account the following: vegetation type, terrain form, colour and texture of the soil. The boundaries are then refined through soil auger and or soil probe. All qualifying soil forms are then investigated in more detail;
- 2) River and streams are then delineated in different components, i.e., base flow and riparian areas. Uplands water saturated areas are mapped (normally belonging to soil forms with gleyed subsoil. These boundaries will indicate the *permanently saturated zone*;
- 3) Matrix colours and mottle of the subsoil at a depth less than 500 mm are then measured against the criteria indicated above and the areas of Temporary and Seasonal waterlogged conditions mapped;
- 4) Positions of observation points are taken with GPS and placed on a base map, and combined with texture and colour on aerial photographs; the final boundary of the wetland is then delineated.

**Indicator plants where wetlands may occur**

Gramineae (Grasses)

- |                                     |                        |
|-------------------------------------|------------------------|
| 1) <i>Imperata cylindrical</i>      | Temporary wetness      |
| 2) <i>Setaria sphacelata</i>        | Temporary and seasonal |
| 3) <i>Pennisetum thunbergii</i>     | Temporary and seasonal |
| 4) <i>Hemarthria altissima</i>      | Temporary and seasonal |
| 5) <i>Paspalum urvillei</i>         | Temporary              |
| 6) <i>Paspalum dilatatum</i>        | Temporary              |
| 7) <i>Paspalum distichum</i>        | Seasonal and permanent |
| 8) <i>Andropogon appendicularis</i> | Temporary and seasonal |
| 9) <i>Ischaemum fasciculatum</i>    | Seasonal and permanent |
| 10) <i>Arundinella nepalensis</i>   | Temporary and seasonal |
| 11) <i>Andropogon eucomis</i>       | Temporary and seasonal |
| 12) <i>Festuca caprina</i>          | Temporary and seasonal |
| 13) <i>Aristida junciformis</i>     | Temporary and seasonal |
| 14) <i>Eragrostis plana</i>         | Temporary              |
| 15) <i>Eragrostis planiculmis</i>   | Temporary and seasonal |



- 16) *Phragmites australis* Permanent
- 17) *Leersia hexandra* Temporary and seasonal
- 18) *Miscanthus capensis* Temporary and seasonal
- 19) *Miscanthus junceus* Temporary and seasonal

Cyperaceae (Sedges)

- 1) *Cyperus sexangularis* Temporary and seasonal
- 2) *Cyperus latifolius* Seasonal and permanent
- 3) *Cyperus fastigiatus*
- 4) *Cyperus marginatus*
- 5) *Fuirena pubescence*
- 6) *Kyllinga erecta*
- 7) *Scleria welwitschii*
- 8) *Eleocharis dregeana*
- 9) *Eleocharis limosa*
- 10) *Schoenoplectus brachycerus*
- 11) *Schoenoplectus corymbosus*

Juncaceae (Rushes)

- 1) *Typhaceae* (Bullrushes) Permanent
- 2) *Typha capensis*

Potamogetonaceae (Pondweeds)

- 1) *Potamogeton thunbergii* Permanent

Asphodelaceae (Red-hot pokers) Wetland and non wetland

- 1) *Kniphofia species*
- 2) *Kniphofia linearfolia*

Amaryllidaceae (Vlei lilies) Wetland and non wetland

- 1) *Crinum species*
- 2) *Crinum macowanii*

**Polygonaceae (Knotweeds)** Permanent and or seasonal

- 1) *Persicaria attenuate*

Additional species form other families

- 1) *Xyris capensis*
- 2) *Satyrrium hallackii*
- 3) *Ranaculus multifidus*
- 4) *Sium repandum*
- 5) *Gunnera repandum*
- 6) *Mentha aquatica*

## Soil profile description

The site survey consisted of individual sampling and profile descriptions. The positions and soil properties are indicated in the following figure and table.



Proposed township establishment on the Remainder of the farm Modder East 27-IR

Table 3 Soil survey data

POINT	ELEVATION	SOIL TYPE	COLOR	SOIL DEPTH	MOTTLES	RESTRICT	TEXTURE	STRUCTURE	CONSISTENC	CLAY TOP	CLAY SUB	STRUCT TYP	NOTES
1	400	Hu/Cv/Bv/Sd	Yellow	400	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400/R2
2	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	32	Crumb	Av600
3	400	Vf/Oa/Fw/Du	Reddish Br	400	Few	Gley	SaCLm	Weak	Friable	24	44	Crumb	Ka/wet
4	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
5	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
6	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
7	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
8	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
9	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
10	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
11	200	Cf/Gs/Ms	Grey brown	200	None	Hard Rock	Sa	Structur	Loose	0	0		Ms r3
12	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
13	400	Hu/Cv/Bv/Sd	Yellow	400	Few	Plintite	SalM	Structur	Loose	18	24	Granular	AV400/R3
14	400	Hu/Cv/Bv/Sd	Yellow	400	Few	Plintite	SalM	Structur	Loose	18	24	Granular	AV400/R2
15	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
16	0	Rock		0						0	0		burrowpit/rock
17	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Ac800
18	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
19	400	Hu/Cv/Bv/Sd	Yellow	400	Moderate	Plintite	SalM	Structur	Loose	18	24	Granular	Av400/wer
20	0	Yellow		0	Few		SalM	Weak	Friable	18	32	Crumb	
21	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Weak	Friable	18	32	Granular	Ac600/wet-pan-
22	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
23	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
24	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	AV800
25	400	Hu/Cv/Bv/Sd	Yellow	400	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400
26	0	Rock		0						0	0		Rock
27	0	water		0						0	0		water
28	0	Water		0						0	0		Water
29	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400
30	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400
31	0	Water		0						0	0		Water
32	0	Rock		0						0	0		Rocks
33	0	Av400		0						0	0		Water
34	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400
35	200	Rg/Ar	Black	200	Few	Gley	SaCl	Strong	Firm	32	55	Blocky	Re400/gley
36	600	Hu/Cv/Bv/Sd	Grey brown	600	Few	Plintite	SaCLm	Moderate	Firm	24	44	Crumb	Av400
37	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
38	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
39	0			0	Few		SaCLm	Weak	Friable	24	44	sub ang b	Ka/pan
40	400	Vf/Oa/Fw/Du	Grey brown	400	Few	Gley	SalM	Weak	Friable	24	32	Crumb	Ka
41	600	Sw/Va	Grey brown	600	Few		SaCLm	Moderate	Friable	18	32	Blocky	Se600/wetness
42	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
43	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
44	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
45	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
46	600	Rg/Ar	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	32	Granular	Av600
47	200	Sw/Va	Grey brown	200	Few	Hard Rock	SaCLm	Weak	Friable	24	32	Crumb	Se600
48	400	Sw/Va	Grey brown	400	Few	Loose rock	SaCLm	Weak	Friable	18	32	Crumb	Se400/R2
49	0	Sw/Va		0						0	0		Se/R2/wet
50	0	Ka/wet/water/g		0						0	0		Ka/wet/water/g
51	0	Ka/gley		0						0	0		Ka/gley
52	400	Sw/Va		400	Few					0	0		Se400/wet
53	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	32	Granular	Av400
54	400	Sw/Va	Grey brown	400	Few	Plintite	SaCLm	Weak	Friable	18	32	Blocky	Se400/wet
55	0	Ka/gley		0						0	0		Ka/gley
56	0	Ka/vlei/gley		0						0	0		Ka/vlei/gley
57	200	Ka/gley	Grey brown	200	Moderate	Gley	SalM	Structur	Loose	10	44	Granular	Ka/gley
58	0	Se400 wet	Grey brown	0	Few		SaCLm	Moderate	Friable	24	32	Crumb	Se400 wet
59	600	Vf/Oa/Fw/Du	Grey brown	600	Few	None	SalM	Structur	Loose	18	18	Granular	Fw/wet
60	200	Cf/Gs/Ms	Grey brown	200	None	Hard Rock	SalM	Structur	Loose	18	0	Granular	Ms r3
61	0	Cf/Gs/Ms		0						0	0		Ms r3
62	0	Rock		0						0	0		Ms r3
63	400	Hu/Cv/Bv/Sd	Yellow	400	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400
64	400	Hu/Cv/Bv/Sd	Yellow	400	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400/R2
65	200	Es/Kd	Grey brown	200	Moderate	Gley	SaCLm	Moderate	Firm	24	44	sub ang b	Ka gley
66	0	quary/rocks		0						0	0		quary/rocks
67	0	Cf/Gs/Ms		0						0	0		Ms r3
68	200	Hu/Cv/Bv/Sd	Yellow	200	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av400
69	0	Av200/wet	Grey brown	0	Moderate		SalM	Weak	Firm	8	0		Av200/wet
70	200	Lo/We/Av/Ks/Pn	Grey brown	200	Moderate	Gley	SaCl	Moderate	Very firm	32	44	sub ang b	Ka gley
71	0	Cf/Gs/Ms		0						0	0		Ms r3/hafdpli
72	0	Ka gley		0						0	0		Ka gley
73	0	Lo/We/Av/Ks/Pn		0						0	0		Ms r3/hardpli
74	0	Ka gley /water		0						0	0		Ka gley /water
75	400	Sw/Va	Grey brown	400	Few	Plintite	SaCLm	Weak	Friable	24	32	Blocky	Se400/wet
76	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
77	0	Lo/We/Av/Ks/Pn		0						0	0		Ms r3 hard-pli
78	0	Ka gley water		0						0	0		Ka gley water
79	200	Cf/Gs/Ms	Yellow	200	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Ms r3
80	200	Hu/Cv/Bv/Sd	Yellow	200	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av200 Rocks
81	0			0						0	0		
82	0	Ka gley water		0						0	0		Ka gley water
83	400	Sw/Va	Grey brown	400	Few	Plintite	SaCLm	Moderate	Firm	24	44	Blocky	Se400 wet
84	600	Sw/Va	Grey brown	600	Few	Plintite	SaCLm	Moderate	Friable	24	44	Blocky	Se600
85	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Ac600
86	0	Se		0						0	0		Se400 wet
87	0	Rock		0						0	0		Ms r3 plinth
88	0	Rock		0						0	0		Ms r3
89	0	Rock		0						0	0		Ms r3 plinth
90	0	Ws/Gc/Dr		0						0	0		Ms r3 plinth
91	0	Rock		0						0	0		Ms r3 plinth
92	400	Hu/Cv/Bv/Sd	Yellow	400	Few	Loose rock	SalM	Structur	Loose	18	24	Granular	Ac400/RR2
93	600	Hu/Cv/Bv/Sd	Yellow	600	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av600
94	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800
95	800	Hu/Cv/Bv/Sd	Yellow	800	Few	Plintite	SalM	Structur	Loose	18	24	Granular	Av800

