

**DRAFT BASIC ASSESSMENT REPORT  
FOR THE PROPOSED CONSTRUCTION OF A  
DAM FOR THE STORAGE OF WATER FOR  
THINUS MARITZ VAALWATER (PTY) LTD.  
VAALWATER, LEPHALALE  
LOCAL MUNICIPALITY,  
LIMPOPO PROVINCE**

**SUBMITTED TO:**

**Limpopo Department  
of Economic Development,  
Environment & Tourism**

**20 Hans van Rensburg Street  
/19 Biccard Street  
Polokwane  
Limpopo  
0699**

**APPLICANT:**

  
**Thinus Maritz  
Boerdery  
Vaalwater**



**spoor**  
environmental services

SPOOR Environmental Services (PTY) Ltd.

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South Africa

**December 2021**





## EXECUTIVE SUMMARY

### Introduction

SPOOR Environmental Services (PTY) Ltd. was appointed by Thinus Maritz Vaalwater (PTY) Ltd. as the Environmental Assessment Practitioner to manage the Environmental Management process relevant to the construction and operation of a proposed dam for the storage of water for irrigation. Application was originally made for this dam as part of a Section 24(G) NEMA (Act 107 of 1998) application, for a set of dams and subsequently authorized (12/1/9/S24G-W31). The specific dam was subject to an enlargement of an existing dam alongside the Sterkstroom River, in a different location to the south west of the current proposed position but on the same farm portion A portion of the proposed dam fell within the 1:100 year floodline of the Sterkstroom and was subsequently not licenced by the DWS. As a result of this, the Client decided to move the proposed dam north eastward and outside of the 1:100 year floodline area.

### Locality

The proposed dam will be situated 24km's to the west of the town of Vaalwater on portion 1 of the farm Groendraai 213 KQ, Limpopo Province, South Africa and falls under the jurisdiction of the Lephale Local Municipality as well as the Waterberg District Municipality. The project furthermore falls in the A42E quaternary drainage region (QDR) of the Limpopo Water Management Area (WMA). Access to the property are gained via the R517 which runs on the southern border of the application area.

### Project Description

The proposed project constitute the storing of the existing lawful water allocation in a dam for the purposes of agricultural irrigation. The proposed infrastructure includes;

- ❖ A square dam with compacted earth dam walls and lined with a plastic lining;
- ❖ Dam volume of 150 000m<sup>3</sup>;
- ❖ Covering an area of 3,580 hectares;
- ❖ Maximum dam wall height of 4,8 meters;
- ❖ Associated outlet infrastructure.

### Study Methodology

The approach adopted in compiling the Basic Assessment Report for the proposed project was to discuss the development in terms of its bio-physical and socio-economic components by means of reconnaissance site surveys as well as desktop evaluations. Key environmental issues were identified by superimposing the proposed activities on the existing site environment. Where relevant, alternatives for this phase of the project were compared and evaluated in terms of their anticipated impacts. Interested and affected parties were notified of the intended development along with the relevant authorities. The Limpopo Department of Economic Development, Environment and Tourism will now be consulted to obtain their comments and recommendations.

In short, this Basic Assessment Report will describe the following:

- ❖ The background to the project;
- ❖ a detailed description of the proposed scope of the project;
- ❖ The relevant legislation and guidelines that were considered in preparation of the Basic Assessment Report;
- ❖ a description of the properties on which the proposed activity is to be located;
- ❖ a description of the environment that may be affected by the project which will include all current physical, biological, social, economic, and cultural aspects of the receiving environment;
- ❖ details of the public participation process conducted;

- ❖ a description of all feasible and reasonable alternatives;
- ❖ identification of all physical, biological, social, economic, and cultural environmental impacts of the proposed development on the receiving environment as well as the recommended mitigation measures to reduce any anticipated impacts.

### Public Participation

The public participation process which was followed was conducted as set forth in Chapter 6 of the amended Environmental Impact Assessment Regulations, GN No 326 of the NEMA (Act No. 107 of 1998 as amended). A summary of all the comments received by interested and affected parties, as well as the response from the environmental practitioner is included in the comments and response report.

### Alternatives

The following alternatives were considered:

- ❖ **Location Alternative:**
  - The original position of the proposed dam was designed to be partially inside of the 1:100 year floodline. The proposed dam has now been moved 1,7 km north east. This position is deemed better from an environmental impact point of view as it now falls in an area where no natural vegetation occurs as apposed to the first position where it fell partially in CBA1 and ESA1 category as well as within the 1:100 year floodline.
- ❖ **Scheduling Alternative:**
  - The construction phase of the project will involve some site clearing and earth moving. This will cause loose top soils, which may result in silt laden stormwater runoff during downpours and associated degradation of water quality in local water bodies. For this reason, the construction phase of the project must be scheduled (as far as this is possible) to take place during the winter months when there will be less precipitation and therefore less runoff across the site.

### Environmental Impacts Identified

Anticipated impacts have been identified and described because of the abovementioned processes and the pertinent impacts are summarized in the table below.

### Impact Summary

Potential Impacts	Impact Significance with Mitigation
<b>Geology and Soils:</b>	
❖ Possible scouring and erosion	Low
❖ Possible loss of topsoils	Low
❖ Contaminations	Low
<b>Hydrology:</b>	
❖ ELU volumes	Low
❖ Surface water contaminations	Low
❖ Sedimentation and siltation	Low

Potential Impacts	Impact Significance with Mitigation
<b>Stormwater Management:</b>	
❖ Erosion and siltation	Low
<b>Fauna and Flora</b>	
❖ EWR	Medium
❖ Proliferation of alien vegetation	Low
<b>Local Employment:</b>	
❖ Additional local job opportunities	High (positive)

Comprehensive mitigation measures were developed for each of the identified impacts and are described in detail in Section E of this Report.

### Conclusion

South Africa is situated in a semi-arid region and as such, is classified as a water-scarce country. Due to the high variability in availability of river water, storage needs to be implemented in order to assure the water availability for crop irrigation during dry-spells. In addition, the Limpopo Employment, Growth and Development Plan (LEGDP), which culminates from the revision of the Provincial Growth and Development Strategy (PGDS), includes the policy framework that contains the strategic vision of the province with the aim of growing the economy and enhancing sustained economic growth and job creation.

The Thinus Maritz Vaalwater (PTY) Ltd. farming operations is one of a number of other irrigation farms in the area where pivot irrigation is used for crop farming. In terms of the ecological impacts the proposed dam are not situated in an in-stream position of a sensitive watercourse or within a sensitive vegetation type. Calculations made by the specialist Hydrologist indicated that the Ecological water reserve (EWR) for this reach of the Sterkstroom river is exceeded by some margin. The Hydrologist reported that there is adequate information that points to a possible problem with the EWR calculations for the Sterkstroom though and that this would need to be revisited by the Department of Water and Sanitation (DWS) to determine accurate EWR volumes. Simulated irrigation requirements for the farming operations falls within the low to average use scenarios with the maximum use scenario exceeding the water volume available for irrigation from this reach of the Sterkstroom River.

Irrigation requirement calculations for this study were simulated from the WRSMPitman models which has been setup to simulate the monthly runoff for the Sterkstroom River, for the period of October 1920 to September 2010, as part of the Water Resources of South Africa, 2012 Study (WR2012) (Bailey and Pitman, 2015). The model has been calibrated on river flow gauge A4H008 on the Sterkstroom River in the vicinity of the study area. The legislated addition of water meters on all the water pumps extracting water from the Sterkstroom River for the Thinus Maritz Vaalwater (PTY) Ltd. farming operations will now serve to measure the actual water use for the various farm portions. This will provide real time data that the Thinus Maritz Vaalwater (PTY) Ltd. farming operations can use to ensure that it stays within the ELU limits.

To ensure that water use stays within the EWR and ELU limits on a farm by farm basis is critical. Firstly, for the purposes of safeguarding the required water volumes in the Sterkstroom, to allow this river system to function on optimal ecological levels, and secondly to permit water users to use their lawful use volumes. Should there not be enough water to allow for the EWR requirements in the Sterkstroom river, it will have almost immediate negative implications. These include socio ecological impacts such as reduced water availability and reduced water quality.

The reverse of the above scenario is a situation where all the stakeholders, from the Farmer to the WUA to the local and district Municipalities, the provincial Authorities and the DWS WMA Managers, perform their duties responsibly to ensure sustainable water availability for the river system itself and all the lawful water users, in the long term.

In the light of the environmental data described, issues investigated and discussions with interested and affected parties, it is believed that the Environmental Impact Management Process is completed for this Phase of the impact assessment. It will be imperative to implement the mitigation measures and recommendations stipulated by this Basic Assessment Report and the various specialist studies. These mitigation measures and recommendations are included and refined in the Environmental Management Programme of which adherence must form part of the operational stage management stakeholders (Farmer, LDEDET, DWS, the local Water User Association (WUA) etc..

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## ABBREVIATIONS

CBA	-	Critical Biodiversity Area
CLO	-	Community Liaison Officer
COIDA	-	Compensation for Occupational Injuries and Diseases Act (No 130 of 1993)
DWS	-	Department of Water and Sanitation
EAP	-	Environmental Assessment Practitioner
ECA	-	Environment Conservation Act
ECO	-	Independent Environmental Control Officer acting on behalf of the Client
EIA	-	Environmental Impact Assessment
ELU	-	Existing Lawful Use
EMPr	-	Environmental Management Programme
ESA	-	Ecological Support Area
EWR	-	Ecological Water Requirement
H&S Rep	-	Health and Safety Representative
IEM	-	Integrated Environmental Management
IDP	-	Integrated Development Plan
I&AP	-	Interested and Affected Parties
LLM	-	Lephalale Local Municipality
MAMSL	-	Metres Above Mean Sea Level
NEMA	-	National Environmental Management Act
NEMBA	-	National Environmental Management Biodiversity Act
NEMWA	-	National Environmental Management Waste Act
NFEPA	-	National Freshwater Ecosystems Priority Areas
NHRA	-	National Heritage Resources Act (Act 25 of 1999)
NWA	-	National Water Act (Act 36 of 1998)
OHS	-	Occupational Health and Safety
OHS Act	-	Occupational Health and Safety Act (No 85 of 1993)
PC	-	Principal Contractor
PHRA	-	Provincial Heritage Resources Authority
PM	-	Project Manager
PPE	-	Personal Protective Equipment
QDR	-	Quaternary Drainage Region
QDSG	-	Quarter Degree Square Grid
SABS	-	South African Bureau of Standards
SAHRA -	-	South African Heritage Resources Agency
SANS	-	South African National Standards
SDF	-	Spatial Development Framework
SHE	-	Safety, Health and Environment
SME	-	Small and Medium Enterprise
SSC	-	Species of Special Concern
TDS	-	Total Dissolved Solids
WDM	-	Waterberg District Municipality
WMA	-	Water Management Area
WUA	-	Water Users Association
WULA	-	Water Use Licence Application





# LIMPOPO

PROVINCIAL GOVERNMENT  
REPUBLIC OF SOUTH AFRICA

## DEPARTMENT OF ECONOMIC DEVELOPMENT, ENVIRONMENT & TOURISM

### BASIC ASSESSMENT REPORT - EIA REGULATIONS, 2014

Basic Assessment report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

File Reference Number:

--

NEAS Reference Number:

(For official use only)

Date Received:

Due date for acknowledgement:

Due date for acceptance:

Due date for decision

Kindly note that:

1. The report must be compiled by an independent Environmental Assessment Practitioner.
2. 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.
3. Where applicable **tick** the boxes that are applicable in the report.
4. 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 Department of Economic Development, Environment and Tourism as the competent authority (Department) for assessing the application, it may result in the rejection of the application as provided for in the regulations.
5. An incomplete report may be returned to the applicant for revision.
6. Unless protected by law, all information in the report will become public information on receipt by the department. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.

20 Hans Van Rensburg Street / 19 Biccard Street, POLOKWANE, 0700, P O Box 55464, POLOKWANE, 0700  
Tel: 015 290 7138/ 7167, Fax: 015 295 5015, website: <http://www.ledet.gov.za>

*The heartland of southern Africa – development is about people!*

7. The Act means the National Environmental Management Act (No. 107 of 1998) as amended.
8. Regulations refer to Environmental Impact Assessment (EIA) Regulations of 2014.
9. The Department may require that for specified types of activities in defined situations only parts of this report need to be completed. No faxed or e-mailed reports will be accepted.
10. This application form must be handed in at the offices of the Department of Economic Development, Environment and Tourism:-

<p><b><u>Postal Address:</u></b>  Central Administration Office  Environmental Impact Management  P. O. Box 55464  <b>POLOKWANE</b>  0700</p>	<p><b><u>Physical Address:</u></b>  Central Administration Office  Environmental Affairs Building  20 Hans Van Rensburg Street / 19 Biccard  Street  <b>POLOKWANE</b>  0699</p>
<p><b>Queries should be directed to the Central Administration Office: Environmental Impact Management:-</b></p> <p><b>For attention:</b> Mr E. V. Maluleke  <b>Mobile:</b> 082 947 7755  <b>Email:</b> <a href="mailto:malulekeev@ledet.gov.za">malulekeev@ledet.gov.za</a></p>	

**VIEW THE DEPARTMENT'S WEBSITE AT [HTTP://WWW.LEDET.GOV.ZA/](http://www.ledet.gov.za) FOR THE LATEST VERSION OF THE DOCUMENTS.**

## SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?

YES	NO
-----	----

If YES, please complete the form entitled “Details of specialist and declaration of interest” or appointment of a specialist for each specialist thus appointed:

Any specialist reports must be contained in Appendix D.

### 1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail<sup>1</sup>:

The application constitute the storing of the existing lawful water allocation in a dam on Portion 1 of the Farm Groendraai 213 KQ. The proposed dam is for the purposes of agricultural irrigation. The proposed infrastructure includes;

- ❖ A square dam with compacted earth dam walls and lined with a plastic lining;
- ❖ Dam volume of 150 000m<sup>3</sup>;
- ❖ Covering an area of 3,580 hectares;
- ❖ Maximum dam wall height of 4,8 meters;
- ❖ Associated outlet infrastructure.

### 2. FEASIBLE AND REASONABLE ALTERNATIVES

“**alternatives**”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe 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 in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the

<sup>1</sup> Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether 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. After receipt of this report the Department 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.

**Paragraphs 3 – 13 below should be completed for each alternative.**

### 3. 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 degrees, minutes, and seconds. The projection that must be used in all cases is the Hartebeeshoek 94 WGS84 spheroid in a national or local projection.

List alternative sites, if applicable.

**Latitude (S):**

**Longitude (E):**

**Alternative:**

Alternative S1<sup>2</sup> (preferred or only site alternative)

24°	11'	51,90"	27°	59'	17.80"
24°	12'	10.75"	27°	58'	2.90"
°	'	"	°	'	"

Alternative S2 (if any)

Alternative S3 (if any)

**In the case of linear activities:**

**Alternative:**

**Latitude (S):**

**Longitude (E):**

Alternative S1 (preferred or only route alternative)

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

°	'	"	°	'	"
°	'	"	°	'	"
°	'	"	°	'	"

Alternative S2 (if any)

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

°	'	"	°	'	"
°	'	"	°	'	"
°	'	"	°	'	"

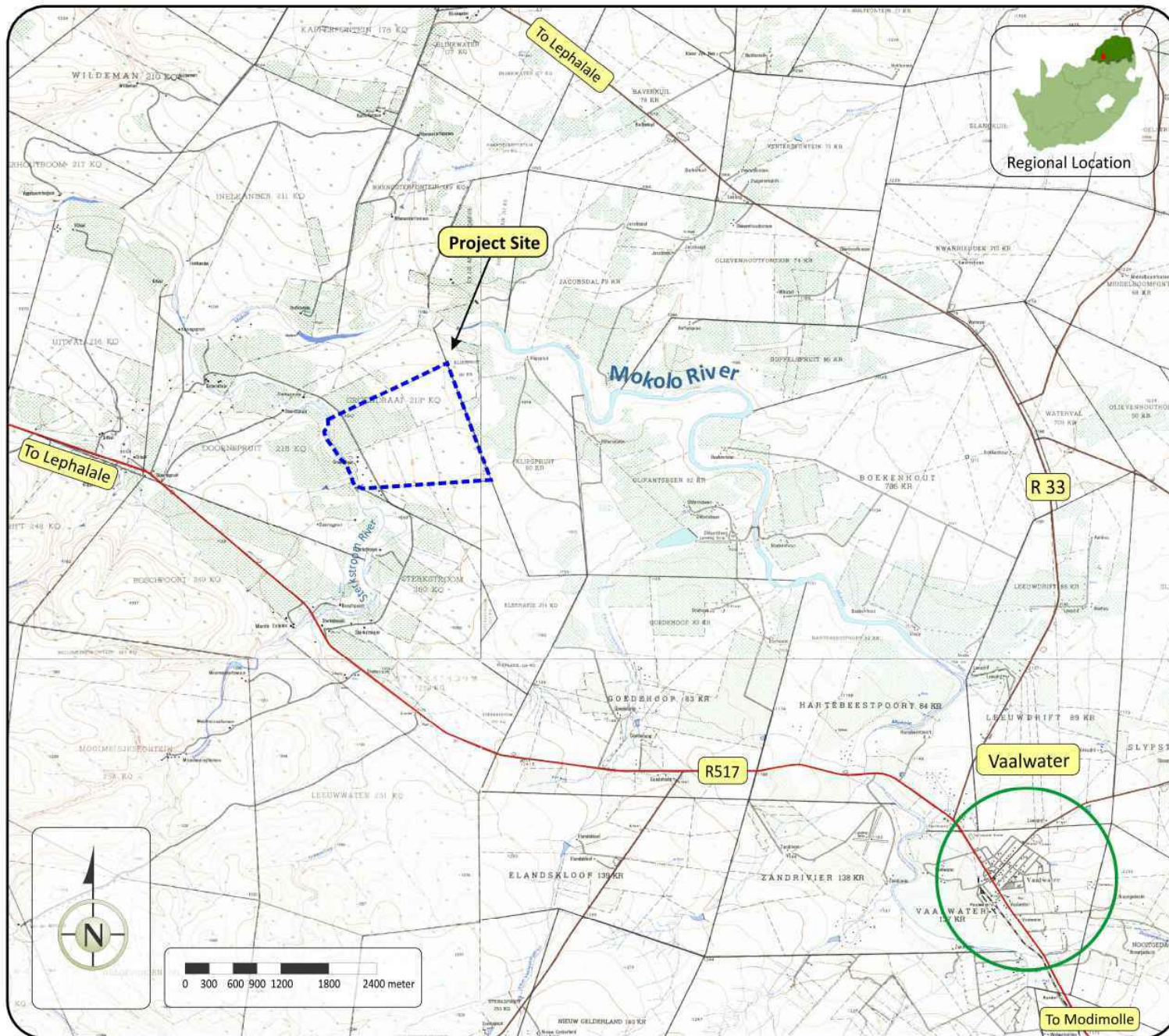
Alternative S3 (if any)

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

°	'	"	°	'	"
°	'	"	°	'	"
°	'	"	°	'	"

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

<sup>2</sup> "Alternative S.." refer to site alternatives.