Proposed township establishment on the Remainder of the farm Modder East 27-IR

## G.02: Agricultural potential

PROPERTY: A PORTION OF THE REMAINDER OF THE FARM MODDER EAST 71-IR, AND A SMALL PART OF THE REMAINDER OF PORTION 1 OF THE FARM MODDER EAST 72-IR., EKURHULENI METRO.

# AGRICULTURAL POTENTIAL ASSESSMENT

	Compiled by Dr Andries Gouws Index
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May 2019

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# 1 BACKGROUND

## 1.1 TERMS OF REFERENCE

Index was appointed by Greenfields Gardens (Pty) Ltd to do an agricultural study for the following property:

- Parent Farm: a Portion of the Remainder of the Farm Modder East 71-IR, and a small part of the Remainder of Portion 1 of the Farm Modder East 72-IR.

The objective of the study is to determine the agricultural potential of the site.

## 1.2 LOCALITY

The site is located just south of Daveyton in the Ekurhuleni Metro.

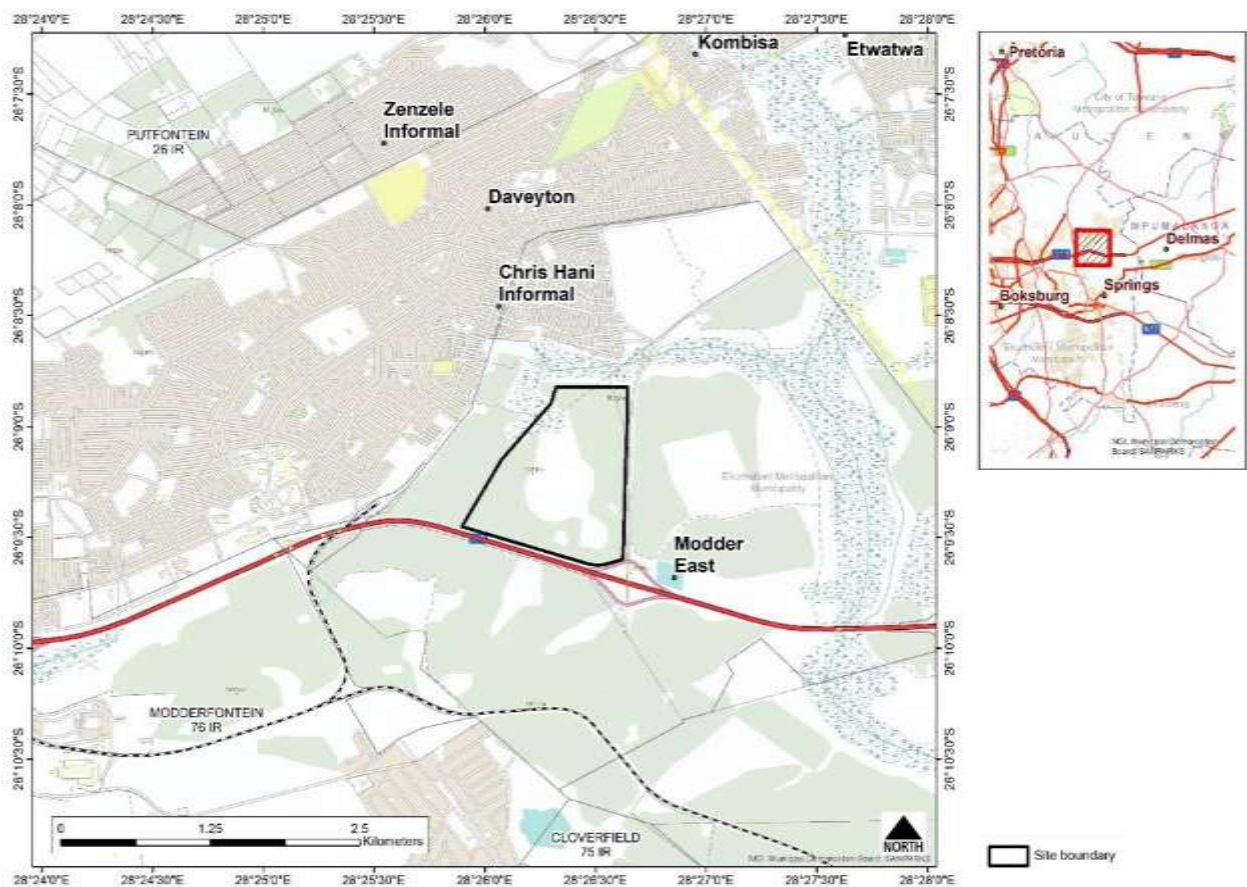


Figure 1. Locality of Chris Hani

The design of the town is as follows:



Figure 2. Farm portions

### 1.3 METHOD

The focus of this study was to evaluate the impact that the development will have on agriculture.

#### LAND USES

Existing land uses were mapped based on high-resolution aerial photos.

The site was visited at various time over the past year, with the latest in April 2019. This visits were to confirm land uses and do a soil survey.



## SOILS

A detailed level survey was done for the proposed development. Soil patterns were identified from the orthophoto and then confirmed by field observations. Soil types were described by using the Taxonomic system for RSA (Soil Working group, 1991).

## WATER

Pans were identified from the orthophoto.

## VEGETATION

There is no natural vegetation on the property.

## OBSERVATIONS

A large number of observations were made of which 44 were photographed. Positions are indicated in the addenda.

# 2 PRESENT LAND USES

## REGIONAL

The land to the north and west is urban. This property and much of the surrounding land is under extreme pressure from land invasions for housing purposes. South and east is farmland, however, mining for coal is expected just east of the site.



Figure 3. Regional land uses

### LAND USE ON THE PROPERTY

- Arable land is cultivated and planted to summer crops;
- The pans are dry for most of the year and is unused;
- The north-western portion was invaded by informal settlers, but they have since been removed. The area is now vacant but no longer arable because of the pits dug for latrines.

*Table 1. Land uses of the property*

Land uses	Size (ha)
Vacant	1,00
Invaded	19,87
Pan	26,26
Mining	1,22
Cultivated	77,79
<b>Total</b>	<b>126,15</b>



*Figure 4. Land uses of the entire farm*

## 3 NATURAL RESOURCES

### 3.1 CLIMATE

#### 3.1.1 RAINFALL

The rainfall is typical of the Highveld's summer rainfall pattern, where more than 80% falls from October through to April. An average of 715 mm rains per year in the area, of which 585mm are considered as effective rainfall during the active growing period that spans from October to March.

**Table 2. Average annual rainfall**

Annual Cycles of Derived Variables														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave	?
Ground Frost Frequency [%]	0	0	0	0	3	15	15	6	0	0	0	0	3	?
Effective Rain [mm]	107	68	68	51	13	8	3	6	19	65	87	88	583	?
Effective Rain Ratio [%]	78	88	88	91	98	99	100	99	97	88	83	83	85	?
Rainy Days	14	9	9	8	2	1	1	1	3	9	12	12	81	?
Solid Precipitation Ratio [%]	0	0	0	0	1	2	2	1	0	0	0	0	0	?

#### 3.1.2 TEMPERATURE

The area experiences severe frost, which occurs frequently from mid-April to as late as September. Occurrence of frost has to be considered in crop selection. The summers are mild where temperatures above 32°C are seldom reached. The highest average maximum temperature of 25.3°C occurs in December. The average minimum temperature of 10.5°C occurs in June and July.

#### 3.1.3 WIND

Wind with moderately high speeds occurs from late winter to early summer. Wind damage to field crops is not expected but damage to deciduous fruit is common.

#### 3.1.4 GROWING SEASON

The growing season commences in early October when precipitation exceeds 50% of transpiration. This lasts until the beginning of April. The dry season with a rain deficit lasts for 4 months of the year. The winter period is dry with little or no vegetative growth.

### 3.2 SOIL

Observations were made through soil auger and probe. The underlying rock is sandstone, tillite or quartzite. The soil is generally moderately deep yellowish, reddish and dark brown coloured with a sandy, clay loam texture. The dominant soil found on the farm is Avalon.

Table 3. Soil types

Soil types	Description	Size (ha)
Av800	Deep dark brown sandy topsoil that overlies yellowish brown subsoil. The deeper subsoil is soft plinthite, with an abundance of brown nodules.	54,0
Av600	Moderately deep dark brown sandy topsoil that overlies yellowish brown subsoil. The deeper subsoil id soft plinthite, with an abundance of brown nodules.	20,9
MsR and Hu/R	Shallow and rocky soils that has severe mechanical limitation on cultivation.	22,0
Dr/Ka	Soil depth shallower than 300 mm. The soil is greyish brown with a texture of clay loam (18 - 24% clay) and has a moderately developed blocky structure. This subsoil is gleyed. Course fragments are abundant and consists of hard ferricrete nodules, that surfaces on large areas. General description: The soil consists of orthic topsoil on hard plinthite.	0,8
Dr300	Classified as Dresden and Katspruit Soil depth shallower than 300 mm. The soil is greyish brown with a texture of clay loam (18 - 24% clay) and has a moderately developed blocky structure. Course fragments are abundant and consists of hard ferricrete nodules, that surfaces on large areas. General description: The soil consists of orthic topsoil on hard plinthite. It is not arable and should remain under veld. Classified as Dresden.	5,0
Wetland Excavations	Pans and excavations. The soils are shallow and waterlogged.	23,2
		<b>125,9</b>



Photo 1. Dr300



Photo 2. Shallow Avalon



Photo 3. Av600



Photo 4. Dr/Ka



Photo 5. Ms/R



Photo 6. Hu / Av800



Figure 5. Soil map

### 3.3 WATER

There is no surface water on the farm that is available for irrigation. Crops will rely on normal rainfall.

### 3.4 VEGETATION

The entire property has been transformed and consists of cultivated areas or old quarries. Some cultivation has taken place within the areas delineated as wetland.

Dominant species that were found in the areas with shallow soil are typical grassland grasses such as *Cymbopogon pospischilii*, *Eragrostis curvula* and *Tristachya leucothri*.

The dominant wetland species found in the pan and excavations are *Phragmites australis* and *Typha capensis*. A large number of other species occur.

## 4 LAND USE CAPABILITY

### 4.1 AGRICULTURAL POTENTIAL

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Land capability involves consideration of:

- Difficulties in land use owing to physical land characteristics,
- The risks of land damage from erosion and other causes; and
- Climate.

The classic eight-class land capability system (Klingebiel & Montgomery, 1961) was adapted for use with Agriculture Geographic Information System (AGIS) in South Africa.

Land capability is classified according to guidelines published by the National Department of Agriculture in AGIS.

Land Capability is determined by the collective effects of soil, terrain and climate features and shows the most intensive long-term use of land for rain-fed agriculture. At the same time, it indicates the permanent limitations associated with the different land-use classes (refer to Table 4).

- Order A: Arable land – high potential land with few limitations (Classes i and ii)
- Order B: Arable land – moderate to severe limitations (Classes iii and iv)
- Order C: Grazing and forestry land (Classes v, vi and vii)
- Order D: Land not suitable for agriculture (Class viii)

**Table 4. Land capability classes – intensity of land uses**

LAND CAPABILITY			Wildlife	Grazing and Forestry			Crop production			
Order	Class			Forestry	Veld	Pastures	Limited	Moderate	Intensive	Very
Arable	A	i								
		ii								
	B	iii								
		iv								
Non arable	C	v								
		vi								
		vii								
	D	viii								

Note: the shaded area indicate the suitable land use

## 4.2 LAND USE CAPABILITY ON THE SITE

Specifically regarding classification of the subject site:

- Class ii (high potential land) is deeper than 800mm and is now cultivated. Approximately 54 hectares falls into this class;
- Class iii (Moderate potential land) has a depth on 600mm. Approximately 20,9 hectares falls into this class;
- Class iv - vi are non-arable land and was classified as Mispah, shallow Hutton and Dresden. The size of the non-arable classes is 27,8 hectares;
- Class vii is the pan and the excavation. These are not arable or suitable for grazing. The size of the non-arable classes is 23,2 hectares.



**Figure 6. Land use capability of the proposed Chris Hani Settlement**

**Table 5. Land use capability of the proposed Chris Hani Settlement**

Capability class	Soil types	Capability description	Size (ha)
ii	Av800	Arable - high	54
iii	Av600	Arable - low	20.9
iv	MsR	Arable - low	6.8
v	Dr/Ka, Hu/R, MsR	Non arable	16
vi	Dr300	Non arable	5
vii	Wetland, excavations	Very low	23.2
<b>Grand Total</b>			<b>125.9</b>

In summary, the land use capability is as follows:

- High potential arable land: 54 ha
- Low potential arable land: 21 ha
- Very low and none: 51 ha

### 4.3 SOCIO-ECONOMIC CONSTRAINTS

There is severe pressure for housing land in this specific area, as is testament by invasions that have already taken place in the north-western part of the property. Coupled with large unemployment and poverty in the Chris Hani Informal settlement, crop production is no longer a viable proposition.

The impact of the above is that crop farming no longer viable.

## 5 CONCLUSIONS

- Most of the arable land is cultivated and planted to summer crops.
- The north-western portion was invaded by informal settlers, but they have since been removed. The area is now vacant but not no longer arable because of the pits dug for latrines.
- Most of the arable land consists of moderately deep Avalon, Clovelly and Hutton soils that vary in depth between 500mm and 800mm.

Rocky outcrops and excavated land are found in the northern portions.

In summary, the land use capability is as follows:

- High potential arable land: 54 ha
- Low potential arable land: 21 ha
- Very low and none: 51 ha

There is severe pressure for housing land in this specific area, as is testament by invasions that have already taken place in the north-western part of the property. Coupled with



large unemployment and poverty in the Chris Hani Informal settlement, crop production is no longer a viable proposition.

## 6 ADDENDA

### 6.1 SOURCES OF INFORMATION

- Criteria for high potential agricultural land in South Africa, Department of Agriculture, Directorate Land Use and Soil Management, 2002.
- Grondklassifikasie Werkgroep, 1991. Grondklassifikasie, 'n Taksonomiese sisteem vir Suid Afrika, Departement van Landbou-ontwikkeling, Pretoria.
- Department of Agriculture. Grazing capacity. Development of Agricultural Land Framework Bill , 2016
- WRC, 2003 South African Atlas of Agrohydrology and Climatology, Water Research Commission
- Anneliza Collett, 2008. The determination, protection and management of high potential agricultural land in South Africa with special reference to Gauteng. Submitted in partial fulfilment of the requirements for the degree M.Sc (Plant Science) in the Faculty of Natural & Agricultural Science University of Pretoria.