**Legend:**

**Project Site**

Portion 1 of the Farm Groendraai 213 KQ

---

**Project:**

Storage of Water in Dams  
Thinus Maritz Vaalwater (PTY) Ltd.

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**Proponent:**

Thinus Maritz Boerdery Vaalwater

---

**Consultant:**

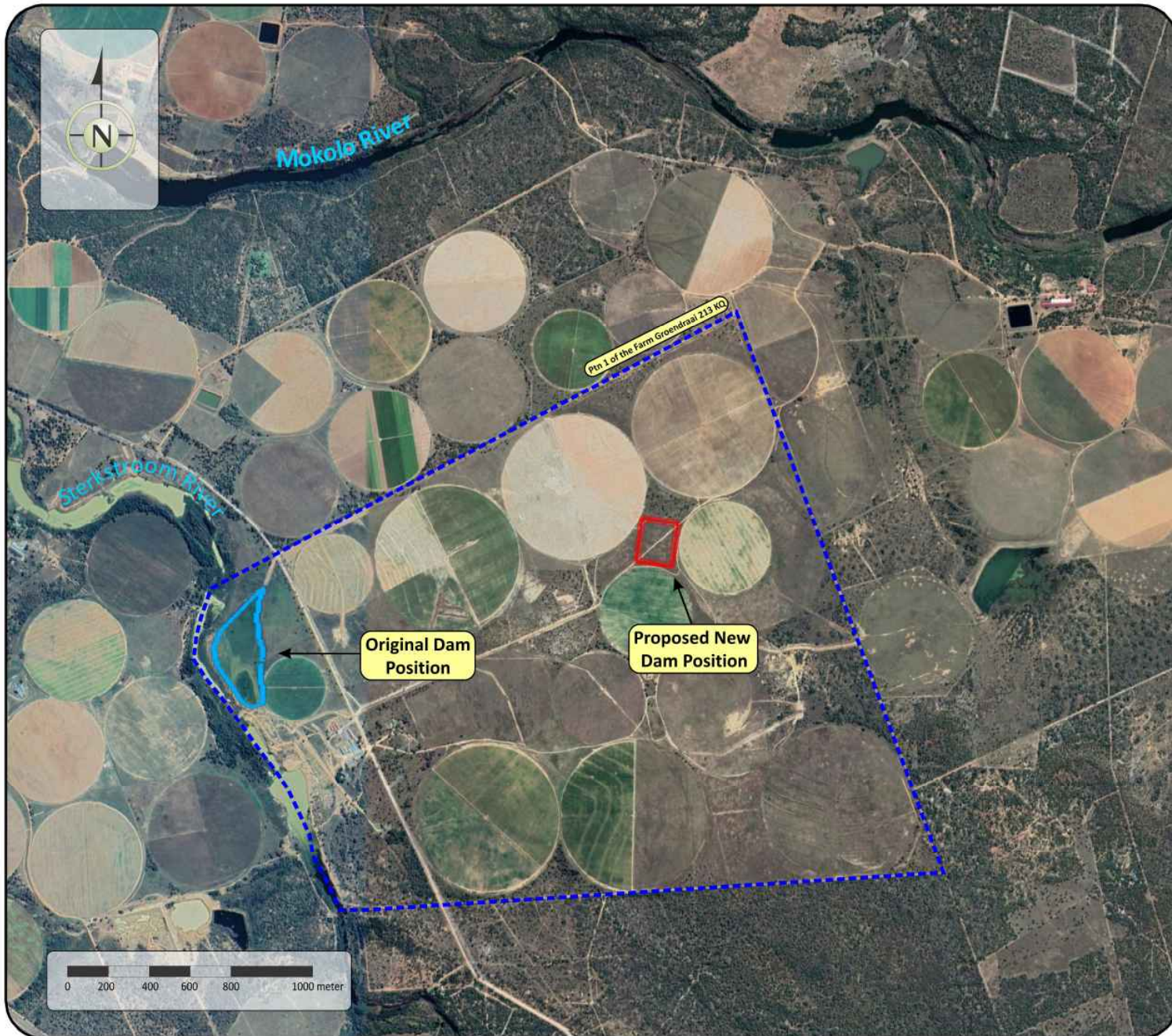
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**Figure 1:**

Locality Map



**Legend:**

**Project Site**

-  Portion 1 of the Farm Groendraai 213 KQ
-  Original Dam
-  Proposed New Dam Position

242788 Topographical Map Sheets

**Project:**

Storage of Water in Dams  
Thinus Maritz Vaalwater  
(PTY) Ltd.

**Proponent:**

**Thinus Maritz**  
**Boerdery**  
Vaalwater

**Consultant:**

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**Dam Positions**




**Legend:**

242788 Topographical Map Sheets

**Project:**  
Storage of Water in Dams  
Thinus Maritz Vaalwater  
(PTY) Ltd.

**Proponent:**  


**Consultant:**  

  
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Lynnwoodridge 0040

**Proposed New Dam**

#### 4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

**Alternative:**

Alternative A1<sup>3</sup> (preferred activity alternative)  
 Alternative A2 (if any)  
 Alternative A3 (if any)

or,

for linear activities:

**Size of the activity:**

35 800m <sup>2</sup>
89 000m <sup>2</sup>
m <sup>2</sup>

**Length of the activity:**

**Alternative:**

Alternative A1 (preferred activity alternative)  
 Alternative A2 (if any)  
 Alternative A3 (if any)

m
m
m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

**Size of the site/servitude:**

**Alternative:**

Alternative A1 (preferred activity alternative)  
 Alternative A2 (if any)  
 Alternative A3 (if any)

35 800m <sup>2</sup>
m <sup>2</sup>

#### 5. SITE ACCESS

**Does ready access to the site exist?**

YES	NO
-----	----

**If NO, what is the distance over which a new access road will be built**

m
---

**Describe the type of access road planned:**

Existing gravel farm access routes will be used. No new access routes will be constructed.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

<sup>3</sup> "Alternative A.." refer to activity, process, technology or other alternatives.



## 6. SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- 6.1 the scale of the plan which must be at least a scale of 1:500;
- 6.2 the property boundaries and numbers of all the properties within 50 metres of the site;
- 6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 6.4 the exact position of each element of the application as well as any other structures on the site;
- 6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 all trees and shrubs taller than 1.8 metres;
- 6.7 walls and fencing including details of the height and construction material;
- 6.8 servitudes indicating the purpose of the servitude;
- 6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
  - rivers;
  - the 1:100 year flood line (where available or where it is required by Department of Water Affairs);
  - ridges;
  - cultural and historical features;
  - areas with indigenous vegetation (even if it is degraded or invested with alien species);
- 6.10 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- 6.11 the positions from where photographs of the site were taken.

## 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 Appendix B to this form. It must be supplemented with additional photographs of relevant features on the site, if applicable.

## 8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C 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.

## 9. ACTIVITY MOTIVATION

### a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?

R7 878 161.94	
R Varies	
YES	NO
YES	NO
20	

What is the expected yearly income that will be generated by or as a result of the activity?

Will the activity contribute to service infrastructure?

Is the activity a public amenity?

How many new employment opportunities will be created in the development phase of the activity?

What is the expected value of the employment opportunities during the development phase?	R158 000.00
What percentage of this will accrue to previously disadvantaged individuals?	20%
How many permanent new employment opportunities will be created during the operational phase of the activity?	1
What is the expected current value of the employment opportunities during the first 10 years?	R9 180.000.00
What percentage of this will accrue to previously disadvantaged individuals?	40%

**b) Need and desirability of the activity**

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

<b>NEED:</b>		
i.	Was the relevant municipality involved in the application?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
ii.	Does the proposed land use fall within the municipal Integrated Development Plan?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
iii.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation:	

<b>DESIRABILITY:</b>		
i.	Does the proposed land use / development fit the surrounding area?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
ii.	Does the proposed land use / development conform to the relevant structure plans, Spatial development Framework, Land Use Management Scheme, and planning visions for the area?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
iii.	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
iv.	If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation:	
v.	Will the proposed land use / development impact on the sense of place?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
vi.	Will the proposed land use / development set a precedent?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
vii.	Will any person's rights be affected by the proposed land use / development?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
viii.	Will the proposed land use / development compromise the "urban edge"?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
ix.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation.	
	The proposed project might set a president in the sense that other farmers in the area will also see the benefit of storage of irrigation water in dams and would therefore want to construct their own dams.	

<b>BENEFITS:</b>		
i.	Will the land use / development have any benefits for society in general?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

ii.	<p>Explain:</p> <p>The construction of the proposed dam will enable the farmer to store his legal volume of water abstracted from the Sterkstroom River. This in itself will set a precedent for the legal abstraction and storage of water. The storage of the irrigation water will contribute to water security for the farmer which will allow him to manage periods of low rainfall and drought more sustainably and to still be able to produce crops. This will in turn contribute to the economic sustainability of the farming operation's value chain and to food security in general.</p>
iii.	<p>Will the land use / development have any benefits for the local communities where it will be located?</p> <p style="text-align: right;"><input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p>
iv.	<p>Explain:</p> <p>As aforementioned the construction of the proposed dam will contribute to the continued economic sustainability of the whole local value chain related to the crops produced at the farm. In addition, the water storage will also assist in more sustainable agricultural production which will in turn require a more constant workforce. A prolonged agricultural production cycle (compared to one that has to stop as a result of the lack of irrigation, related to dryland production) will also secure more sustained food production for the local and larger area.</p>

## 10. 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, if applicable:

Title of legislation, policy, or guideline:	Administering authority:	Date:
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	27 November 1998
National Water Act, 1998 (Act No. 36 of 1998) as amended	National	1998
The National Environmental Management: Biodiversity Act (Act 10 of 2004)	National & Provincial	2004
The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	National & Provincial	06 March 2008
National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEM:AQA)	National & Provincial	2004
National Heritage Resources Act, 1999 (Act No. 45 of 1999 (NHRA)	National & Provincial	April 1999
Occupational Health and Safety Act (No 85 of 1993)	National Department of Labour	23 June 1993
EIA Regulations	National & Provincial	4 December

Title of legislation, policy, or guideline:	Administering authority:	Date:
		2014
Waterberg District Municipality Bioregional Plan	Municipal & Provincial	January 2016
Limpopo Conservation Plan Version 2 (LCP_v2)	Provincial	2013

## 11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

### a) Solid waste management

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

<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
---	-----------------------------

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

150 m <sup>3</sup>
--------------------

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

**Construction waste** will comprise mainly of excess spoil material from excavation activities, construction material, general waste from site personnel, and sewage.

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

**Spoil material** will be re-used where possible (as backfill or erosion mitigation works) while excess spoil will need to be disposed of off-site. Spoil material will be moved with small tipper trucks to a predetermined spoil site (usually excavated) identified by the contractor (off-site). On closing the spoil site, the area will be covered with a layer of topsoil and re-vegetated.

**General waste** will be kept in bins within the construction site and will be collected and disposed of on a weekly basis or failing this will be disposed of into a skip and transported to the nearest landfill site. Spent canisters for paints and solvents will be the responsibility of the respective Contractor dispose of at a suitably licensed landfill site or to sub contract to a specialist contractor.

Will the activity produce solid waste during its operational phase?

<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
------------------------------	--

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

m <sup>3</sup>
----------------

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

N/A

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

N/A

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, then the applicant should consult with the department 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?

<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
------------------------------	--

If yes, inform the department 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	<del>NO</del>
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If yes, then the applicant should consult with the Department to determine whether it is necessary to change to an application for scoping and EIA.

**b) Liquid effluent**

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

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

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

m <sup>3</sup>	
----------------	--

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

Yes	<del>NO</del>
-----	---------------

If yes, the applicant should consult with the Department 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	<del>NO</del>
-----	---------------

If yes, provide the particulars of the facility:

Facility name:			
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:

N/A
-----

**c) Emissions into the atmosphere**

Will the activity release emissions into the atmosphere?

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

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

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.

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

During construction, there will be localized release of dust due to excavations and the hauling of materials around the site. Localised exhaust emissions will also occur, however a significant increase in concentrations of hydrocarbons, nitrogen oxides and carbon monoxide are not anticipated.
---

**d) Generation of noise**

Will the activity generate noise?

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

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

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.

If no, describe the noise in terms of type and level:

During construction, there will be localized increases of noise levels as a result of the construction vehicles and personnel. Noise hinderance is not anticipated due to the remoteness of the activity.

### 12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

municipal	water board	groundwater	<del>river, stream, dam, or lake</del>	other	the activity will not use water
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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:

±76 807m<sup>3</sup>

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

<del>YES</del>	NO
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If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

### 13. ENERGY EFFICIENCY

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

The stormwater drainage channels on the farm properties will be designed to channel stormwater towards the proposed dam to reduce the volume that needs to be pumped conventionally from the Sterkstroom River

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

None

## SECTION B: SITE/AREA/PROPERTY DESCRIPTION

#### Important notes:

- For linear activities (pipelines, etc) as well as activities that cover large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g. A):

0

- Paragraphs 1 - 6 below must be completed for each alternative.

- Has a specialist been consulted to assist with the completion of this section?

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

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:

All specialist reports must be contained in Appendix D.

Property description/physical address: Portion 1 of the Farm Groendraai 213KQ.

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

N/A

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning: Agricultural

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required? 

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

Must a building plan be submitted to the local authority? 

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

Locality map: An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (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 map must indicate the following:

- an indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (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 degrees, minutes, and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

### 1. GRADIENT OF THE SITE

**Indicate the general gradient of the site.**

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
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Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
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Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
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## 2. LOCATION IN LANDSCAPE – APPLICABLE TO ALTERNATIVE S1 AND S2

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

2.1 Ridgeline		2.6 Plain	
2.2 Plateau		2.7 Undulating plain / low hills	
2.3 Side slope of hill/mountain		2.8 Dune	
2.4 Closed valley		2.9 Seafront	
2.5 Open valley			

## 3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:		Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)	YES	NO	YES	NO	YES	NO
Dolomite, sinkhole, or doline areas	YES	NO	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	YES	NO	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	YES	NO	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	NO	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	NO	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	NO	YES	NO	YES	NO
An area sensitive to erosion	YES	NO	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

## 4. GROUNDCOVER

Indicate the types of groundcover present on the site: **Applicable to Alternatives S1 and S2**

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

Natural veld - good condition <sup>E</sup>	Natural veld with scattered aliens <sup>E</sup>	Natural veld with heavy infestation <sup>E</sup>	Veld dominated by alien species <sup>E</sup>	Gardens
Sport field	<del>Cultivated land</del>	Paved surface	Building or other structure	Bare soil



If any of the boxes marked with an "E" is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner does not have the necessary expertise.

## 5. LAND USE CHARACTER OF SURROUNDING AREA - APPLICABLE TO ALTERNATIVES S1 AND S2

Indicate land uses and/or prominent features that does currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area		5.22 School	
5.2 Low density residential		5.23 Tertiary education facility	
5.3 Medium density residential		5.24 Church	
5.4 High density residential		5.25 Old age home	
5.5 Medium industrial <sup>AN</sup>		5.26 Museum	
5.6 Office/consulting room		5.27 Historical building	
5.7 Military or police base/station/compound		5.28 Protected Area	
5.8 Spoil heap or slimes dam <sup>A</sup>		5.29 Sewage treatment plant <sup>A</sup>	
5.9 Light industrial		5.30 Train station or shunting yard <sup>N</sup>	
5.10 Heavy industrial <sup>AN</sup>		5.31 Railway line <sup>N</sup>	
5.11 Power station		5.32 Major road (4 lanes or more)	
5.12 Sport facilities		5.33 Airport <sup>N</sup>	
5.13 Golf course		5.34 Harbour	
5.14 Polo fields		5.35 Quarry, sand or borrow pit	
5.15 Filling station <sup>H</sup>		5.36 Hospital/medical centre	
5.16 Landfill or waste treatment site		5.37 River, stream, or wetland (S2)	X
5.17 Plantation		5.38 Nature conservation area	
5.18 Agriculture	X	5.39 Mountain, koppie or ridge	
5.19 Archaeological site		5.40 Graveyard	
5.20 Quarry, sand or borrow pit		5.41 River, stream, or wetland (S2)	X
5.21 Dam or Reservoir		5.42 Other land uses (describe)	

If any of the boxes marked with an "N" are ticked, how will this impact / be impacted upon by the proposed activity?

N/A

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?

If YES, specify and explain:	N/A
If NO, specify:	

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.

If YES, specify and explain:	N/A
If NO, specify:	

**6. CULTURAL/HISTORICAL FEATURES - APPLICABLE TO ALTERNATIVES S1 AND S2**

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including

YES	<del>NO</del>
Uncertain	

Archaeological or palaeontological sites, on or close (within 20m) to the site?

If YES, explain:

N/A

If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist:

N/A

Will any building or structure older than 60 years be affected in any way?

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

Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

# SECTION C: PUBLIC PARTICIPATION

## 1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

- (a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the department) at a place conspicuous to the public at the boundary or on the fence of—
  - (i) the site where the activity to which the application relates is or is to be undertaken; and
  - (ii) any alternative site mentioned in the application;
- (b) giving written notice to—
  - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  - (v) the municipality which has jurisdiction in the area;
  - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
  - (vii) any other party as required by the department;
- (c) placing an advertisement in—
  - (i) one local newspaper; or
  - (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in sub regulation 54(c)(ii); and
- (e) using reasonable alternative methods, as agreed to by the department, in those instances where a person is desiring of but unable to participate in the process due to—
  - (i) illiteracy;
  - (ii) disability; or
  - (iii) any other disadvantage.

## **2. CONTENT OF ADVERTISEMENTS AND NOTICES**

A notice board, advertisement or notices must:

- (a) indicate the details of the application which is subjected to public participation; and
- (b) state—
  - (i) that the application has been submitted to the department in terms of these Regulations, as the case may be;
  - (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
  - (iii) the nature and location of the activity to which the application relates;
  - (iv) where further information on the application or activity can be obtained; and
  - (v) the manner in which and the person to whom representations in respect of the application may be made.

## **3. PLACEMENT OF ADVERTISEMENTS AND NOTICES**

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the department in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of these Regulations.

Advertisements and notices must make provision for all alternatives.

## **4. DETERMINATION OF APPROPRIATE MEASURES**

The practitioner must ensure that the public participation 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, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the department to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

## **5. COMMENTS AND RESPONSE REPORT**

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in these Regulations and be attached to this application. The comments and response report must be attached under Appendix E.

## 6. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable.

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.

<b>Name of Authority informed:</b>	<b>Comments received (Yes or No)</b>
Lephalale Local Municipality Department of Environmental Management	No
Department of Water Affairs Limpopo Water Management Area	No
South African Heritage Resources Agency	No
Vaalwater SAPS	No

## 7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub regulation to the extent and in the manner as may be agreed to by the department.

Proof of any such agreement must be provided, where applicable.

**Has any comment been received from stakeholders?**

YES	<del>NO</del>
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**If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):**

N/A
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# SECTION D: 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.

## 1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

N/A

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Annexure E):

N/A

## 2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

**In accordance with the requirements of the NEMA, 1998 (Act 107 of 1998) the potential and anticipated impacts will be assessed in terms of the criteria and rating scales listed below. Where possible Specialists will be required to assess the potential and anticipated impacts relating to their specialist fields in the same order to ensure that the impacts are interpreted correctly.**

Criteria	Rating Scales	Notes
Nature	❖ Positive	This is an evaluation of the type of effect the construction, operation and management of the proposed development would have on the affected environment.
	❖ Negative	
	❖ Neutral	
Extent	❖ Low	Site-specific, affects only the development footprint.
	❖ Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius).
	❖ High	Regional (beyond a 10 km radius) to national.
Duration	❖ Low	0-4 years (i.e. duration of construction phase).
	❖ Medium	5-10 years.
	❖ High	More than 10 years to permanent.
Intensity	❖ Low	Where the impact affects the environment in such a way that natural, cultural, and social functions and processes are minimally affected.

	❖ Medium	Where the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way; and valued, important, sensitive, or vulnerable systems or communities are negatively affected.
	❖ High	Where natural, cultural, or social functions and processes are altered to the extent that the impact will temporarily or permanently cease these functions and processes; and valued, important, sensitive, or vulnerable systems or communities are substantially affected.
<b>Frequency of Occurrence</b>	❖ Continuous	Where Impact will occur without interruption
	❖ Intermittent	Impact occurring from time to time without any periodicity
	❖ Periodic	Impact occurring at more or less regular intervals
	❖ Time-linked	Impact occurring only or mostly at specific times e.g. at night or during office hours
<b>Probability (the likelihood of the impact occurring)</b>	❖ Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	❖ Medium	It is between 50 and 70 % certain that the impact will occur.
	❖ High	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
<b>Reversibility</b>	❖ Low	Low ability of environment to be reverted to pre-impact state if cause of impact is removed
	❖ Medium	Medium ability of environment to be reverted to pre-impact state if cause of impact is removed
	❖ High	High ability of environment to be reverted to pre-impact state if cause of impact is removed
<b>Potential for impact on irreplaceable resources</b>	❖ Low	No irreplaceable resources will be impacted.
	❖ Medium	Resources that will be impacted can be replaced, with effort.
	❖ High	There is no potential for replacing a particular vulnerable resource that will be impacted.
<b>Consequence (a combination of extent, duration, intensity, and the potential for impact on irreplaceable resources).</b>	❖ Low	A combination of any of the following: - Intensity, duration, extent, and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium and all three other criteria are rated low.
	❖ Medium	Intensity is medium and at least two of the other criteria are rated medium.
	❖ High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all of the other criteria being rated medium or higher.
<b>Significance (all impacts including potential cumulative impacts)</b>	❖ Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	❖ Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	❖ High	High consequence and medium probability.

		High consequence and high probability.
<b>Confidence</b>  (Degree of confidence in the predictions, based on the availability of information and the specialist's knowledge and expertise)	❖ High	High degree of confidence in the predictions
	❖ Medium	Medium degree of confidence in the predictions
	❖ Low	Low degree of confidence in the predictions

**An explanation of the above-mentioned impact criteria is provided below. Only the above-mentioned criteria will be considered during the assessment of impact significance. In addition, the degree of confidence in the prediction of impacts, the nature of applicable mitigation measures and legal requirements applicable to the impacts will also be described.**

### **Nature**

This is an evaluation of the type of effect the construction, operation and management of the proposed development would have on the affected environment. Will the impact change in the environment be positive, negative, or neutral? This description will include that which will be affected and the manner in which the effect will transpire. There may be a number of possible activities contributing to the same impact. Vice versa there may be a number of different impacts resulting from a single activity.

### **Extent or Scale**

This refers to the spatial scale at which the impact will occur. Extent of the impact is described as: low (site-specific - affecting only the footprint of the development), medium (limited to the site and its immediate surroundings and closest towns) and high (regional and national). This refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of small extent, are of very high importance, e.g. impacts on species of very restricted range.

### **Duration**

The lifespan of the impact is indicated as low (short-term: 0-4 years, typically impacts that are quickly reversible within the construction phase of the project), medium-term: (5-10 years, reversible over time) and high (long-term: greater than 10 years and continue for the operational life span of the proposed development).

### **Intensity or Severity**

This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered? The EAP will quantify the magnitude of the impacts and outline the rationale used.

### **Impact on Irreplaceable Resources**

This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by re-seeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.

### **Consequence**

The consequence of the potential impacts is a summation of above criteria, namely the extent, duration, intensity, and impact on irreplaceable resources.

### **Probability of Occurrence**



The probability of the impact actually occurring based on professional experience of the EAP with environments of a similar nature to the site and/or with similar projects. Probability is described as low (improbable), medium (distinct possibility), and high (most likely). It is important to distinguish between probability of the impact occurring and probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact.

### **Significance**

Impact significance is defined to be a combination of the consequence (as described below) and probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact actually occurring. In simple terms, if the consequence and probability of an impact is high, then the impact will have a high significance. The significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.

### **Degree of Confidence in Predictions**

The EAP will provide an indication of the degree of confidence (low, medium, or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. Degree of confidence is not considered in the determination of consequence or probability.

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.

Alternative A1 (Preferred Activity Alternative)
<b>PRE-CONSTRUCTION AND CONSTRUCTION PHASE</b>
<b>BIO-PHYSICAL ENVIRONMENT</b>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Start of Construction Phase: Security	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Local authorities (e.g. Lephalale Local Municipality, Vaalwater Police Station) as well as the surrounding land owners must be notified of the commencement of the construction activities in advance of the actual start of the activities. The contractor must communicate the dangers of the construction site and that the site is specifically out of bounds for small children.</li> </ul>	Low (positive)	Low
	High (positive)	<ul style="list-style-type: none"> <li>❖ Detailed contact sheets with the relevant contact no's of all the relevant contact personnel as well as the local EMS departments must be placed in the Contractors offices and the relevant other congregating areas at the construction camp for easy access in the case of emergency. This contact detail and its locality must also be communicated to the construction phase personnel at the relevant meetings and tool box talks.</li> </ul>	Medium (positive)	Medium

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
<b>Environmental awareness</b>	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Full documentation (ID, contact details and of next of kin) of all construction personnel must be kept on file at the site office and no unauthorized persons may be allowed on site.</li> </ul>	Low (negative)	Low
	High (positive)	<ul style="list-style-type: none"> <li>❖ Environmental awareness inductions must be held for all employees to ensure that Stakeholders and Staff understand their responsibilities and to adhere to the content of the EMPr (See Appendix F).</li> </ul>	High (positive)	Medium
<b>Availability of EMPr</b>	Low (negative)	<ul style="list-style-type: none"> <li>❖ The EMPr is drafted in such a manner that Section 8 can be reproduced (photocopied) and handed out to the relevant project managers, site managers, contractors and sub-contractors who must use it as a monitoring tool whereby check-ups (weekly or monthly, whichever is applicable) can be performed and added to a final monthly report or project completion report to track the monitoring of the project effectively over the lifetime of the construction phase of the development.</li> </ul>	Low (negative)	Low
<b>Ablution facilities</b>	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Sufficient temporary ablution facilities in the form of chemical toilets (one for every 15 workers) must be provided for all workers during the construction phase of the development. The contractor shall be entirely responsible for</li> </ul>	Low (negative)	Medium

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Proper personal conduct	Medium (negative)	<p>enforcing their use and for maintaining such latrines in a clean, orderly, and sanitary condition. These facilities shall be positioned within walking distance from wherever employees are employed on the works.</p> <ul style="list-style-type: none"> <li>❖ Activities such as littering, informal settlement, loud music and other ill-mannered behaviour will be regarded as unacceptable, and it will be the responsibility of the various contractors and other employers to ensure that workers under their supervision conduct themselves appropriately. These actions must be reported to the Contractor who will see to the issuing of the relevant fines. See Appendix 1 of the EMP.</li> </ul>	Low (negative)	Low
	Medium (negative)	<ul style="list-style-type: none"> <li>❖ A complaints register must be maintained on site. Complaints must be discussed at the construction technical meetings and specific responsibility must be assigned to manage each complained. The responsible parties must report back at the technical meeting as to the progress in terms of the management of each complaint up until it is resolved. The relevant penalties must be levied in terms of non-compliance to this management measure.</li> </ul>	Low (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
	Low (negative)	❖ The, the contractor must provide suitably visible signage informing people that the site is a construction site and private property and that no access is allowed for any unauthorized persons.	Low (negative)	Low
<b>Construction Camp:</b>				
Security	Medium (negative)	❖ Local authorities (e.g. Lephalale Local Municipality, Vaalwater Police Station, Lephalale EMS Departments) as well as the surrounding land owners must be notified of the commencement of the construction activities by the PC well in advance of the actual start of the activities. The contractor must, communicate the dangers of the construction site and that the site is specifically out of bounds for small children.	Low (negative)	Medium
<b>Specific site selection for the construction camps</b>	Low (negative)	❖ No new construction camp is to be established but the existing farm infrastructure is to be used for this purpose. The principle to be followed is that the camp must be situated practically but where possible in an area where the site is already disturbed. The location of this site must be communicated to the ECO who should then perform a screening of the site.	Low (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
<b>Removal of plant material</b>	Medium (negative)	❖ The chosen site for the construction camp must not be located less than 100m horizontally from any drainage way and outside of the 1:100-year flood line of any of these drainage ways.	Low (negative)	Medium
	Medium (negative)	❖ Vegetation clearance for the erection of the construction camp must be kept to an absolute minimum and must adhere to the footprint of an area no larger than the camps themselves.	Low (negative)	Medium
	Medium (negative)	❖ Topsoil (top 300mm layer minimum) must be protected in accordance with the detailed recommendations included in the EMPr. Also see Hydrology.	Low (negative)	Medium
<b>Flora and Faunal species</b>	Low (negative)	❖ No damage and/or removal/trapping/snaring of indigenous plant or animal material for cooking or any other purposes will be allowed. See Appendix 1 of the EMPr. (Also See Fauna and Flora Section).	Low (negative)	Medium
<b>Fires</b>	High (negative)	❖ Care must be taken to prevent veld fires. A designated cooking area must be established where cooking will be performed. This area must be supplied with a permanent fire extinguisher which is in working order. Cooking may only be performed with gas or electrical stoves.	Medium (negative)	Low
<b>Possible contamination by</b>	High (negative)	❖ Vehicles and construction plant must be inspected and	Medium (negative)	Medium

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
<b>fuels and other construction materials</b>	High (negative)	<p>maintained on a regular basis (weekly) to ensure that soils are not being contaminated by leakages or other pollutants.</p> <ul style="list-style-type: none"> <li>❖ All construction materials which may cause soil and sub soil contamination must be kept in suitable watertight containers and these containers must be checked regularly by the ECO.</li> </ul>	Medium (negative)	Medium
<b>Waste</b>	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Adequate water, sanitation and solid waste disposal facilities must be provided or arranged for prior to occupation of the site. Solid waste should be sorted into categories and that which is not suited to be dumped in an appropriate waste skip at the temporary facility e.g. cement must be dumped at a recognized registered waste disposal facility designed for this purpose.</li> </ul>	Low (negative)	Medium
	Medium (negative)	<ul style="list-style-type: none"> <li>❖ A suitable site must be selected for the waste skip site and this site should only contain materials that do not pose any risk in terms of surface or sub surface environmental contamination (e.g. building rubble). This site must also be suitably rehabilitated after completion of the construction activities.</li> </ul>	Low (negative)	Low
<b>Temporary Fuel Tank</b>	High (negative)	<ul style="list-style-type: none"> <li>❖ Any temporary on-site Fuel tank should be accommodated in a watertight bunker at the existing farm facilities, which is</li> </ul>	Low (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
	High (negative)	<p>able to carry the total volume of the tank itself. Should an accidental puncture of the fuel tank occur, the appropriate specialist (See Appendix 2 of the EMPr) should be contacted immediately for clear up operations. The top soils and sub soils of the site of the spillage must be removed in total and be disposed of at a fittingly licensed facility by the specialist and be filled up to the top of the excavation with healthy soils.</p> <ul style="list-style-type: none"> <li>❖ All fuel and lubricant oriented areas (for storage and waste) at the service site (e.g. diesel tanks, workshop shed, and compressor shed) must also be situated at the existing farming maintenance facilities. These areas must be constructed with impervious concrete floors and oil and fuel resistant walls, with watertight sumps at the end of the catchment drains of these areas. Sumps must be pumped into suitable containers and removed by an appropriate specialist, to a suitably licensed waste disposal facility.</li> </ul>	Low (negative)	Low
<b>Possible contamination from construction camp</b>	High (negative)	<ul style="list-style-type: none"> <li>❖ An earth berm or drainage ditch (@ 450mm high) must be constructed or straw bales placed around the construction camp to prevent stormwater entering from outside the camp and to prevent contaminated water leaving the camp. This earth berm must also be</li> </ul>	Low (negative)	High