## 6.2 OBSERVATION POSITIONS

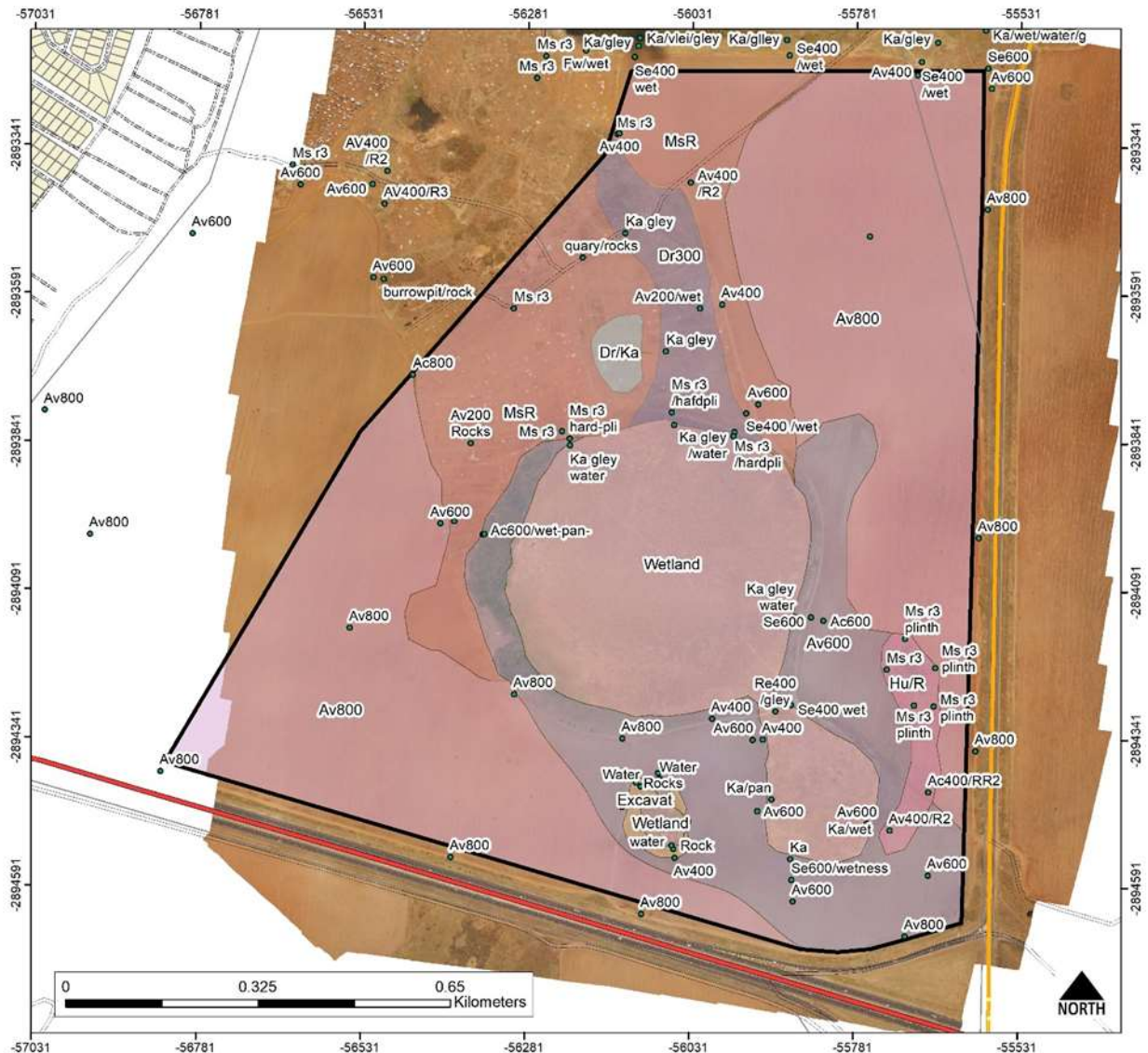


Figure 7. Observation positions

## 6.3 CAPABILITY CLASSIFICATION

Guidelines published on the AGIS website of the NDA was used to determine the capability of soils and their agricultural potential. These guidelines are discussed below.

Soil properties will determine the soil capability for different intensity of use. This is combined with terrain factors and climate to determine the land use capability.

The matrix of qualifications is indicated below:

Table 6. Terrain and soil classes constituting soil capability classes i to viii

Soil Capability class	Terrain		Soil factors				
	Flooding Hazard	Erosion hazard	Soil depth	Soil texture	Internal drainage	Mechanical limitations	Acidity
i	F1, F2	E1; E5	D1	T1	W2, W3	MB0	P1

Soil Capability class	Terrain		Soil factors				
	Flooding Hazard	Erosion hazard	Soil depth	Soil texture	Internal drainage	Mechanical limitations	Acidity
<b>ii</b>	F1-F3	E1,E2; E5	D1,D2	T1,T2	W2, W3	MB0	P2
<b>iii</b>	F1-F4	E1-E3; E5	D1-D3	T1-T3	W1-W4	MB0-MB1	P2
<b>iv</b>	F1-F4	E1-E4; E5	D1-D4	T1-T3	W1-W4	MB0-MB1	P2
<b>v</b>	F1-F5	E1-E5	D1-D4	T1-T3	W1-W5	MB0-MB1	P2
<b>vi</b>	F1-F5	E1-E6	D1-D4	T1-T3	W1-W5	MB0-MB3	P2
<b>vii</b>	F1-F5	E1-E7	D4-D5	T1-T3	W1-W5	MB2-MB4	P2
<b>viii</b>	F1-F5	E1-E8	D4-D5	T1-T3	W1-W5	MB2-MB4	P2

The criteria to determine the soil capability for each soil factor are as follows (see figure 9 for details):

- Soil depth, texture, internal drainage is based on soil types; and mechanical limitations.

### 6.3.1 TERRAIN FACTORS

#### FLOODING HAZARD

The stream is classified as channelled valley according to the HGM system employed by the Department of Water Affairs.

The rating for flood hazard is indicated below:

*Table 7. Criteria for flooding hazard*

Class	Frequency	Duration	Class description
F1	None	None	No reasonable possibility of flooding (near 0% chance of flooding in any year).
F2	Rare	Very brief	Flooding unlikely but possible under unusual weather conditions (from near 0 to 5% chance of flooding in any year, or near 0 to 5 times in 100 years). Flooding will last less than 2 days.
F3	Occasional	Brief	Flooding is expected infrequently under usual weather conditions (5 to 50 times in 100 years). Area flooded for a period of 2 to 7 days.
F4	Frequent	Long	Flooding is likely to occur often under usual weather conditions (more than a 50% chance of flooding in any year or more than 50 times in 100 years). Flooding commonly lasts from 7 days to 1 month.
F5	Common	Very long	Flooding is a regular feature under usual weather conditions and may last a very long time. Examples are wetlands and active streambeds of rivers.

### **6.3.2 CLIMATIC FACTORS**

The parameters used are length of growing season, temperature and hazards related to hail and frost.

Climate conditions will not affect the land use capability.

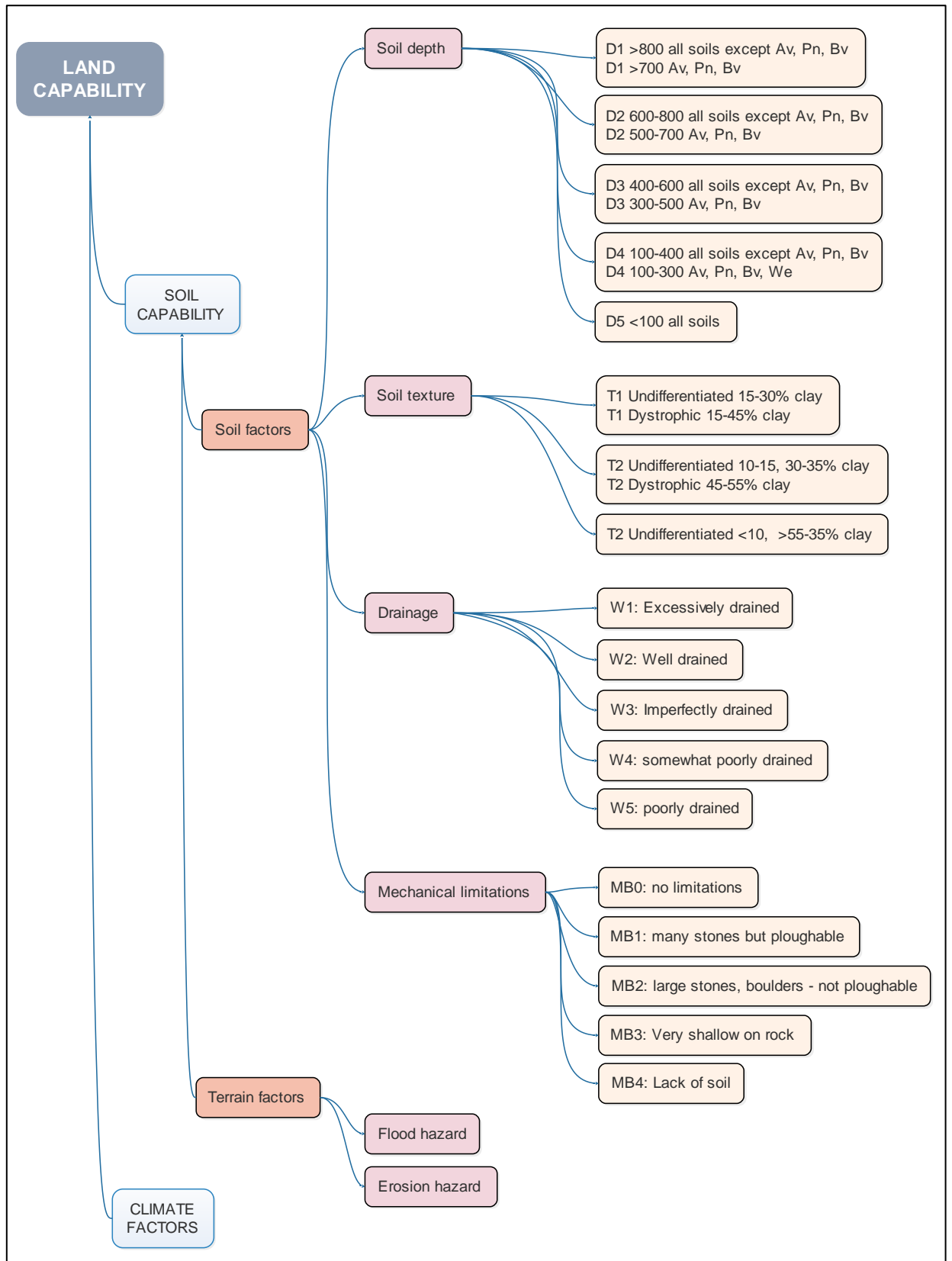


Figure 8. Flow diagram to determine land capability

# Appendix H: EMPr

TO BE UPDATED FOR THE FINAL BAR

# DRAFT ENVIRONMENTAL MANAGEMENT PLAN (EMP) IN SUPPORT OF BASIC ASSESSMENT REPORT

Chris Hani Ext 4 to be developed on a Portion of the Remainder of the Farm  
Modder East 71-IR, and a small part of the Remainder of Portion 1 of the Farm  
Modder East 72-IR., Ekurhuleni Metro