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
<b>Site Rehabilitation</b>	High (negative)	<p>maintained throughout the construction phase.</p> <ul style="list-style-type: none"> <li>❖ Total rehabilitation must be done on and around the site and the appropriate authority (LEDET) must be informed of the completion of the construction phase for the necessary inspections to take place.</li> </ul>	Medium (negative)	Low
<b>Cutting &amp; Blasting:</b> Cut and fill sites	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Specific cut and fill sites should be inspected by a qualified engineer and signed off as stable and safe for work before construction commences.</li> </ul>	Low (negative)	Low
<b>Use of explosives</b>	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Cognisance should be taken of the Geotechnical site conditions, specifically with reference to potentially collapsible soils.</li> </ul>	Low (negative)	Low
	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Where the excavation work involves the use of explosives, a method statement must be developed in accordance with the applicable explosives legislation, The Explosives Act 2003 (Act 15 of 2003) by an appointed person who is competent in the use of explosives for excavation work and the contractor shall ensure that the procedures therein are followed.</li> </ul>	Low (negative)	Low
	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Where there is a reasonable possibility of damage to power and telephone lines or any</li> </ul>	Medium-Low (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
<b>Rehabilitation of site</b>	Medium (negative)	<p>other property, the contractor shall suitably adapt his method of blasting and the size of charges and shall use adequate protective measures, such as cover blasting, to limit the risk of damage as far as possible. Specific requirements relating to certain services may be included in the Project Specifications.</p> <ul style="list-style-type: none"> <li>❖ Vibrations caused by blasting operations must be recorded by one or more blasting seismographs of a type as approved by the Engineer and in positions as described by the specialist blasting Consultant.</li> </ul>	Medium-Low (negative)	Low
	Medium (negative)	<ul style="list-style-type: none"> <li>❖ The Engineer shall be given 24 hours' notice by the Contractor before each blasting operation is carried out.</li> </ul>	High (positive)	Low
	Medium (positive)	<ul style="list-style-type: none"> <li>❖ Material (only natural) from cutting should be used for the shaping of earth berms or for landscaping.</li> </ul>	Medium (positive)	Medium
<b>Geology and Soils:</b>		<ul style="list-style-type: none"> <li>❖ See detail under Construction Camp</li> </ul>		
<b>Hydrology:</b> High rainfall in 24 hours	Medium (negative)	<ul style="list-style-type: none"> <li>❖ A construction management plan should be implemented to specify appropriate time for the bulk of the construction activities to commence (preferably May to early October)</li> </ul>	Low (negative)	High

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Scouring and erosion resulting from increased volumes and velocities of stormwater across the site	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Special attention must be given to site drainage details. Qualified engineers must inspect the impacted areas and adequate in stream drainage structures must be designed and constructed to avoid scouring and erosion around these structures and ultimate failure.</li> </ul>	Low (negative)	Low
Siltation of downstream water bodies and stormwater management structures.	High (negative)	<ul style="list-style-type: none"> <li>❖ Drainage structures must be designed by qualified engineers and in a way the disposes of the site stormwater in a safe matter, which is not harmful to the surrounding environment in any way. Typical precautionary measures include sufficient infiltration structures to reduce overall stormwater build up at the lowest point of the site and stormwater energy dissipaters in major stormwater channels.</li> </ul>	Medium (negative)	Medium
	Low (negative)	<ul style="list-style-type: none"> <li>❖ Maximum infiltration must be attained at each specific site and infiltration structures must be designed and constructed to this effect to limit the overall increase in stormwater volume and velocity as far as possible.</li> </ul>	Low (negative)	Low
	Low (negative)	<ul style="list-style-type: none"> <li>❖ Special attention must also be given to the design of the stormwater structures at the discharge ends of the stormwater system so as not to cause erosion damage where this system discharges.</li> </ul>	Low (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Possible groundwater pollution from site establishment.	High (negative)	❖ On site waste disposal must strictly be prohibited during the construction phase and disposal must be carried out with standard sealed chemical toilets and waste disposal containers.	Low (negative)	Low
	High (negative)	❖ Vehicles and construction plant must be inspected and maintained on a regular basis (weekly) to ensure that soils are not being contaminated by leakages or other pollutants.	Low (negative)	Medium
	High (negative)	❖ All fuel and lubricant oriented areas (for storage and waste) at the service site (e.g. diesel tanks, workshop shed, and compressor shed) must be constructed with impervious concrete floors and oil and fuel resistant walls, with watertight sumps at the end of the catchment drains of these areas. Sumps must be pumped into suitable containers and removed by an appropriate specialist, to a suitably licensed waste disposal facility.	Low (negative)	Low
<b>Fauna and Flora:</b> Disturbances to existing fauna and flora species.	Medium (negative)	❖ Vegetation clearance for the erection of the construction camps must be kept to an absolute minimum and must adhere to the footprint of an area no larger than the camps themselves.	Low (negative)	High
	Low (negative)	❖ No damage and/or removal/trapping/snaring of indigenous plant or animal material for	Low (negative)	Medium

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Proliferation of alien vegetation	Medium (negative)	<p>cooking or any other purposes will be allowed. See Appendix 1 of the EMPr.</p> <ul style="list-style-type: none"> <li>❖ The project ECO must monitor the proliferation of alien and invasive vegetation with special reference to the Water hyacinth (<i>Eichhornia crassipes</i>), Syringa Tree (<i>Melia Azerarach</i>), Silver oak tree (<i>Grevillia robusta</i>) and Poplar (<i>Populus alba</i>). Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998).</li> </ul>	Low (negative)	Medium
<p>Site Sensitive Features:</p> <ul style="list-style-type: none"> <li>❖ Sterkstroom River</li> </ul> <p>Construction camps and laydown areas</p>	Medium (negative)	<ul style="list-style-type: none"> <li>❖ No construction camps and laydown areas may be located within the 32m buffer or within 100m horizontally of the river.</li> </ul>	Low (negative)	Low
Site clearance for construction	High (negative)	<ul style="list-style-type: none"> <li>❖ Construction and maintenance of the dam infrastructure must preferably take place during the winter months and must be completed at the highest quality levels and in the shortest possible time.</li> </ul>	Medium (negative)	High
Soils conservation	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Vegetation clearance for construction camps and along</li> </ul>	Low (negative)	Medium

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Stormwater control	Medium (negative)	<p>the actual construction footprint must be kept to an absolute minimum.</p> <ul style="list-style-type: none"> <li>❖ Topsoil (top 300mm layer minimum) must be protected in accordance with the detailed recommendations included in the EMPr. Also see Construction Camps and Hydrology.</li> </ul>	Low (negative)	High
	High (negative)	<ul style="list-style-type: none"> <li>❖ Stormwater protection in the form of hay bales or similar must be placed between the construction area and the water surface area of the river. This must be maintained throughout the construction phase.</li> </ul>	Medium (negative)	Medium
	High (negative)	<ul style="list-style-type: none"> <li>❖ Stormwater discharge structures must be designed by a qualified engineer and must include silt and litter traps as well as energy dissipating features to ensure erosion free discharge of stormwater into river and the wetland areas where this is required. Stormwater discharge structures must also be floodproof.</li> </ul>	Medium (negative)	Medium
Rehabilitation	High (positive)	<ul style="list-style-type: none"> <li>❖ Areas where construction or maintenance activities took place within the 32m buffer area of the river and within the river itself must preferably be rehabilitated from a landscape point of view to allow for the shortest possible recovery time and associated restored</li> </ul>	Medium (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Management of alien invasive species	Medium (negative)	ecological functioning. ❖ Alien invasive species eradication and control must be implemented during the construction phase to protect natural riverine and wetland habitat and curb against excessive water use.	High (positive)	Medium
Maintenance activities	Medium (negative)	❖ All construction personnel and maintenance staff (operational phase) must be inducted on the river sensitivities and clear instructions on operational procedure for any maintenance activity within the riverine areas must be implemented. Specific induction aspects must include product use in riverine areas, spill management, planning of maintenance within riverine areas as well as riverine rehabilitation procedures.  ❖	Low (negative)	Medium
<b>SOCIO-ECONOMIC ENVIRONMENT</b>				
Local Employment:  A limited number of temporary jobs may be created for the duration of the construction phase.	Medium (positive)	❖ The maximum number of employment opportunities must be created by making use of labour intensive construction methods. In addition, the proposed project must also make use of the maximum extent of local SME's as far as possible.	High (positive)	Low
	High (positive)	❖ Members of the local community should be employed as far as possible.	High (positive)	Low
	High	❖ Opportunities for unskilled/ low-	High	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
	(positive)  High (positive)	skilled workers should be maximised. On-the-job training should form part of the employment period and contract, to contribute to skills development.  ❖ An equal number of males and females should be employed.	(positive)  High (positive)	Low
<b>Traffic:</b> Accidents may occur during construction due to the presence of construction vehicles during construction.	High (negative)  High (negative)	<ul style="list-style-type: none"> <li>❖ Local authorities (e.g. the Lephalale Local Municipality, Vaalwater Police Station, Lephalale EMS Departments) as well as the surrounding land owners must be notified of the commencement of the construction activities at least 6 weeks before the actual start of the activities.</li> <li>❖ The Contractor must ensure that drivers of construction vehicles carries the adequate training and associated licences and permits to drive the applicable construction vehicle and plant.</li> </ul>	Medium (negative)  Medium (negative)	Medium  Medium
<b>Noise:</b> There will be an increase in noise due to construction activities	Medium (negative)  Medium (negative)	<ul style="list-style-type: none"> <li>❖ Noisy activities related to the construction phase of the development (e.g. vehicles, compressors, workers) must be kept to the necessary minimum.</li> <li>❖ Construction activities must be restricted to between 8:00 in the mornings and 17:00 in the afternoon and not on any weekend or public holidays.</li> </ul>	Low (negative)  Low (negative)	Low  Medium



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
	Medium (negative)	❖ Construction vehicles and equipment must be regularly serviced to avoid the noise that these machines may make if in disrepair.	Low (negative)	Low
	Low (negative)	❖ Construction workers and staff must be supplied with sufficient protective clothing and other gear (e.g. ear plugs) and must furthermore be trained how to use this gear properly.	Low (negative)	Low
<b>Air Quality:</b> During construction dust will be generated that can reduce visibility for drivers.	Low (negative)	❖ Dust suppression must be performed according to the seasonal changes and according to the prevailing site-specific circumstances via a dust suppression truck on the site roads, other construction areas and the plant parking areas.	Low (negative)	Medium
<b>Access:</b> Site access & utilization of existing roads.	Low (negative)	❖ Access to the site to be through existing roads to the site.	Low (negative)	Low
	Medium (negative)	❖ Construction vehicles must take cognisance of the existing traffic flow onto the R517 and surrounding routes and always provide right of way.	Low (negative)	Low
<b>Heritage Impacts:</b> Heritage resources of value could be found during site preparation and	Low (negative)	❖ Employees, contractors, and construction workers should be informed to report any unusual finds during the construction	Low (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
construction.		phase to the EAP, to implement the correct procedures according to the South African Heritage Resources Act to conserve these finds appropriately. As a general rule of thumb, any construction must be halted immediately should an unusual item be unearthed. The site EAP should be informed, and a photo record be taken and sent to a Specialist for recommendation and further action.		
<b>OPERATIONAL PHASE</b>				
<b>BIO-PHYSICAL ENVIRONMENT</b>				
<b>Geology and Soils</b> Rehabilitation monitoring	Low (negative)	❖ The entire construction area must be monitored quarterly for at least one year after completion of the construction phase to ensure that vegetation has established successfully.	Low (negative)	Medium
	Low (negative)	❖ Any areas where 100% vegetation cover has not been established must be reseeded with the recommended grass seed mix.	Low (negative)	High
	Low (negative)	❖ Areas where erosion has occurred must be rehabilitated and stabilized so that erosion will not occur in future.	Low (negative)	Low
<b>Surface and Groundwater</b> Exiting lawful water use volumes (ELU)	High (negative)	❖ Water meters must be installed at all surface and groundwater	Medium (negative)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
Ecological Water Reserve (EWR)	High (negative)	<p>abstraction points to ensure that the farming operation stays within its legal water use limits.</p> <ul style="list-style-type: none"> <li>❖ The DWS will need to re-determine the accurate EWR values for the Mokolo catchment in order for Farmers to know the sustainable water use limits of their operations and to ensure the optimum ecological functioning of the Mokolo and Sterkstroom rivers.</li> </ul>	Medium (negative)	High
High rainfall in 24 hours	Low (negative)	<ul style="list-style-type: none"> <li>❖ Special attention must be given to the site drainage details, especially in terms of the dam wall and overflow structures. The entire dam must be maintained in terms of the Dam Structural Maintenance Plan and the relevant maintenance and repair actions must be taken as soon as a deviation (from the recommendations of the Structural Maintenance Plan) is noted. (See Appendix D_4)</li> </ul>	Low (negative)	Low
Stormwater Management:	Low (negative)	<ul style="list-style-type: none"> <li>❖ Stormwater structures must be monitored and maintained on a continual basis throughout the lifetime of the project.</li> </ul>	Low (negative)	Low
<b>Fauna and Flora:</b> Alien invasive vegetation control	Medium (negative)	<ul style="list-style-type: none"> <li>❖ Proliferation of alien and invasive species is expected within disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the proposed filling development. Alien plant</li> </ul>	Low (negative)	High

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
	High (positive)	<p>seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, must be controlled.</p> <ul style="list-style-type: none"> <li>❖ Removal of the alien and weed species encountered at the proposed infrastructure must take place to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational and rehabilitation/ maintenance phases.</li> </ul>	High (positive)	High
<b>Waste Management:</b> General waste	Low (negative)	<ul style="list-style-type: none"> <li>❖ Adequate general waste disposal facilities must be provided for. General waste should be sorted into categories and recycled as far as possible. General waste which is not suited to recycled must be collected and removed to the municipal waste facility.</li> </ul>	Low (negative)	Low
Hazardous waste	High (negative)	<ul style="list-style-type: none"> <li>❖ All hazardous waste including used oils and fuels and wash water containing hydrocarbons must be managed in accordance with its hazardous substance category. Hazardous wastes must be taken away to the nearest</li> </ul>	Low (negative)	Medium

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		hazardous waste handling facility on managed by an appropriate hazardous waste Contractor.		
<b>Site Sensitive Features:</b> ❖ Sterkstroom River  Monitoring and maintenance	High (positive)	❖ Concurrent monitoring and maintenance actions must be conducted on the dam infrastructure to ensure that the structures are structurally and functionally sound. Where ever this is not the case, faulty infrastructure or degraded areas must be repaired in line with the Dam Structural Maintenance Plan or rehabilitated immediately, so that the Sterkstroom river is not negatively affected. See Appendix D_4.	High (positive)	Low
<b>SOCIO-ECONOMIC ENVIRONMENT</b>				
<b>Local Employment:</b> Local labour	High (positive)	❖ The maximum number of local employment opportunities must be created by making use of labour intensive operational methods. Opportunities for unskilled/ low-skilled workers should be maximised. On-the-job training should form part of the employment period and contract, to contribute to skills development.	High (positive)	Low
	High (positive)	❖ Only members of the local communities must be	High (positive)	Low

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		employed. An equal number of males and females should be employed.		
<b>Safety:</b> Water Safety	Medium (negative)  High (positive)	<ul style="list-style-type: none"> <li>❖ The Farm management must ensure that the farm staff and visitors are aware of the dangers of the dam, especially during periods of heavy precipitation and resultant high stormwater flows.</li> <li>❖ The relevant safety instructions and contact details of the local Lephalale EMS services must be clearly displayed and all of the management staff must be aware of the location of these contact details.</li> </ul>	High (positive)  High (positive)	Low  Low

### Alternatives

Alternative S2 – N/A Exactly the Same as For Alternative S1				
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented

Alternative S3 – N/A				
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented

NO-GO				
Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
<b>BIOPHYSICAL ENVIRONMENT</b>				
<b>Climate &amp; Hydrology:</b> Scouring and erosion	Low (N/A)	❖ No additional impacts should dam not be constructed.	Low (negative)	N/A
Surface water deterioration	Low (negative)	❖ Water quality flowing into the Sterkstroom might decrease slightly as the dam acts as a silt trap for stormwater.	Low (positive)	N/A
<b>Geology and Soils:</b> Scouring and erosion	Low (negative)	❖ No additional impacts should dam not be constructed.	Low (negative)	N/A
<b>Vegetation and Animal Life:</b> Disturbances to existing fauna and flora	Low (positive)	❖ No potential disturbances to the existing site fauna and flora.	Low (positive)	N/A
Alien invasive species	Medium (negative)	❖ No management of alien invasive species on site.	Medium (negative)	N/A
<b>SOCIO-ECONOMIC ENVIRONMENT</b>				
<b>Dam Infrastructure</b>	High (negative)	❖ The need for sustained availability of water for crop irrigation was discussed in the sections above. It is important in terms of sustained crop production albeit in a reduced rate during times of low river flow or drought. Increased crop production security in turn translates into employment security for the farm employees	High (negative)	N/A.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented
		as well as the local and greater farming value chain. Lastly, increased crop production security also translates into food security.		
<b>Employment Opportunities:</b>	Medium (negative)	❖ It is foreseen that various temporary jobs can be created during the construction phase of the project. If the proposed development does not proceed, these opportunities will not materialize.	Medium (positive)	Medium
<b>Safety</b>	Medium (positive)	❖ There will be no additional safety risks to the site area	Medium (positive)	N/A
<b>Impeded Traffic Flow</b>	Medium (positive)	❖ There will be no additional traffic impediment.	Medium (positive)	N/A
<b>Air Quality</b>	Medium (positive)	❖ There will be no additional air quality related impacts.	Medium (positive)	N/A
<b>Noise</b>	Low (positive)	❖ There will be no additional noise related impacts.	Low (positive)	N/A

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

- ❖ Heritage Impact Assessment
- ❖ Dam Design Report

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



- ❖ Studies and assessments were only conducted for the immediate site environment and more distant impacts of the site environment on the proposed development were therefore only assessed to a limited extent.
- ❖ All information provided by the Applicant and specialists is valid and accurate. For specific details on assumptions made and knowledge gaps in terms of the Specialist Assessments, please refer to Appendix D.