GAUTENG DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT (GDARD)  
REFERENCE NUMBER: GAUT 002/17-18/E2080

COMPILED FOR:

GREENFIELDS GARDENS (PTY) LTD

PREPARED BY:

INDEX (PTY) LTD  
P.O. BOX 96023  
WATERKLOOF VILLAGE  
PRETORIA, 0145  
TEL: +27 (0)12 346-5307  
E-MAIL: INDEX@IAFRICA.COM

JUNE 2019

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# ENVIRONMENTAL AMANAGEMENT PLAN (EMP)

CHRIS HANI EXT 4 TO BE DEVELOPED ON A PORTION OF THE REMAINDER OF THE FARM MODDER EAST 71-IR, AND A SMALL PART OF THE REMAINDER OF PORTION 1 OF THE FARM MODDER EAST 72-IR., EKURHULENI METRO.

## 1 INTRODUCTION

The Environmental Management Plan (EMP) Report provides guidelines and directions to ensure that the proposed development is able to pursue its economic goals without impairing the long- term sustainability of the biophysical and cultural environment. The EMP addresses the managerial and operational activities of the development during and after construction. Once approved by the authority, compliance is obligatory for developers, contractors, municipality, service providers and property owners.

## 2 ACTIVITIES COVERED BY THE EMPR/ DESCRIPTION OF ACTIVITY

The site is proposed to be developed for various uses, including a school, church, residential, offices and other ancillary uses. The application site is approximately 158 hectares in extent and is located on the corner of the N12 and Laris Street, Daveyton, Ekurhuleni.

The assessment and EMP also include the installation of the sewer line from the lowest point of the development to the bulk outfall sewer line north of the proposed development.

Figure 1 Site Plan



### 3 OWNER / DEVELOPER OF SITE/ MUNICIPALITY

Greenfields Gardens (Pty) Ltd

The developer is ultimately responsible for:

- Commissioning the preparation, implementation and monitoring of the EMP.
- Ensuring that the EMP is submitted for approval with the Environmental Impact Assessment and that approval in the form of an Environmental Authorization is given before development begins.
- Appointing the Environmental Control Officer (ECO).
- Ensuring compliance by all parties and the imposition of penalties for non-compliance through the ECO.
- Appointment of an Internal Environmental Officer (IEO)
- Bearing the costs of development and implementation.
- Implementing corrective action where required
- After the development has been completed and individual buyers take ownership, the above responsibilities devolve to the property owners' association or other appropriate organisation.

### 4 ENVIRONMENTAL CONSULTANT

INDEX (PTY) Ltd

The consultant is responsible for:

- Preparing the EMP.
- Facilitating its submission to the Authority for an Environmental Authorization.
- The consultant is *not* responsible for the implementation or the monitoring of the EMP unless expressly commissioned to do so.

The consultant has ±30 years' experience in environmental planning. This includes environmental impact assessment and environmental management. The Company has undertaken numerous EIA and BA applications for authorisation under both the Environment Conservation Act (Act 73 of 1989) and the National Environmental Management Act (NEMA)(as amended) (Act 107 of 1998).

### 5 AUTHORITY

GAUTENG DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT (GDARD)

The Authority is responsible for:

- Appraising the EMP in the light of the Basic Assessment Report (BAR) findings and other relevant information.
- Calling for modifications, extensions or further information if required.
- Issuing an Environmental Authorization on the Environmental Impact Report, which includes approval (or otherwise) of the EMP.

### 6 ENVIRONMENTAL CONTROL OFFICER (ECO)

TO BE APPOINTED

The ECO is appointed by the developer and is responsible for:

- Implementing all aspects of the EMP.
- Monitoring and verifying compliance with the EMP by contractors, sub-contractors, agents, property owners and any other parties concerned with the development.

- Being fully familiar with relevant legislation and regulations.
- Providing guidance and assistance to all participants in implementing and complying with the EMP.
- Keeping a permanent, written and photographic record of activities, instances of non-compliance.
- Implementing corrective action with regard to the EMP and imposing appropriate penalties for non-compliance as authorised by the owner/developer.

## 7 CONTRACTORS AND SERVICE PROVIDERS

All contractors, sub-contractors and service providers are responsible for:

- Incorporating the EMP into their contracts and signing agreements to comply with its conditions.
- Submitting an obligatory Methods Statement for approval by the ECO before any work is undertaken.
- Adhering to any instructions issued by the ECO.

## 8 PROPERTY OWNERS ASSOCIATION OR SIMILAR BODY

Once ownership of the development falls to the buyers of properties, responsibility for implementing all aspects of the EMP must be incorporated into the constitution of the property owners associations, body corporates, managing agencies etc.

## 9 LEGISLATION AND POLICY

Management of the development during both the construction and the operational stages is subject to a suite of environmental law. Compliance with this legislation is an integral aspect of the EMP. Examples of the some of the relevant legislation:

- National Environmental Management Act 107 of 1998 (as amended) National Heritage Resources Act (Act No. 25 Of 1999)
- National Environmental Management: Biodiversity Act (Act 10 of 2004) National Environmental Management: Protected Areas Act (Act 57 of 2003) Conservation of Agricultural Resources Act (Act 43 of 1983)
- National Water Act 36 of 1998
- Atmospheric Pollution Prevention Act 45 of 1965
- Local Government Municipal Structures Act 117 of 1998 Hazardous Substances Act 85 of 1993
- Fire Services Act 99 of 1956
- Occupational Health and Safety Act 85 of 1993 Environmental Planning Act (Act No. 88 of 1967)
- Forest and Veld Conservation Act (Act No. 13 of 1941) Land Survey Act (Act No. 9 of 1921)
- Minerals and Petroleum Resources Development Act (Act No. 28 Of 2002) Soil Conservation Act (Act No. 76 of 1969)
- Water Services Act (Act 108 of 1997)
- Relevant building codes (e.g. SABS 089)
- Provincial and Local Government Ordinances and Bylaws Land Use Planning Policies.

## 10 EMP UPDATE

This EMP must be updated upon:

- receipt of an Environmental Authorization (EA), and/or
- issues of any relevant environmental permit, licence, or authorisation with respect to the project.

## 11 PLANNING, DESIGN AND PRE-CONSTRUCTION PHASE

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
All planning and design aspects of the development	None	<p>Planning and design of all elements of the development to be in accordance with acceptable and approved standards as required by the relevant authorities and as stipulated in this EMP.</p> <p>Planning and design to take cognisance of localised conditions and circumstances, particularly in terms of any sensitive areas on the site such as the pans, existing attenuation pond, control of building operations, appropriate approved and registered contractors, access to the site, source of labour and transportation.</p>	Project planning team	Throughput planning phases, before construction commences
Contractual Issues	None	<p>All appointed contractors will be contractually bound to these conditions as well as the provisions of this EMP.</p> <p>The appointed contractors will undertake an induction process with all staff and workers on site and issue a written schedule of rules and work conditions specific to the site.</p>	Project planning team and developer as well as contractor	As required
Site Establishment and site infrastructure	Vegetation and soil disturbance	<ul style="list-style-type: none"> <li>• The contractor and/ or developer must provide for the following:</li> <li>• The installation of a fence around the pan.</li> <li>• The construction site camp and plant laydown-yard are to be fenced off.</li> <li>• Adequate ablution facilities for all construction personal are to be provided. Defecating anywhere other than in the toilets provided is strictly forbidden.</li> <li>• Eating areas must be safe from animals, to avoid pests on the site and should encourage animals towards the construction camp.</li> <li>• Provide clean drinking water to all construction staff.</li> <li>• Provide refuse bins and waste skips in the construction site office area as well as on the construction site.</li> <li>• All roads and accesses to the site must be maintained.</li> </ul>	Project planning team and developer as well as contractor	Before actual construction commences on the site