### 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.

#### Alternative S1 (Proposed Activity Alternative)

<b>PLEASE NOTE:</b>				
There is no decommissioning envisaged for this development even in the long-term. Should the development need to be decommissioned for some unforeseen reason, it will trigger listed activities in terms of the National Environmental Management Act, 107 of 1998. Therefore, potential impacts would be identified and assessed at that time.				
<b>Potential impacts:</b>	<b>Significance rating of impacts (positive or negative):</b>	<b>Proposed mitigation:</b>	<b>Significance rating of impacts after mitigation:</b>	<b>Risk of the impact and mitigation not being implemented</b>

<b>Alternative S2 – N/A</b>				
<b>Potential impacts:</b>	<b>Significance rating of impacts (positive or negative):</b>	<b>Proposed mitigation:</b>	<b>Significance rating of impacts after mitigation:</b>	<b>Risk of the impact and mitigation not being implemented</b>

<b>Alternative S3 – N/A</b>				
<b>Potential impacts:</b>	<b>Significance rating of impacts (positive or negative):</b>	<b>Proposed mitigation:</b>	<b>Significance rating of impacts after mitigation:</b>	<b>Risk of the impact and mitigation not being implemented</b>

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

N/A

Where applicable indicate the detailed financial provisions for rehabilitation, closure, and ongoing post decommissioning management for the negative environmental impacts.

N/A

#### 4. 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:

##### **Ecological Water Reserve (EWR) and Existing Lawful Water Use (ELU)**

To ensure that water use stays within the EWR and ELU limits for the Sterkstroom River and the larger Mokolo River Catchment, on a farm by farm basis is of critical importance. It is important firstly, for the purposes of safeguarding the required water volumes in the Sterkstroom River, to allow these river systems to perform at optimal ecological functionality, Should there not be enough water to allow for the EWR requirements to be met it will have almost immediate negative implications. These include socio-ecological impacts such as reduced water availability because of the inability of the watercourse to store water (e.g. to low water levels can cause an over vegetated watercourse) and reduced water quality (e.g. stagnant pools of water with decomposing vegetation).

Secondly over extraction will lead to downstream water users not being able to use their lawful use volumes.

The reverse of the above scenario is a situation where all the stakeholders, from the Farmer to the Water Users Associations (WUA) to the local and district Municipalities, the provincial Authorities and the DWS WMA Managers, perform their duties responsibly to ensure sustainable water availability for the river system itself and all the lawful water users, in the long term.

##### **Employment Opportunities:**

The development and construction of the proposed dam infrastructure with its associated services will result in limited new job opportunities but it will however sustain and strengthen the existing employment model by supporting sustained agricultural production from season to season. In the light of the local socio-economic profile, every additional employment opportunity will make a significant contribution towards the reduction of unemployment in the area.

#### 5. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity 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.

##### **Alternative A1 (preferred alternative)**

Possible impacts anticipated to occur during the construction phase include:

- ❖ Erosion and loss of topsoils;
- ❖ Siltation and resulting decrease in surface water quality of local water bodies;
- ❖ Soil and water contaminations;
- ❖ Proliferation of alien invasive vegetation;
- ❖ Security.

Possible impacts anticipated to occur during the operational phase:

- ❖ Over abstraction of surface water volumes;
- ❖ EWR not being met;
- ❖ Proliferation of alien invasive vegetation.

Initially, the majority of the anticipated environmental impacts would be limited to the construction phase of the project and will therefore be of a temporary nature. Impacts caused during the operational phase of the proposed infrastructure can be minimised to where productive ecological processes can be maintained. Both the construction and the operational phase impacts can be mitigated significantly provided that the mitigation and rehabilitation measures included in the BAR and EMP are strictly adhered to.

### **No-go alternative (compulsory)**

This alternative would result in no construction related environmental impacts considering that the dam development would not be pursued. In terms of the operation of the proposed infrastructure the No-Go alternative will result in reduced availability of the Farmers ELU, reduced irrigation capability and reduced long term agricultural production capacity, which in turn may lead to reduced food security as well as a reduced ability to provide sustained employment opportunities.

### **Alternative A2**

N/A

### **Alternative A3**

N/A

**For more alternatives please continue as alternative D, E, etc.**

## SECTION E. RECOMMENDATION OF 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)?

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

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

N/A

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 department in respect of the application:

### ELU and EWR

- ❖ Water meters must be installed at all the abstraction points and the data must be used to ensure that the farming operations stays within its ELU volumes;
- ❖ The Sterktroom River's Catchment's EWR must be re-examined by the DWS ensure that the accurate reserve is determined in order for surrounding water users to know within what limits they can use the local resource without causing permanent damage to the resources which will in turn put their agricultural production abilities at risk.

### Ground-and Surface Water Quality, Soils:

- ❖ All stormwater channels must be lined with grass and frequent rock strips to ensure limited erosion and maximum infiltration of stormwater. Stormwater infrastructure must be maintained at all times;
- ❖ Ensure vehicles and heavy machinery used on-site are regularly inspected for leaks and serviced at frequent intervals;
- ❖ Construction and operational maintenance activities must be performed outside the riparian buffer.
- ❖ Chemical sanitary facilities must be provided for construction workers and emptied on regular intervals;
- ❖ All materials, fuels and chemicals must be stored in a secured, sealed and bunded area to prevent pollution from spillages and leakages. The use of chemicals should be controlled;
- ❖ Regular, ongoing monitoring and maintenance must be undertaken of the infrastructure in terms of the approved Structural Maintenance Plan.

### Rehabilitation and Monitoring:

- ❖ Post construction rehabilitation must be performed in line with the recommendations of the EMPr
- ❖ Monitoring of the success of the rehabilitation procedures must be done quarterly. Repairs must be done where stormwater damage causes erosion and barren areas must be re-grassed with the prescribed grass mix.

### Alien Invasive Specie Management and Control

- ❖ Alien invasive control must be managed in line with the recommendations with the freshwater Specialist.

### **Operational Maintenance**

- ❖ Regular, ongoing monitoring and maintenance must be undertaken of the infrastructure in terms of the approved Structural Maintenance Plan.

### **Safety:**

- ❖ Detailed contact sheets with the relevant contact no's of all the relevant contact personnel as well as the local EMS departments must be placed in the contractors and Farmers offices and the relevant other congregating areas at the construction camp for easy access in the case of emergency. This contact detail and its locality must also be communicated to the construction phase personnel at the relevant meetings and tool box talks;
- ❖ The necessary warning signage must be applied to the site to warn that the site is under construction and of the relevant hazards;
- ❖ Employees should be trained regularly on fire safety and there should be fire marshals;
- ❖ The prescribed industry specific fire safety precautions in terms of the Occupational Health and Safety Act must be adhered to.

### **Environmental Management Programme Report (EMPr)**

- ❖ The site-specific recommendations and mitigation measures as pointed out in the EMPr should be made a condition of the authorization. (Appendix F).

Is an EMPr attached?

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

The EMPr must be attached as Appendix F.

## SECTION F: APPENDIXES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports

Appendix E: Comments and responses report

Appendix F: Environmental Management Programme (EMPr)

Appendix G: Other information

## SECTION G: DECLARATION BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

I, JC van Rooyen declare that I –

- (a) act as the independent environmental practitioner in this application;
- (b) do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- (c) do not have and will not have a vested interest in the proposed activity proceeding;
- (d) have no, and will not engage in, conflicting interests in the undertaking of the activity;
- (e) undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2006;
- (f) will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- (g) will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the Department in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the Department may be attached to the report without further amendment to the report;
- (h) will keep a register of all interested and affected parties that participated in a public participation process; and
- (i) will provide the Department with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

  
\_\_\_\_\_  
Signature of the Environmental Assessment Practitioner:

SPOOR Environmental Services (PTY) Ltd.

\_\_\_\_\_  
Name of company:

2021-12-06

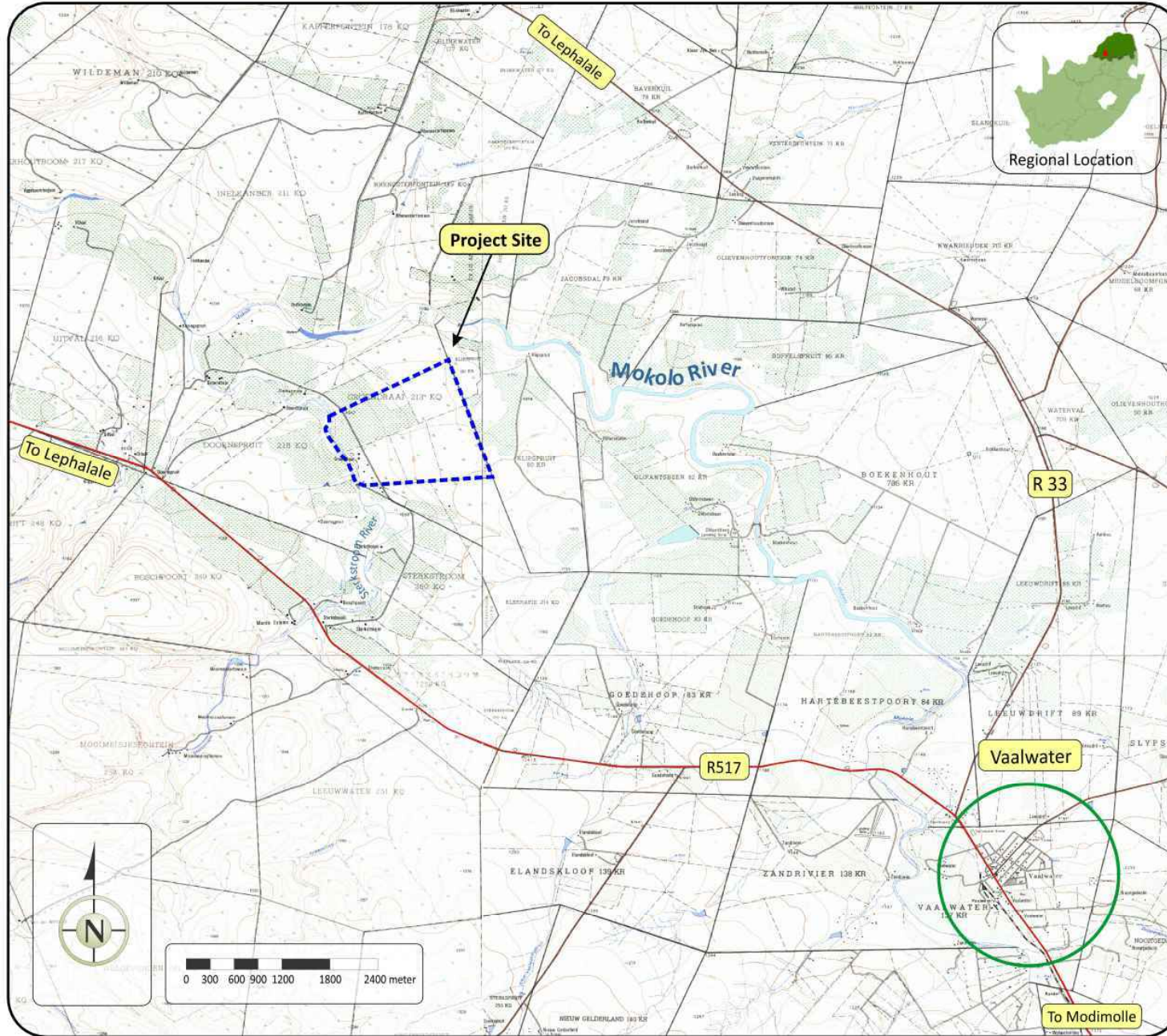
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Date:



## APPENDIXES TO THE DRAFT BA REPORT


<b>Appendix A</b>	Site Plans
<b>Appendix B</b>	Site Photographs
<b>Appendix C</b>	Facility Illustrations
<b>Appendix D</b>	Specialist Reports
<b>Appendix E</b>	Public Participation Information
<b>Appendix E_1</b>	Proof of Site Notice
<b>Appendix E_2</b>	Proof of Newspaper Advertisement
<b>Appendix E_3</b>	Written Notices Issued to I&APs
<b>Appendix E_4</b>	Communications to and from I&APs
<b>Appendix E_5</b>	Notices, Comments and Responses in terms of the Draft BA Report
<b>Appendix E_6</b>	Comments and Responses Report
<b>Appendix E_7</b>	I&AP Database
<b>Appendix F</b>	Environmental Management Programme
<b>Appendix G</b>	Other Information

**APPENDIX A**  
**SITE PLANS**



**Legend:**

**Project Site**

 Portion 1 of the Farm Groendraai 213 KQ

242788 Topographical Map Sheet

**Project:**

Storage of Water in Dams  
 Thinus Maritz Vaalwater  
 (PTY) Ltd.

**Proponent:**

  
 Thinus Maritz  
 Boerdery  
 Vaalwater

**Consultant:**

  
 spoor  
 environmental services

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 w: spoorenvironmental.co.za  
 p: Suite 448 P/Bag X025  
 Lynwoodridge 0040


**Figure 1:**

Locality Map




**Legend:**

**Project Site**

 Portion 1 of the Farm Groendraai 213 KQ

 Original Dam

 Proposed New Dam Position

2427BB Topographical Map Sheets

**Project:**

Storage of Water in Dams  
Thinus Maritz Vaalwater (PTY) Ltd.

**Proponent:**

  
Thinus Maritz  
Boerdery  
Vaalwater

**Consultant:**

  
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Lynnwoodridge 0040

**Dam Positions**



**Legend:**

2427BB Topographical Map Sheets

**Project:**

Storage of Water in Dams  
Thinus Maritz Vaalwater  
(PTY) Ltd.

**Proponent:**

**Thinus Maritz**  
Boerdery  
Vaalwater

**Consultant:**

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**Proposed New  
Dam**

**APPENDIX B**

**SITE PHOTOGRAPHS**

(Taken from the Centre of the Site)



North



North East



East



South East



South



South West



West



North West





Eastern corner of the proposed dam looking east



Patches of Sandy Bushveld to the south west of the proposed dam



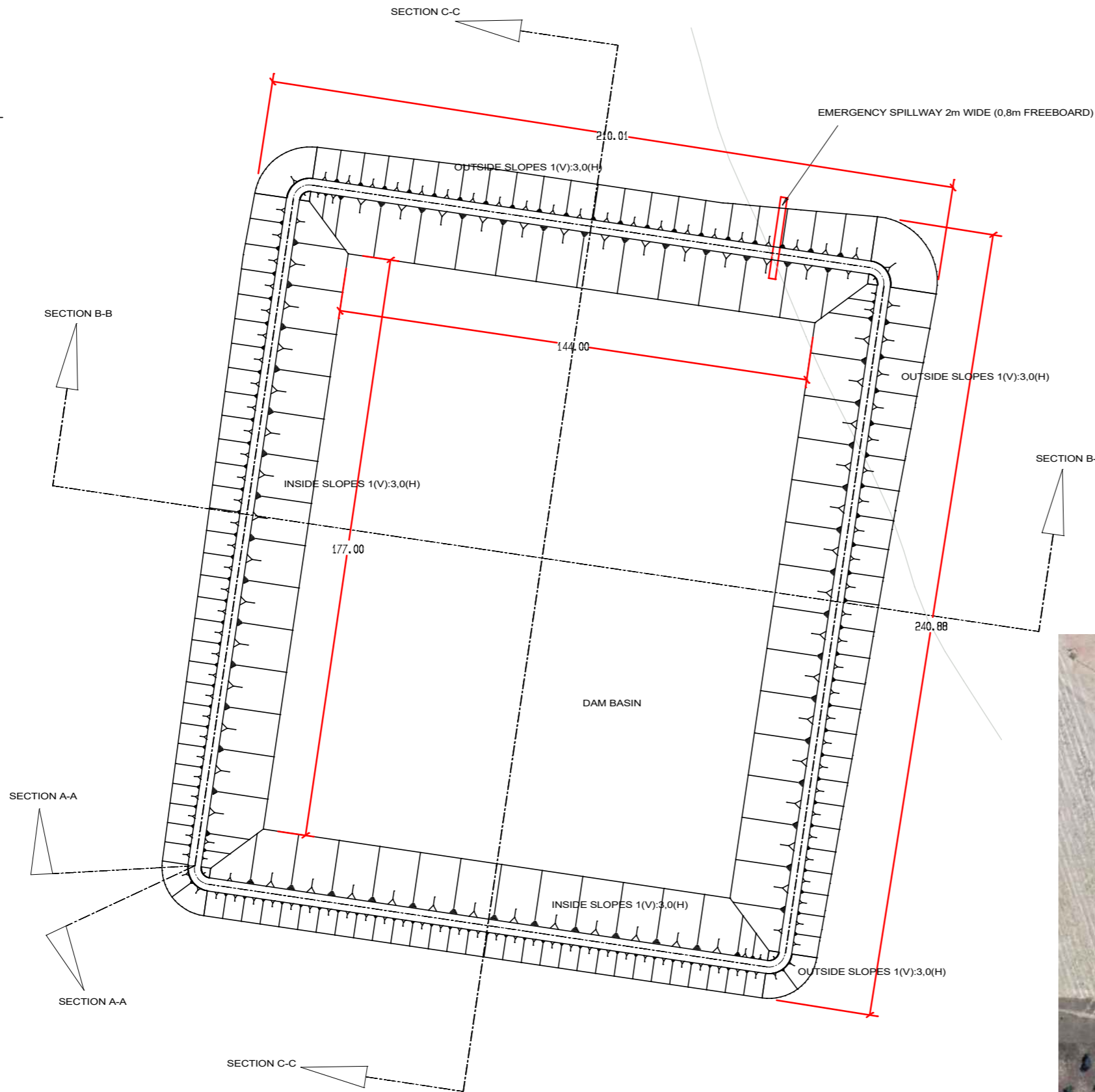
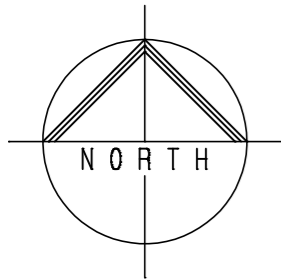
Pivot under Amaryllis bulbs to the north east



Main access road to the dam site to the south east

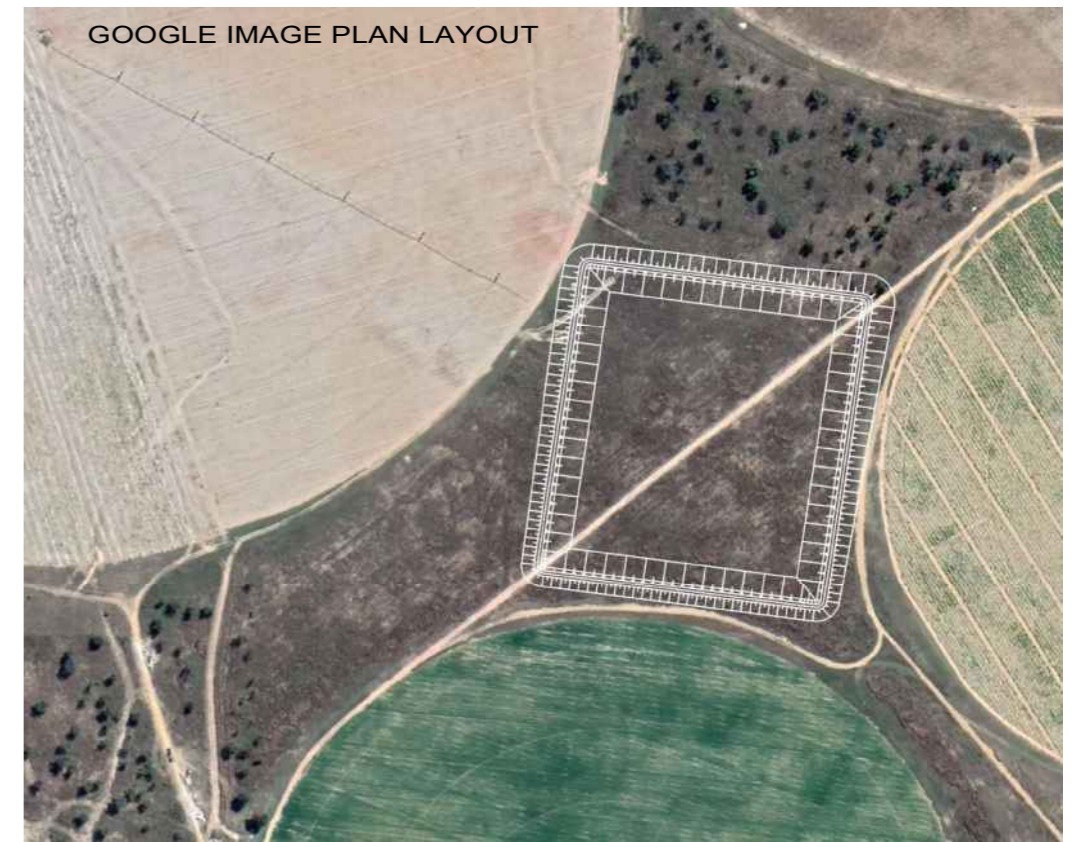
**APPENDIX C**  
**FACILITY ILLUSTRATIONS**

**PROPOSED DAM**



**KRANSKLOOF HDPE LINED BALANCING DAM**  
 WATER SURFACE AREA - 3,580ha  
 STORAGE CAPACITY - 150 000m<sup>3</sup>

**NOTE: SETTING OUT COORDINATES TO BE FINALIZED DURING DETAIL DESIGN**



**DAM LAYOUT PLAN - SCALE 1:1500 (A3)**

CONCEPT DESIGN DRAWINGS

ORIGINAL SIZE A3

AMENDMENTS			
NO.	DATE	APPROVED	DESCRIPTION

**NOTES:**

**GENERAL NOTES:**  
 1. ALL WORK MUST COMPLY WITH THE BY-LAWS AND SPECIFICATIONS OF THE LOCAL AUTHORITY, NATIONAL BUILDING REGULATIONS AND SANS 1200  
 2. ALL DIMENSIONS AND LEVELS SHALL BE CHECKED ON SITE BEFORE WORK COMMENCES AND ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IN WRITING  
 3. THE ENGINEER WILL ASSIST THE CONTRACTOR IN STAKING LINES WHERE AFTER THE CONTRACTOR SHALL TAKE OVER ALL SETTING OUT PEGS AND SURVEY BEACONS AND MAINTAIN THEM DURING THE CONSTRUCTION PERIOD

**DAM OWNER**

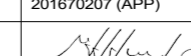
**THINUS MARITZ BOERDERY (PTY) LTD  
 VAALWATER**

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 VAALWATER  
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 Email: vaalwater@thinusmaritz.co.za  
 Cell: 082 524 8598

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 Gallo Manor, 2052  
 Telephone/Mobile: +27 (0) 82 337 6905  
 E-mail: pieter@pgconsulting.co.za  
 Website: www.pgconsulting.co.za

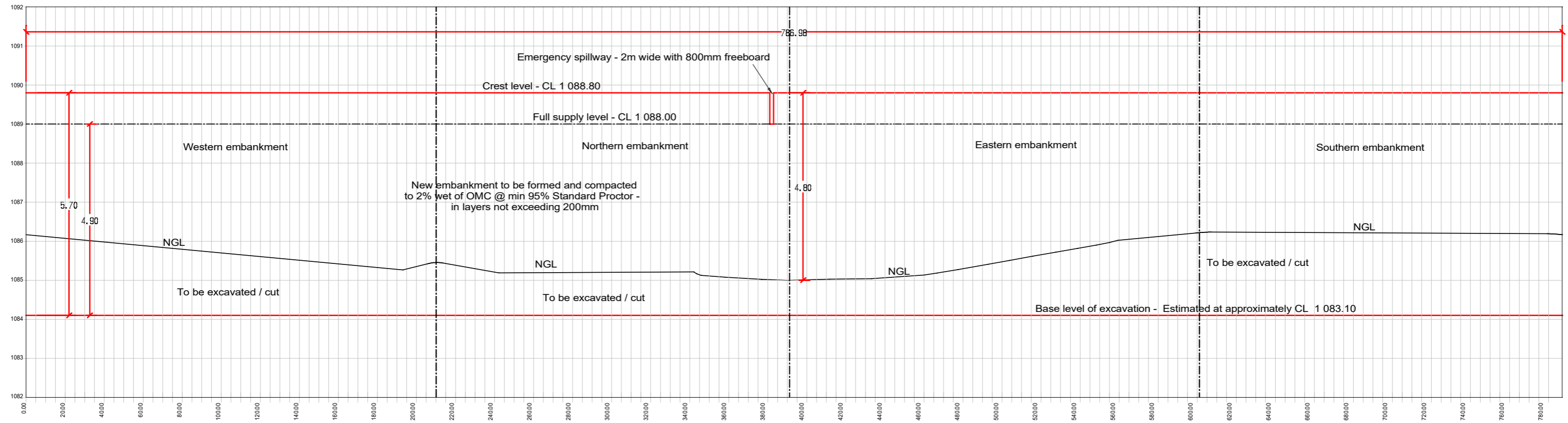


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DESIGNED	MF JOUBERT Pr Tech Eng
APPROVED PR. NO.	MF JOUBERT Pr Tech Eng 201670207 (APP)
SIGNATURE	

Project		<b>KRANSKLOOF DAM (PROPOSED)</b>	
Plan Description		DATE	SCALE
PLAN LAYOUT KRANSKLOOF DAM HDPE LINED BALANCING DAM		2021-12-01	AS SHOWN
		DRAWING NUMBER	
		075/W/KK/001	
		REVISION NUMBER	0
		PROJECT NUMBER	075

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SECTIONS



EMBankment LONG SECTION (A-A) - SCALE AS INDICATED

CONCEPT DESIGN DRAWING

ORIGINAL SIZE A3

AMENDMENTS			
NO.	DATE	APPROVED	DESCRIPTION

**NOTES:**

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**DAM OWNER**

**THINUS MARITZ BOERDERY (PTY) LTD  
VAALWATER**

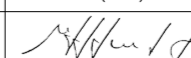
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Email: vaalwater@thinusmaritz.co.za  
Cell: 082 524 8598

**CONSULTANTS**

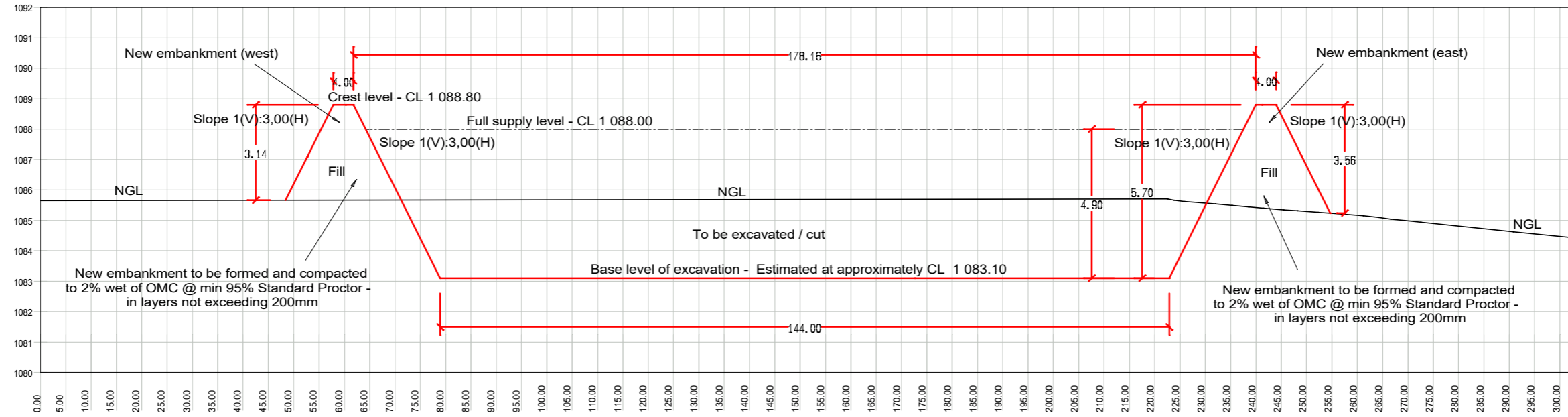
Physical Address: Building 24, Sunninghill Office Park,  
20 Peltier Drive, Sunninghill, Johannesburg, 2191  
Postal: Postnet Suite 356, Private Bag X29,  
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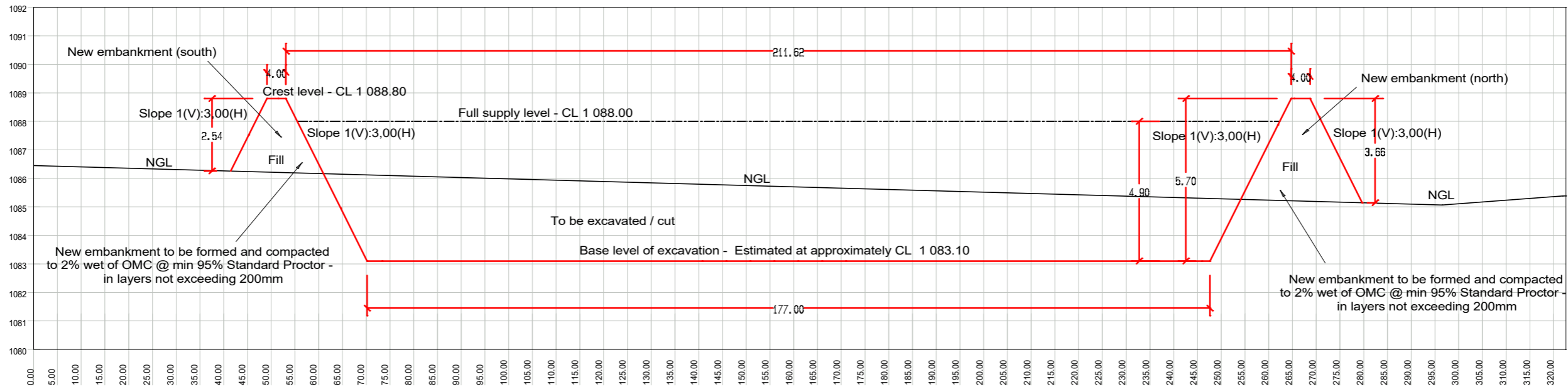
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DESIGNED	MF JOUBERT Pr Tech Eng
APPROVED PR. NO.	MF JOUBERT Pr Tech Eng 201670207 (APP)
SIGNATURE	

Project		<b>KRANSKLOOF DAM (PROPOSED)</b>	
Plan Description		EMBankment LONG SECTION & DETAILS KRANSKLOOF DAM HDPE LINED BALANCING DAM	
DATE	SCALE	DRAWING NUMBER	REVISION NUMBER
2021-12-01	AS SHOWN	075/W/KK/001	0
PROJECT NUMBER		075	
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EMBAKMENT CROSS SECTION (B-B) - SCALE AS INDICATED



EMBAKMENT CROSS SECTION (C-C) - SCALE AS INDICATED

CONCEPT DESIGN DRAWING

ORIGINAL SIZE A3

AMENDMENTS			
NO.	DATE	APPROVED	DESCRIPTION

NOTES:

GENERAL NOTES:

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DAM OWNER

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Project		<b>KRANSKLOOF DAM (PROPOSED)</b>	
Plan Description		EMBAKMENT CROSS SECTIONS & DETAILS KRANSKLOOF DAM HDPE LINED BALANCING DAM	
DATE	SCALE	DRAWING NUMBER	REVISION NUMBER
2021-12-01	AS SHOWN	075/W/KK/001	0
PROJECT NUMBER		075	
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**APPENDIX D**  
**SPECIALIST REPORTS**



**APPENDIX D\_1**  
**HERITAGE IMPACT ASSESSMENT**

# SPOOR ENVIRONMENTAL SERVICES (PTY) LTD: THE PROPOSED THINUS MARITZ DAM DEVELOPMENT PROJECT, WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

## ARCHAEOLOGICAL IMPACT ASSESSMENT

Submitted subject to Section 38(3) and Section 38(8) of the NHRA

**Prepared For:**

JC Van Rooyen

Director: SPOOR Environmental Services (PTY) Ltd

Project Code	Date	Version	Status
NH-R-20-059	2 December 2021	1.0	Draft

# ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) ON A PORTION OF THE FARM GROENDRAAI 213KQ FOR THE PROPOSED THINUS MARITZ DAM DEVELOPMENT PROJECT IN THE WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

## SPECIALIST DECLARATION OF INDEPENDENCE

I, Nelius Kruger, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Thinus Maritz Dam Development Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, including the relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980), the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment (SAHRA, EC-PHRA and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.