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
		<ul style="list-style-type: none"> <li>Vehicles may not leave the designated roads, tracks and/or turnaround points at any time.</li> </ul>		
Demarcation of the Sites	Vegetation and soil disturbance, visual and noise	<ul style="list-style-type: none"> <li>The Contractors shall demarcate the boundaries of the actual construction areas on the site in order to restrict their construction activities to the areas that are necessary for the installation of infrastructure.</li> <li>A fence must be constructed around the pan and along the boundary of the construction site, to reduce stormwater flow off the construction site and in to the adjacent roads as well as keep construction personnel on the site</li> </ul>	Contractor and developer	Before commencement of construction
Topsoil conservation	Loss of topsoil	<ul style="list-style-type: none"> <li>Any topsoil which is to be stripped for the installation of services or for the construction on site must be stockpiled for use during rehabilitation and landscaping of the road verges, parking areas and general garden and landscaped areas within the development Sand bags are to be placed at the base of all topsoil stockpiles as soon as the topsoil is stockpiled, in order to limit erosion and washing away of the soil during any rain storms.</li> <li>No topsoil is to be stockpiled outside of the actual demarcated site area</li> </ul>	Contractor	Before construction
Movement of Construction Personnel and Equipment on and off site	Disturbance to traffic and residential areas of Kempton Park	<ul style="list-style-type: none"> <li>Movement of all construction personnel to and from the construction sites must be strictly controlled and monitored. No unauthorized movement of personnel is permitted.</li> <li>Construction personnel are only to move onto site and off site by means of official construction related vehicles and at the official entrance to the property</li> </ul>	Contractor	Daily
Erosion Control	Loss of soils due to erosion	<ul style="list-style-type: none"> <li>The Contractors shall take all reasonable measures to ensure that erosion does not occur as a result of any construction related activities.</li> <li>Measures such as cut off trenches, sand bags, haybales and berms must be installed in areas where erosion has or is predicted to take place. This must be done in conjunction with ECO and managed accordingly.</li> </ul>	Contractors and ECO	As required

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
		<ul style="list-style-type: none"> <li>Soil is to be stockpiled around the sides of the site and on the higher ground so that it does not wash away off the site during heavy storms</li> </ul>		
Legal compliance	Non-compliance	<ul style="list-style-type: none"> <li>All relevant legislation must be adhered to before construction commences. The environmental authorisation as well as any licences or permits must be in place before construction commences, and any recommendations contained in these permits, licences and/or authorizations must be incorporated into the project design.</li> </ul>	Project Manager and contractor	As required
IAP consultation	Unplanned impacts on neighbours	<ul style="list-style-type: none"> <li>A form must be established to allow neighbours and other IAP's to raise concerns.</li> <li>It is proposed that a register be kept at the site offices where complaints can be registered.</li> <li>Complaints must be reacted to within a maximum of 7 days and the response and methods of ameliorating complaints submitted to the complainant.</li> </ul>	ECO/ developer	Monitor daily and reporting within 7 days.

## 12 CONSTRUCTION PHASE

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
Monitoring and reporting	Compliance with the EMP and Environmental Authorisation.	<ul style="list-style-type: none"> <li>Monitor site activities and compliance with EMP.</li> <li>Identify, propose, monitor and sign off on the implementation of rectification measures</li> </ul>	ECO/ developer	Monitor daily. Full report back monthly.
Environmental Incidents	Environmental incident during the construction phase	<ul style="list-style-type: none"> <li>The ECO must immediately be informed should any serious incident occur which is likely to have detrimental effects on the environment. A record of these incidents must be kept.</li> </ul>	Contractor and ECO	As required
Traffic	Degradation to access roads to the site	<ul style="list-style-type: none"> <li>Schedule all construction related deliveries between certain times of the day, preferably NOT before 7am or after 5pm.</li> <li>No work is to be undertaken on Sunday's and normal working hours of 7am to 5pm must be adhered to, to avoid disturbance outside of</li> </ul>	Contractor	Daily

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
		<p>these times to neighbouring residents.</p> <ul style="list-style-type: none"> <li>Trucks and delivery vehicles must strictly obey speed limits on all residential roads so as to not cause additional noise or dust from driving at high speed in the vicinity of the site</li> <li>Any damage to roads caused as a direct result of the construction vehicles must be fixed immediately.</li> </ul>		
Maintenance of vehicles and equipment	Oil, diesel, petrol leaks	<ul style="list-style-type: none"> <li>Regularly check vehicles, machinery and equipment operating on site to ensure that none have leaks or cause spills of oil, diesel, grease or hydraulic fluid.</li> <li>No vehicles, machinery or equipment with leaks or causing spills may be allowed to operate on the construction site. These must be sent to the maintenance yard or workshop for repair, or must be removed from site.</li> </ul>	Contractor	Daily
Noise	Nuisance from excessive noise associated with construction	<ul style="list-style-type: none"> <li>Keep residents of the area surrounding the site informed of unusually noisy activities (i.e. blasting, but this is not likely).</li> <li>Noise suppression measures can be applied to all equipment.</li> <li>Equipment must be kept in good working order, and where appropriate fitted with silencers which are to be kept in good working order.</li> <li>The project contractor and developer must agree to specified work times during the week, to limit any noise disturbance. No construction activities are to take place on the site on a Sunday or public holiday. Only emergency construction work to take place on a Sunday, in accordance with an agreement between the developer, contractors and surrounding residents</li> </ul>	Contractor and ECO	As required
Soil and geological conditions	<p>Changes to Soil Structure as a Result of disturbance</p> <p>Loss of topsoil due to erosion.</p>	<ul style="list-style-type: none"> <li>Soil stripping should be limited to areas within the sites that the contractors and developers require for services or structures, so as to limit soil disturbance (as well as unnecessary removal of all vegetation.</li> </ul>	Contractor, project engineer, site engineering geologist	Check daily

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
		<ul style="list-style-type: none"> <li>• All good topsoil exposed must be stockpiled for use in rehabilitation and landscaping. Stockpiles must be on already disturbed areas</li> <li>• All cement or mortar mixing shall be done in already impacted areas, and on trays or sealed areas (e.g. brick bunded areas), to prevent soil contamination Measures such as cut off trenches, sand bags, haybales and berms must be installed in areas where erosion has or is predicted to take place. This must be done in conjunction with the ECO</li> <li>• All conclusions and recommendations contained in any further onsite Engineering Geological Investigations, as well as all of the final recommendations made must be adhere to before any construction is to commence on the site</li> </ul>		
Ground water pollution	Decrease in ground water quality and quantity	<ul style="list-style-type: none"> <li>• All cement or mortar mixing shall be done in already impacted areas, and on trays or sealed areas, to prevent any water pollution. All excess cement must be disposed of at a registered landfill site</li> <li>• Any hazardous substances (i.e. diesel or oil) that are spilled must be contained and removed immediately.</li> <li>• All hazardous storage vessels must be designed and managed in order to prevent pollution. All vessels to be bunded.</li> <li>• The main contractor will be responsible for ensuring that used oils/lubricants are not disposed of on or near the site, and that contractors purchasing these materials understand the liability under which they must operate.</li> </ul>	ECO and Contractor	Daily
Surface water pollution	Decrease in surface water quality and/ or quantity	<ul style="list-style-type: none"> <li>• The entire work site must be managed in order to prevent pollution of any nearby watercourse systems, due to suspended solids, silt or chemical pollutants.</li> <li>• All cement or mortar mixing shall be done in already impacted areas, and on trays or sealed areas, to prevent any water pollution. All excess cement must be disposed of off site, at a registered land fill site that accepts discard cement.</li> </ul>	Contractor and ECO	Daily



Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
		<ul style="list-style-type: none"> <li>• Measures such as cut off trenches, sand bags, haybales and berms must be installed in areas where erosion has, or is predicted to take place. This must be done in conjunction with the ECO.</li> <li>• Implement “eco-engineered” grassed swales and bio-filters within the parking areas and roads within the overall site that will minimise the impact of water runoff into the pan and attenuation ponds.</li> <li>• A site boundary fence with shade cloth must be constructed around the construction site, which will act as a good buffer between the construction site and the residential areas.</li> <li>• Exotic vegetation which is likely to become established on bare soils during the construction activities should be managed and removed to prevent it from becoming established on the site.</li> </ul>		
Air pollution due to dust and odours	Air pollution due to dust, odours or fire	<ul style="list-style-type: none"> <li>• The Contractors will wet exposed soil surfaces on the site with a water bowser or sprinklers, as necessary to minimise dust problems.</li> <li>• The Contractors will commence rehabilitation of exposed soil surfaces as soon as practical after completion of construction to limit any dust</li> <li>• Cooking will only be permitted at a designated area and the establishment of open fires will strictly prohibited</li> </ul>	Contractor – ECO to monitor strictly	Daily
Security	Crime	<ul style="list-style-type: none"> <li>• The relevant policing and security forces that are responsible for the area must be approached and become involved in the monitoring of activities on the site during construction.</li> <li>• During construction, the developer is responsible for controlling access to the site and guards the site to reduce crime.</li> <li>• No construction personnel will only be allowed to live on the site.\</li> <li>• There is to be 24-hour security at the construction camp/ laydown yard to control all access to this area.</li> </ul>	Contractor and developer	Daily