Signature of specialist

**Name:** Nelius Kruger

**Date:** 2 December 2021

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The Heritage Consultant promotes the conservation of sensitive archaeological and heritage resources and uncompromisingly adheres to relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980). In order to ensure best practices and ethics in the examination, conservation and mitigation of archaeological and heritage resources, The Heritage Consultant follows the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment as set out by the South African Heritage Resources Agency (SAHRA) and the CRM section of the Association for South African Professional Archaeologists (ASAPA).

## EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) process for the proposed Thinus Maritz Dam Development Project on a portion of the Farm Groendraai 213KQ in the Waterberg District Municipality of the Limpopo Province. The project entails the construction of a agriculture storage dam across approximately **4.9ha**. The report includes background information on the area's archaeology, its representation in Southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the South African Heritage Resources Agency (SAHRA) and recommendations contained in this document will be reviewed.

<b>Project Title</b>	Thinus Maritz Dam Development Project
<b>Project Type / Scope</b>	Storage Dam Development
<b>Project Impact Footprint/s Area</b>	<b>4.9ha</b>
<b>Project Location</b>	S24.197371° E27.988444°
<b>1:50 000 Map Sheet</b>	2427BB
<b>Farm Portion / Parcel</b>	A Portion of the Farm Groendraai 213KQ
<b>Magisterial District / Municipal Area</b>	Waterberg District Municipality
<b>Province</b>	Limpopo Province

The history of the western Limpopo Province is reflected in a rich archaeological landscape. Sites, documenting Stone Age habitation occur in places, mostly in open air locales or in sediments alongside rivers or pans. Bantu-speaking groups moved into this area during the last millennia and these presumably Batswana groups occupied the landscape during the Late Iron Age times at around AD 1500-1800. Settlement by Iron Age communities occurred near rivers and close to rocky outcrops. European farmers, settling in the area since the middle of the 19th century, divided up the landscape into a number of farms. In recent years the Vaalwater region has seen intensive agriculture and tourism development. Similarly, large portions of the farm Groendraai have been converted into agricultural fields but natural vegetation and landscape features remain relatively intact in some areas along the Sterkstroom River and the Mokolo River. A study of aerial photos indicate that parts of the site demarcated for the dam have been transformed for farming in previous decades. **This inference was confirmed during an archaeological site assessment during which no *in situ* archaeological or heritage remains were encountered.** The following recommendations are made based on general observations in the proposed Thinus Maritz Dam Development Project in terms of heritage resources management:

- Even though no archeological sites, features or artefacts were noted in the project area, the location of the proposed new dam in the landscape around the Sterkstroom River renders it prone to alluvial deposits that could bury potential Stone Age material and *in situ* Stone Age remains might occur in previously undetected contexts in the larger landscape. As such, it is recommended that all development activities be closely monitored in order to avoid the destruction of previously undetected heritage remains and particularly Stone Age occurrences.
- It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the project area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of

construction and development, including the operational phases of the development. Generally, the frequent monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.

***Cognisant of known site distribution patterns in this section of the Limpopo Province, and based on general on-site observations and off-site assessments and, notably the fact that the project sites and its immediate surrounds have previously been transformed by historical and contemporary agriculture activities, the author of this report is of the opinion that the construction of the Thinus Maritz Dam Development will have no impact on archaeological artefacts, features or structures surviving in primary context, subject to the fact that no previously undetected heritage remains (for example, those in sub-surface deposits) are exposed at any stage of the development.***

This report details the methodology, limitations and recommendations relevant to these heritage areas, as well as areas of proposed development. It should be noted that recommendations and possible mitigation measures are valid for the duration of the development process, and mitigation measures might have to be implemented on additional features of heritage importance not detected during this Phase 1 assessment (e.g. uncovered during the construction process).

## NOTATIONS AND TERMS/TERMINOLOGY

**Absolute dating:** Absolute dating provides specific dates or range of dates expressed in years.

**Archaeological record:** The archaeological record minimally includes all the material remains documented by archaeologists. More comprehensive definitions also include the record of culture history and everything written about the past by archaeologists.

**Artefact:** Entities whose characteristics result or partially result from human activity. The shape and other characteristics of the artefact are not altered by removal of the surroundings in which they are discovered. In the Southern African context examples of artefacts include potsherds, iron objects, stone tools, beads and hut remains.

**Assemblage:** A group of artefacts recurring together at a particular time and place, and representing the sum of human activities.

**Context:** An artefact's context usually consists of its immediate *matrix*, its *provenience* and its *association* with other artefacts. When found in *primary context*, the original artefact or structure was undisturbed by natural or human factors until excavation and if in *secondary context*, disturbance or displacement by later ecological action or human activities occurred.

**Cultural Heritage Resource:** The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

**Cultural landscape:** A cultural landscape refers to a distinctive geographic area with cultural significance.

**Cultural Resource Management (CRM):** A system of measures for safeguarding the archaeological heritage of a given area, generally applied within the framework of legislation designed to safeguard the past.

**Feature:** Non-portable artefacts, in other words artefacts that cannot be removed from their surroundings without destroying or altering their original form. Hearths, roads, and storage pits are examples of archaeological features

**Impact:** A description of the effect of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

**Lithic:** Stone tools or waste from stone tool manufacturing found on archaeological sites.

**Matrix:** The material in which an artefact is situated (sediments such as sand, ashy soil, mud, water, etcetera). The matrix may be of natural origin or human-made.

**Midden:** Refuse that accumulates in a concentrated heap.

**Microlith:** A small stone tool, typically knapped of flint or chert, usually about three centimetres long or less.

**Monolith:** A geological feature such as a large rock, consisting of a single massive stone or rock, or a single piece of rock placed as, or within, a monument or site.

**Phase 1 CRM Assessment:** An Impact Assessment which identifies archaeological and heritage sites, assesses their significance and comments on the impact of a given development on the sites. Recommendations for site mitigation or conservation are also made during this phase.

**Phase 2 CRM Study:** In-depth studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required. Mitigation / Rescue involves planning the protection of significant sites or sampling through excavation or collection (in terms of a permit) at sites that may be lost as a result of a given development.

**Phase 3 CRM Measure:** A Heritage Site Management Plan (for heritage conservation), is required in rare cases where the site is so important that development will not be allowed and sometimes developers are encouraged to enhance the value of the sites retained on their properties with appropriate interpretive material or displays.

**Provenience:** Provenience is the three-dimensional (horizontal and vertical) position in which artefacts are found. Fundamental to ascertaining the provenience of an artefact is *association*, the co-occurrence of an artefact with other archaeological remains; and *superposition*, the principle whereby artefacts in lower levels of a matrix were deposited before the artefacts found in the layers above them, and are therefore older.

**Random Sampling:** A probabilistic sampling strategy whereby randomly selected sample blocks in an area are surveyed. These are fixed by drawing coordinates of the sample blocks from a table of random numbers.

**Scoping Assessment:** The process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment. The main purpose is to focus the impact assessment on a manageable number of important questions on which decision making is expected to focus and to ensure that only key issues and reasonable alternatives are examined. The outcome of the scoping process is a Scoping Report that includes issues raised during the scoping process, appropriate responses and, where required, terms of reference for specialist involvement.

**Site (Archaeological):** A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity. These include surface sites, caves and rock shelters, larger open-air sites, sealed sites (deposits) and river deposits. Common functions of archaeological sites include living or habitation sites, kill sites, ceremonial sites, burial sites, trading, quarry, and art sites,

**Stratigraphy:** This principle examines and describes the observable layers of sediments and the arrangement of strata in deposits

**Systematic Sampling:** A probabilistic sampling strategy whereby a grid of sample blocks is set up over the survey area and each of these blocks is equally spaced and searched.

**Trigger:** A particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an *issue* and/or potentially significant *impact* associated with that proposed development that may require specialist input. Legal requirements of existing and future legislation may also trigger the need for specialist involvement.

## LIST OF ABBREVIATIONS

<b>Abbreviation</b>	<b>Description</b>
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
BGG	Burial Grounds and Graves
CRM	Culture Resources Management
EIA	Early Iron Age (also Early Farmer Period)
EIA	Environmental Impact Assessment
EFP	Early Farmer Period (also Early Iron Age)
ESA	Earlier Stone Age
GIS	Geographic Information Systems
HIA	Heritage Impact Assessment
ICOMOS	International Council on Monuments and Sites
K2/Map	K2/Mapungubwe Period
LFP	Later Farmer Period (also Later Iron Age)
LIA	Later Iron Age (also Later Farmer Period)
LSA	Later Stone Age
MIA	Middle Iron Age (also Early later Farmer Period)
MRA	Mining Right Area
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
PFS	Pre-Feasibility Study
PHRA	Provincial Heritage Resources Authorities
SAFA	Society for Africanist Archaeologists
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

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## 1 BACKGROUND

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### 1.1 Scope and Project Brief

SPOOR Environmental Services (PTY) Ltd has commissioned an Archaeological Impact Assessment (AIA) as part of an Environmental Basic Assessment (BA) process for the proposed establishment of a new dam on a portion of the Farm Groendraai 213KQ in the Limpopo Province (hereafter referred to as the “Thinus Maritz Dam Development Project” or “the Project”). The rationale of the AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

The project entails the construction of an agriculture catchment dam across a surface area of approximately **3ha** (refer to Figure 1-1).

### 1.2 Project Direction

Mr Neels Kruger acts as field director for the project; responsible for the assimilation of all information, the compilation of the final consolidated AIA report and recommendations in terms of heritage resources on the demarcated project areas. Mr Kruger is an accredited archaeologist and Culture Resources Management (CRM) practitioner with the Association of South African Professional Archaeologists (ASAPA), a member of the Society for Africanist Archaeologists (SAFA) and the Pan African Archaeological Association (PAA).

### 1.3 Project Terms of Reference

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that, through the management of change, developments still conserve our heritage resources. It is also a legal requirement for certain development categories which may have an impact on heritage resources. Thus, EIAs should always include an assessment of heritage resources. The heritage component of the EIA is provided for in the **National Environmental Management Act, (Act 107 of 1998)** and endorsed by section 38 of the **National Heritage Resources Act (NHRA - Act 25 of 1999)**. In addition, the NHRA protects all structures and features older than 60 years, archaeological sites and material and graves as well as burial sites. The objective of this legislation is to ensure that developers implement measures to limit the potentially negative effects that the development could have on heritage resources.

Based hereon, this project **terms of reference** for heritage specialist input area:

- *Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.*
- *Assess the nature and degree of significance of such resources within the area.*
- *Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;*
- *Assess and rate any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible heritage management measures provided that such action is necessitated by the development.*
- *Liaise and consult with the South African Heritage Resources Agency (SAHRA). A Notification of Intent to Develop (NID) will be submitted to SAHRA at the soonest opportunity.*

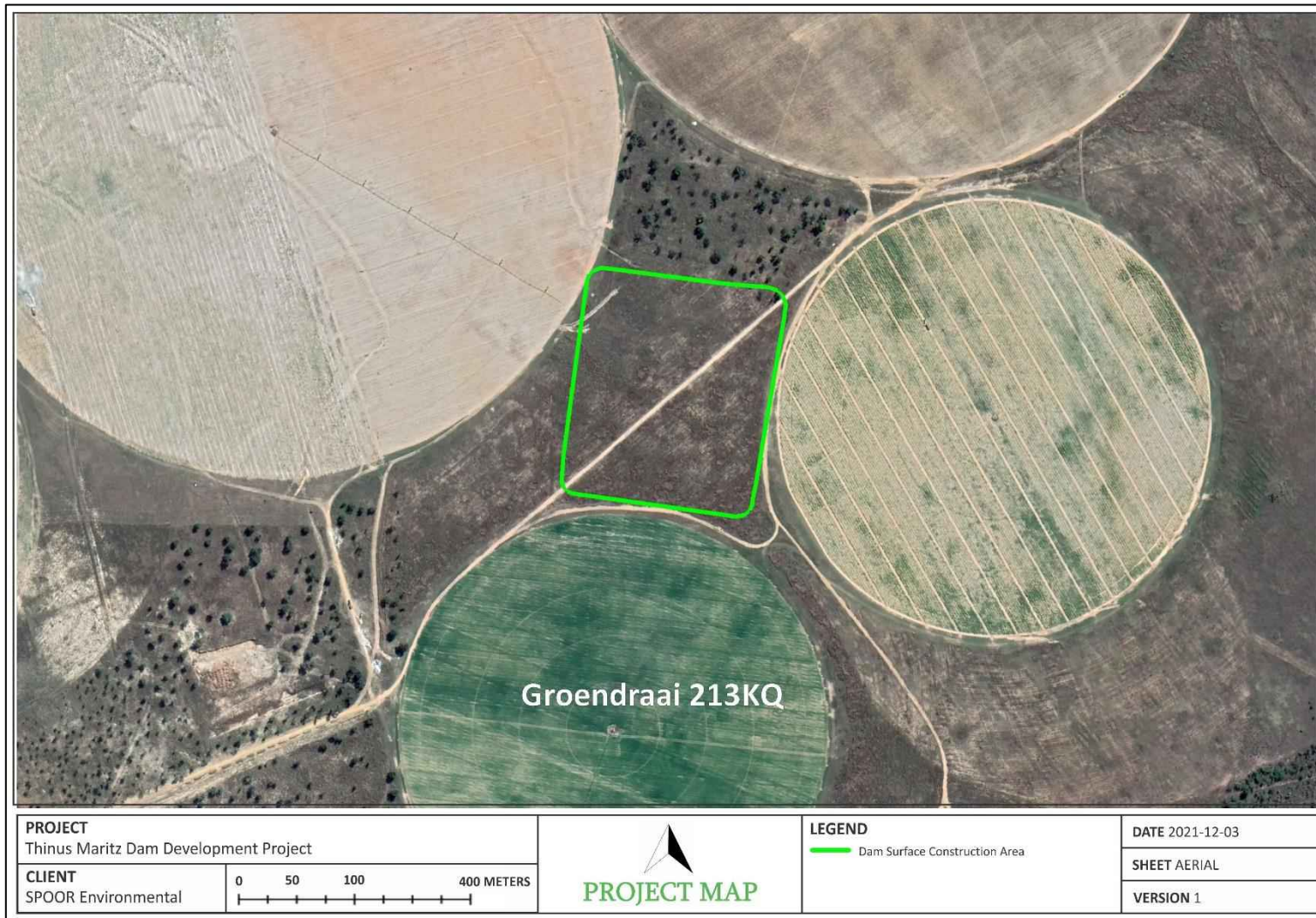


Figure 1-1: Aerial map indicating the extent of the Thinus Maritz Dam Development Project.

## 2 LEGISLATIVE FRAMEWORK

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### 2.1 CRM: Legislation, Conservation and Heritage Management

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

#### 2.1.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and its provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

##### a. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act No 25 of 1999 (section 35) the following features are protected as cultural heritage resources:

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

In addition, the national estate includes the following:

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

With regards to activities and work on archaeological and heritage sites this Act states that:

*“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority.” (34. [1] 1999:58)*

and

*“No person may, without a permit issued by the responsible heritage resources authority-*

- (a) *destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) *destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) *trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) *bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."*

and

*"No person may, without a permit issued by SAHRA or a provincial heritage resources agency-*

- (a) *destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."*

#### **b. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925**

Graves and burial grounds are commonly divided into the following subsets:

- a. ancestral graves
- b. royal graves and graves of traditional leaders
- c. graves of victims of conflict
- d. graves designated by the Minister
- e. historical graves and cemeteries
- f. human remains

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and Ordinance on Excavations (Ordinance no. 12 of 1980) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments.

#### **c. National Heritage Resources Act No 25 of 1999, Section 35**

This act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made. Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

#### **2.1.2 Background to HIA and AIA Studies**

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact

assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

**A detailed guideline of statutory terms and requirements is supplied in Addendum 1.**

## 2.2 Rating of significance

The National Heritage Resources Act (Act no 25 of 1999) also stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- *Grade I:* Heritage resources with qualities so exceptional that they are of special national significance;
- *Grade II:* Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region;
- *Grade III:* Other heritage resources worthy of conservation, and which prescribes heritage resources assessment criteria, as set out in section 3(3) of the act.