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
		<ul style="list-style-type: none"> <li>Fence off and screen (using shade cloth) the entire site, along the roads and all property boundaries.</li> </ul>		
Waste management	Littering, contaminated water runoff, hazardous spills	<ul style="list-style-type: none"> <li>All waste streams (general, solid, liquid, hazardous etc...) must be disposed of adequately by the contractor/ developer.</li> <li>Provide general waste bins (and Waste skips) throughout the construction site camp and enforce the use of these by all construction personnel. Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out or being overturned</li> <li>Immediately clean any accidental oil or fuel spills or leakages, and clean up and dispose of all general or non-hazardous construction related waste immediately.</li> <li>A dedicated waste contractor must be appointed to oversee the entire waste management process during construction</li> </ul>	Contractor – ECO to inspect  Waste management consultant	Daily
Fire	Destruction of properties surrounding site	<ul style="list-style-type: none"> <li>The Contractor and developer shall take all the necessary precautions to ensure that fires are not started as a result of activities on site</li> <li>No open fires for heating or cooking shall be permitted anywhere but the designated site next to the site office/construction camp. Closed fires or stoves shall only be permitted at agreed designated safe sites at the site office.</li> <li>All firefighting equipment is to be onsite at all times</li> <li>Any fire started intentionally or unintentionally from the site during construction will be the responsibility of the contractors and site developers</li> </ul>	Contractor, ECO monitor	Daily
Vegetation (flora)	Reduction of biodiversity/ loss of flora as a result of the development	<ul style="list-style-type: none"> <li>The site is already very disturbed and degraded. Sensitive areas are the pans.</li> <li>Landscaping within the development should be all indigenous and large trees should be planted as soon as construction of roads and services is complete.</li> </ul>	Contractor and ECO	Monitor continuously

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
Wildlife (fauna)	Disturbance to natural wildlife and/or loss of natural wildlife	<ul style="list-style-type: none"> <li>No animals must be trapped or killed during the construction phase of the development.</li> <li>Ensure that the Work Site is kept clean, tidy and free of rubbish that would attract animals.</li> </ul>	Contractor and ECO	Monitor continuously
Stormwater management	Increased runoff from the site	<ul style="list-style-type: none"> <li>Consultants were appointed to prepare a stormwater management plan (SWM). The purpose of the stormwater management plan was to establish general principles for stormwater management for the entire development.</li> <li>The objective of stormwater management is to identify the stormwater routes to suitable outlets and to provide adequate storage for the difference between the pre- and post-development scenarios for a 1:25 year rainfall event in order to ensure that the run-off is introduced into the system at a rate equal, or less than, for the pre-development scenario. The difference in the volume are catered for by introducing retention ponds for each catchment where required.</li> </ul>	Contractors and ECO	Monitor continuously
Plant collection	Unnecessary damage to Flora/ loss of valuable flora	<ul style="list-style-type: none"> <li>No plant collecting for medicinal or other purposes to occur on the site or on the neighbouring sites or open areas</li> </ul>	Contractor and ECO	Daily
Alien invasive plants and weeds	Emergence of Invasive Weeds to the Detriment of Indigenous Plants	<ul style="list-style-type: none"> <li>All invasive weeds and exotic plants on the site are to be identified and removed during the construction phase of the project.</li> <li>According to the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared aliens that occur on the property must be effectively controlled. In terms of this Act 198 alien species were listed as declared weeds and invaders and ascribed to one of the following categories: <ul style="list-style-type: none"> <li>Category 1: Prohibited and must be controlled.</li> <li>Category 2: (commercially used plants – i.e. the Eucalyptus trees): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.</li> </ul> </li> </ul>	Contractor and ECO	Daily

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
		<ul style="list-style-type: none"> <li>Category 3: (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within flood lines of watercourses and wetlands</li> </ul>		
Socio-economic (positive)	Economic investment by the applicant in public roads and infrastructure and well as job creation	<p>Jobs will be created during the construction and operation phase of the development – for formal skilled jobs and informal jobs.</p> <p>Additional actions to enhance the positive socio-economic impact are as follows:</p> <ul style="list-style-type: none"> <li>Utilise local market - The labour force should largely be recruited from the local communities, where ever possible, including skilled and semi-skilled positions. The contractors must indicate that recruitment will take place through formal procurement procedures, which will be implemented in conjunction with the local community.</li> <li>Training and Education - In order to facilitate training and education, it is recommended that the contractors, where possible, recruits its Employees from previously disadvantaged groups and from low income areas such as Daveyton, and not only will they fill certain posts, but for those posts that they are inexperienced in, a mentorship process should be initiated.</li> <li>Labour intensive construction methods - Where appropriate, labour intensive construction methods should be utilised to maximize the potential number of employment opportunities whilst mitigating impact on site of machinery</li> </ul>	Contractor and developer	Continuous

### 13 POST-CONSTRUCTION REHABILITATION PHASE

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
Site clean-up		Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, fixtures, waste and any other temporary construction works.	Contractor and developer. ECO and landscape architect	Once off after construction
Rehabilitation		<ul style="list-style-type: none"> <li>The principle of progressive reinstatement must be followed wherever possible. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded.</li> <li>All topsoil removed for any reason during construction must be used for landscaping or to rehabilitate any areas scarred by construction works, that will form a part of landscaping plans</li> <li>In areas with natural vegetation, indigenous grass and shrubs should be planted in areas which are devoid of vegetation.</li> <li>Landscaping of gardens within the development area must be undertaken by qualified landscapers and in accordance with approved landscape development plans.</li> </ul>	Contractor, developer and ECO.	Directly after construction, until such time as the ECO is satisfied with the rehabilitation

### 14 OPERATIONAL PHASE

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
Legal requirements	Non-compliance	<ul style="list-style-type: none"> <li>The EMP may need to be updated on a periodic basis to ensure that environmental legal requirements for the operational phase are adhered to.</li> <li>An on-site safety plan must be available and all staff must be trained in the appropriate emergency procedures.</li> <li>The conditions of this EMP must be implemented strictly by the Management and landscape maintenance team</li> </ul>	Contractor and developer/ HOA/ management committees	Continuous

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
Vegetation and landscaping management	Loss of vegetation, positive reintroduction of indigenous vegetation	<p>Landscaping should be environmentally sensitive and should meet the following requirements:</p> <ul style="list-style-type: none"> <li>• Limited irrigation through water-wise gardening (use local plants adapted to local conditions).</li> <li>• Rainwater harvesting should be undertaken and used for garden watering</li> <li>• Strict fertiliser, pesticide and herbicide control (limited usage of biological friendly products).</li> <li>• Reduction of weeds and erosion control by minimum tillage gardening practices (use of groundcovers and mulching).</li> <li>• Strictly monitor for emergence of any exotic/invasive plants within the development, on the outside fringes of the development and along all road – particularly during early spring and summer.</li> <li>• Remove all invasive plants in the area (as required), as well as within the road reserves.</li> <li>• Re-vegetate/ plant area with indigenous plants where necessary.</li> </ul>	HOA/ management committees	Continuous
Sewerage and waste (services)	Spills or broken pipes	<ul style="list-style-type: none"> <li>• All waste will be disposed of by the municipality, as agreed by the service agreements and bulk service contributions.</li> <li>• General waste generated by the development will be disposed of at a registered landfill site as agreed by the municipality</li> <li>• All spillages or broken pipes are to be attended to immediately to avoid environmental contamination</li> <li>• All general waste will be disposed of by the municipality, as agreed by the service agreements and bulk service contributions by the developer. General waste generated by the development will be disposed of at a registered landfill site as agreed by the municipality</li> <li>• General waste must be sorted on site into the various waste types and recycled accordingly</li> </ul>	HOA/ management committees	Continuous

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
Geology and soils	Erosion	<ul style="list-style-type: none"> <li>Implement "eco-engineered" grassed swales along all the main access roads on the development site that will minimise the impact of water runoff.</li> <li>The use of Sustainable Drainage Solutions (SuDS) in car parking areas and in landscaped gardens around the site will assist in "scrubbing" stormwater runoff and filtering it through bio-swales, bio- retention areas, filter strips, permeable pavements or infiltration trenches</li> </ul>	HOA/ management committees	Continuous
Stormwater management	Erosion and stormwater management	<ul style="list-style-type: none"> <li>Implement "eco-engineered" grassed swales along all the main access roads in the development site that will minimise the impact of water runoff on the pans.</li> <li>All grassed swales are to be planted and maintained with an indigenous creeping grass species such as <i>Cynodon dactylon</i> to limit erosion.</li> <li>The implementation of Sustainable Drainage Systems (SuDS) within the development must be encouraged.</li> </ul>	HOA/ management committees / appointed landscape contractor	Continuous
Security	Crime	The relevant policing and security forces that are responsible for the area must be approached and become involved in the monitoring of the area, access control and general security.	HOA/ management committees	Continuous

## 15 DECOMMISSIONING PHASE

Aspect/ activity	Impacts	Management and mitigation	Responsibility	Frequency
Permanent closure and decommissioning	N/A	This activity will not be decommissioned. This project has an extended lifespan period, and it is determined that decommissioning of the project will never happen. Due to this, no possible mitigation can at this stage be tabled, due to many environmental changes that will take place over time, which will subsequently render any mitigation discussed, void.	N/A	N/A

# Appendix H: Impact Assessment Methodology

## 1 Method used in determining the significance of environmental impacts

The results of the investigation are combined and a matrix of criteria developed to assess the possible impacts. The values for each criterion are calibrated so as to differentiate not only between the weights of criteria, but also the significance of a particular weight. Aspects that are considered are:

### 1.1 Nature and Extent of the impact

The spatial or geographic area of influence of the impact, i.e.:

- site specific: extending only as far as the activity;
- local: limited to the immediate surroundings;
- regional: affecting the municipality or the region;
- national: affecting large parts of the country;
- International: affecting areas across international boundaries.

### 1.2 Duration

The predicted life-span of the impact:

- short term, (e.g. duration of the construction phase);
- medium term, (e.g. operational phase);
- long term, (e.g. lifespan of the project);
- Permanent, where time will not mitigate the impact.

### 1.3 Intensity

The magnitude of the impact on the environment:

- low, where natural resources are not affected;
- medium, where natural resources are affected to a limited extent;
- high, where resources are significantly affected.

### 1.4 Probability

The degree of possibility of the impact occurring:

- improbable, where the possibility of the impact occurring is very low;
- probable, where there is a distinct possibility that the impact will occur;
- highly probable, where it is most likely that the impact will occur; or
- Definite, where the impact will occur regardless of any prevention measures.

### 1.5 Significance

The significance of impacts will be determined by their nature, duration, intensity, extent and probability, and be described as:

- low, where it will not have an influence on the decision;



- medium, where it should have an influence on the decision unless it is mitigated; or
- high, where it would influence the decision regardless of any possible mitigation.

## 2 Impact prediction

The impact matrix indicates various impacts, ranging from low to very high. The significance culminates into a matrix of criteria and extent of impact as set out in the table below:

*Table 1. Impact assessment matrix*

Aspect	Description	Weight
Probability		
	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration		
	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale		
	Local	1
	Site	2
	Regional	3
Magnitude/Severity		
	Low	2
	Medium	6
	High	8
Significance. Sum (Duration, Scale, Magnitude) x Probability		
	Negligible	<20
	Low	<40
	Moderate	<60
	High	>60

# Appendix I: Company Profiles

## J.01. INDEX Company profile and EAPs CV's

6/10/2019

## **Short CV: Dr Eugene Gouws**

Tel 012 346-5307 or 082 553-3787

E-Mail: Eugene@iafrica.com

Address: PO Box 96023, Waterkloof Village, 0145

Web site: www.indexsa.net

### **Specialisation**

Environmental Impact Assessment, Environmental Planning, Mining applications and Environmental Management Plans

### **Education**

University of Pretoria

1977 | Bachelor's degree in Landscape Architecture

1992 | Master's degree in Landscape Architecture

Trinity University

2005 | PhD (Interdisciplinary Studies)

### **Position**

#### **1991 – 2015.**

Director of **INDEX** (Pty) Ltd. (Integrated Rural and Urban Development Expertise). This firm specialises in Environmental Impact Assessments and the integration of expertise in the planning and management of eco-tourism, agricultural and mining projects.

#### **1996 to 1998**

Project Manager of the Elephant Coast Tourism Development Company in Mozambique. Was involved in structuring the company and preparing policy on conservation and development and co-ordinating developments with the Mozambican Government and World Bank for a conservation area of 250 000 ha between Maputo and the South African border at KwaZulu-Natal. The owner of the concession passed away and the project was abandoned.

#### **1980 to 1996**

Partner of Gouws Uys & White Landscape Architects and Environmental Planners and headed Environmental Planning, EIA and Eco-tourism & Strategic Planning.

#### **1975 to 1980:**

Landscape Architect in charge of the ecological planning in the office of Farrell and Van Riet. Responsibilities were Environmental Planning, Rehabilitation, Environmental Impact Assessments and planning of recreation facilities.

### **Experience in EIA: Selected projects**

#### **Troutmere Holdings**

Development proposal and restructuring of Troutmere, a trout angling resort between Dullstroom and Belfast, Mpumalanga Province, South Africa.

**Northwest Province Parks Board**

Development Masterplan, site works and project co-ordination for the camps in the Pilanesberg National Park, Borakalalo National Park and Lotlamoreng Dam

**Proplexis**

Development proposals for Digger's Valley, a potential tourism project at Pilgrim's Rest linked to the gold mines of the previous century.

**Cape Technicon Campus Planning**

Landscape masterplan, contract documentation and construction supervision.

**Various**

Site development plans for housing estates such as Highburry Estate in George, Redcliff Private Reserve at Pelindaba, Agricultural Village at Greyton, and Soccer Training Village at Meyerton for Pirates Soccer Club

**ENVIRONMENTAL MANAGEMENT PLANS AND MINING****Valpré**

Land Management Proposal and EIA for the bottling Plant, which aimed at setting management guidelines to ensure consistent quality and mineral content from springs by manipulating land use;

**De Beers & Bathopele Resources**

EIA, Environmental Management Plan and mine planning of alluvial diamond deposits in the Cullinan Nature Reserve

**North West Mining Chambers**

Permitting, EIA and Environmental Management Plan of a travertine deposit at Taung

**Bathopele Resources**

Environmental Management Plan and permitting of an alluvial diamond deposit at Aggeneys

**SAMREC**

EIA and EMPR of the SAMREC Andalusite Mine at Penge in Limpopo Province

**HIPPO Quarries**

Environmental Management Plan of more than 20 quarries throughout South Africa: Ferro Crushers, Jukskei Quarry, Makassar Sand in the Cape Peninsula, Middleburg Quarry, Eikenhof Quarry, Malmesbury Quarry, Belville Quarry, etc.

**Mpumalanga Roads Authority**

EIA's and EMPR's of roads and borrow areas at White River, Jeppe's Reef and Khombaso.

**North West Roads Authority**

EIA's and EMPR's of roads and borrow areas at Madidi, Kgomo-Kgomo, Moretele and Dikebu.

**Buildmax Aggregates and Quarries**

Consultant for Buildmax undertaking resource estimations, mine works plans, EMPR's and environmental auditing of mines at Bapsfontein and Rayton.

**Makoppa Holdings**

More than 20 applications for prospecting and mining rights for a range of minerals such as gold, diamonds, platinum group metals, iron and heavy metals and coal in Mpumalanga, KwaZulu Natal,

North West Province, Limpopo and Northern Cape. Environmental Management Plans and project management for the above mining applications.

**EBOTSE**

Scoping report and Environmental Management Framework for a golfing estate at Rynfield Dam, Benoni.

**Quinhove Investments**

Development proposals and EIA of an integrated project consisting of an agricultural development, tourism and housing estate on the Vaal River in Gauteng, South Africa.

**Standard Bank of South Africa**

Environmental Impact Assessment of a conservation area with agricultural developments, lodges, hotels and bush camps in the Cradle of Humankind World Heritage Site.

**Department of Housing**

Various environmental impact assessments and Basic Assessments of housing projects in Ekurhuleni, Johannesburg and Tshwane.

**Pietersburg City Council**

EIA of EDUPARK in Pietersburg, a satellite campus of the Universities of the North, Vista and UNISA. Site selection, basic planning and the EIA of the new cemetery for Pietersburg

**Gauteng Department of Agriculture, Conservation and Environment**

Environmental Management Framework (EMF) for Kungwini. This document forms the basis of guiding future development of the area and to prescribe requirements for environmental impact assessment of individual projects.

**Limpopo Department of Environment and Tourism**

Environmental Management Framework (EMF) for the Kruger to Canyons Biosphere Reserve. This framework is the statutory procedure that informs land owners and communities of land use options.

**Elephant Coast Tourism Development Company in Mozambique.**

The structuring of the company, the preparation of conservation and development policy, and co-ordinating developments with the Mozambican Government and World Bank of the 250 000 ha Elephant Coast Conservation area between Maputo and the South African border at KwaZulu Natal.

SIA, EIA and coordination of infrastructure, e.g., 40 kilometres of elephant proof fencing and game introductions of the Elephant Coast Conservation Area in Mozambique

**Ghana Department of Local Government**

Environmental Impact and development proposals for landfill sites in Tamale, Kumasi and Sekondi/Takoradi in Ghana.

This information is true and correct at 1 June 2019



Eugene Victor Gouws.