Significance is influenced by the context and state of the archaeological site. Six criteria were considered following Kruger (2019):

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

The categories of significance were based on the above criteria the above and the grading system outlined in NHRA and summarised below:

Significance	Rating Action
No significance: sites that do not require mitigation.	None
Low significance: sites, which may require mitigation.	2a. Recording and documentation (Phase 1) of site; no further action required 2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which require mitigation.	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High significance: sites, where disturbance should be avoided.	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism
High significance: Graves and burial places	4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinternment [including 2a, 2b & 3]

### **3 REGIONAL CONTEXT**

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#### **3.1 Area Location**

The proposed Thinus Maritz Dam Development Project occurs on a portion of the Farm Groendraai 213KQ in the Limpopo Province. The project area is situated approximately 20km northwest of the town of Vaalwater and 60km southeast of Lephalale. Access to the site is from the R517 from Vaalwater. The study areas appear on 1:50000 map sheet 2427BB (see Figure 2-1) and a key location point for the project is:

- **S24.197371° E27.988444°**

#### **3.2 Area Description: Receiving Environment**

The study area lies within the Savanna biome which is the largest biome in Southern Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs). Fire and grazing also keep the grassy layer dominant. The most recent classification of the area by Mucina & Rutherford shows that the site is classified as Central Sandy Bushveld. The project area is characterised by slightly undulating to flat plains with major drainage, specifically the Mokolo and Sterkstroom Rivers as well as the Blinkwaterspruit bisecting the area.

#### **3.3 Site Description**

The landscape on the farm Groendraai is generally open land with undulating rolling hills in places. Existing infrastructure on the property comprises offices, farmsteads and workers buildings. The current land-use of the farm is intensive crop cultivation and neighbouring farms are being used for livestock grazing and cattle farming. As a result, large portions of land along the Sterkstroom and Mokolo Rivers as well as the Blinkwaterspruit have been converted into crop fields but natural riparian vegetation remain relatively intact in places. The proposed project site occurs wedged between two pivot irrigation fields south of the Mokolo River in an area that has seen surface transformation as a result of agriculture and related vegetation clearing. Small pockets of vegetation in the form of grasslands and occasional trees remain scattered between the irrigation fields.

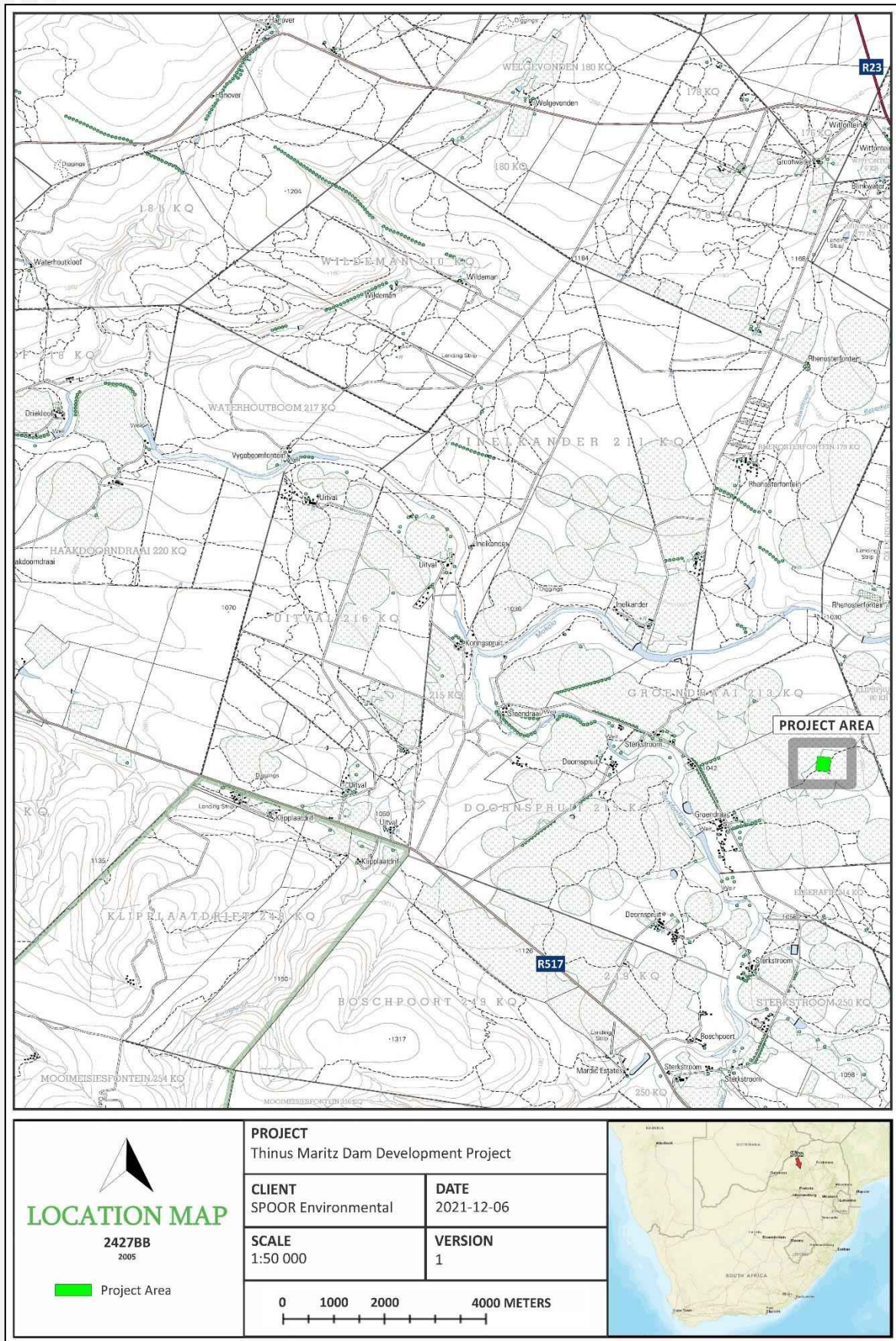


Figure 3-1: 1:50 00 Map representation of the location of the proposed Thinus Maritz Dam Development Project (sheet 2427BB).



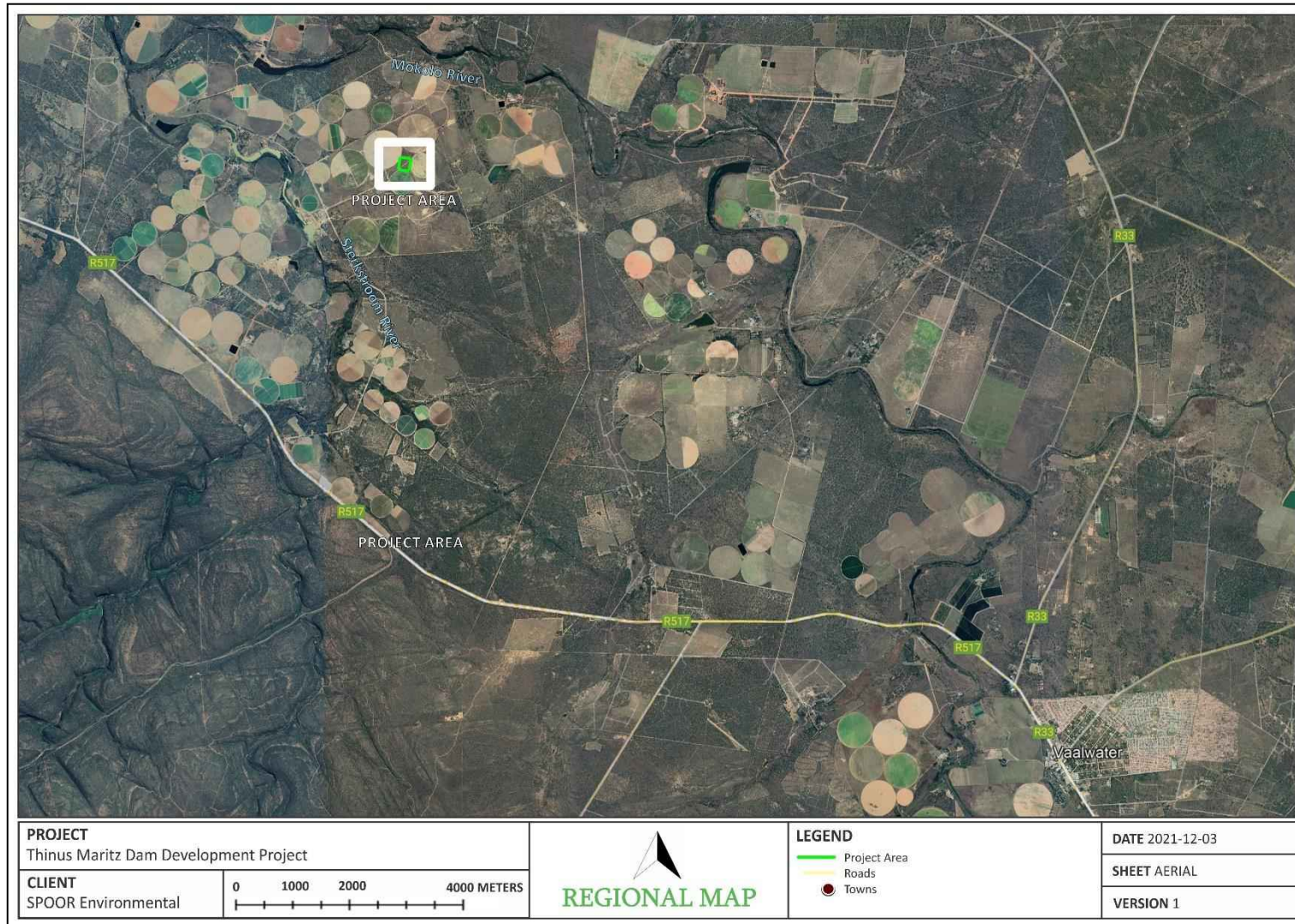


Figure 3-2: Aerial map providing a regional context for the proposed Thinus Maritz Dam Development Project area.

## 4 METHOD OF ENQUIRY

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### 4.1 Sources of Information

Data from detailed desktop, aerial and field studies were employed in order to sample surface areas systematically and to ensure a high probability of heritage site recording.

#### 4.1.1 Desktop Study

The larger landscape around Vaalwater has been well documented in terms of its archaeology and history. A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. The study focused on relevant previous studies, archaeological and archival sources, aerial photographs, historical maps and local histories, all pertaining to the project area and the larger landscape of this section of the Limpopo Province. A number of Cultural Resources Management (CRM) projects have been conducted in the Vaalwater area and these include:

- Hutten, M. 2013c. HIA for the proposed solar park development on the farm Aapieskruil near Koedoeskop, Limpopo Province. Compiled for: Jonk Begin Omgewingsdienste.
- Fourie, W. 2012. Wachteenbietjesdraai 350 KQaAnd Kwaggashoek 345 KQ Heritage Impact Report on proposed mining activities of Project Phoenix. PGS Heritage Consultants
- Fourie, W. 2014. Proposed Development of the Steenbokpan Extension 3 Township on the Remainder and Portions 1, 2, 3 and 4 of the Farm Grootdoorn 292 LQ, Portions 20, 22 and 25 of the Farm Theunispan 293 LQ and Portion 3 of the Farm Steenbokpan 295 LQ at Steenbokpan, Lephalale Local Municipality, Waterberg District, Limpopo Province. Client: Flexilor Properties (Pty) Ltd . PGS Heritage Consultants
- Van Schalkwyk, J.A. 1994. A survey of archaeological and cultural historical resources in the Amandelbult mining lease area. Unpublished report 94KH03. Pretoria: National Cultural History Museum.
- Van Schalkwyk, J.A. 2001. A survey of cultural resources in two development areas, Amandelbult, Northern Province. Unpublished report 2001KH13. Pretoria: National Cultural History Museum.
- Van Schalkwyk, J.A. 2003. A survey of archaeological sites for the Amandelbult Platinum Mine Seismic exploration program. Unpublished report 2003KH16. Pretoria: National Cultural History Museum.
- Van Schalkwyk, J.A. 2004. Heritage impact report for the Amandelbult electricity sub-transmission lines, Amandelbult Platinum Mine, Limpopo Province. Unpublished report 2004KH32. Pretoria: National Cultural History Museum.
- Van Schalkwyk, J. 2007. Survey of heritage resources in the location of the proposed Merensky Mining Project, Amandelbult Section, Rustenburg Platinum Mine, Limpopo Province. Prepared For WSP Environmental.
- Van Vollenhoven, A. July 2013. A Report on a Cultural Heritage Impact Assessment for the Continental Limestone Mine, close to Thabazimbi, Limpopo Province.

#### 4.1.2 Remote Sensing

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. The site assessment of the project area relied heavily on this method to assist the challenging foot site survey. Here, depressions, variation in vegetation, soil marks and landmarks were examined and specific attention was given to shadow sites (shadows of walls or earthworks which are visible early or late in the day), crop mark sites (crop mark sites are visible because disturbances beneath crops cause variations in their height, vigour and type) and soil marks (e.g. differently coloured or textured soil (soil marks) might indicate ploughed-out burial mounds). Attention was also given to moisture differences, as prolonged dampening of soil as a result of precipitation frequently occurs over walls or embankments. In

addition, historical aerial photos obtained during the archival search were scrutinized and features that were regarded as important in terms of heritage value were identified and if they were located within the boundaries of the project area they were physically visited in an effort to determine whether they still exist and in order to assess their current condition and significance. By superimposing high frequency aerial photographs with images generated with Google Earth as well as historical aerial imagery, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as reference points from where further vehicular and pedestrian surveys were carried out.

#### **4.1.3 Map Data**

Similar to the aerial survey, the site assessment of the project area relied heavily on archive and more recent map renderings of the Vaalwater and the Groendraai areas to assist the challenging foot site survey where historical and current maps of the project area were examined. By merging data obtained from the desktop study and the aerial survey, sites and areas of possible heritage potential were plotted on these maps of the larger region using GIS software. These maps were then superimposed on high-definition aerial representations in order to graphically demonstrate the geographical locations and distribution of potentially sensitive landscapes.

#### **4.1.4 Field Survey**

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the project area was conducted in November 2021. The process encompassed a random field survey in accordance with standard archaeological practice by which heritage resources are observed and documented. Particular focus was placed on GPS reference points identified during the aerial and mapping survey. Where possible, random spot checks were made and potentially sensitive heritage areas were investigated. Using a Garmin GPS, the survey was tracked and general surroundings were photographed with a Samsung Digital camera. Real time aerial orientation, by means of a mobile Google Earth application was also employed to investigate possible disturbed areas during the survey.

#### **4.1.5 General Public Liaison**

Consultation with the far owner of the property who is familiar with the area in question did not identify any heritage receptors in the project area.

### **4.2 Limitations**

#### **4.2.1 Access**

The study area is accessed via a farm access road connecting to the R517 to Vaalwater. Access control is applied to the survey area but no restrictions were encountered as access arrangements were made with the owner.

#### **4.2.2 Visibility**

The surrounding vegetation in the project area mostly comprised out of large pivot irrigation fields, grasslands and farmlands with pockets of pioneering species and occasional trees. The general visibility at the time of the AIA survey (November 2021) ranged from high along the transformed areas to the west of the project area, to moderate in the more overgrown eastern areas. In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.



Figure 4-1: View of general surroundings in transformed agriculture fields in the project area.



Figure 4-2: View of general surroundings in the project area.



Figure 4-3: View of grasslands in a section of the project area.



Figure 4-4: Site access road and agricultural fields in of the project area.



Figure 4-5: View of a pocket of natural vegetation in the larger project landscape.



Figure 4-6: View of an agricultural field adjacent to the project area.

#### 4.2.3 Summary: Limitations and Constraints

The site survey for the Thinus Maritz Dam Development Project AIA proved to be constrained and the investigation primarily focused around areas tentatively identified as sensitive and of high heritage probability (i.e. those noted during the mapping and aerial survey) as well as areas of potential high human settlement catchment. In summary, the following constraints were encountered during the site survey:

- The general visibility at the time of the AIA survey (November 2021) ranged from high along agricultural fields to moderate in overgrown areas. Visibility proved to be a minor constraint during the site survey.

Cognisant of the constraints noted above, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

## 5 ARCHAEO-HISTORICAL CONTEXT

### 5.1 The archaeology of Southern Africa

Archaeology in Southern Africa is typically divided into two main fields of study, the **Stone Age** and the **Iron Age** or **Farmer Period**. The following table provides a concise outline of the chronological sequence of periods, events, cultural groups and material expressions in Southern African pre-history and history.

**Table 1 Chronological Periods across Southern Africa**

Period	Epoch	Associated cultural groups	Typical Material Expressions
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominins: <i>Australopithecines</i> <i>Homo habilis</i> <i>Homo erectus</i>	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First <i>Homo sapiens</i> species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	<i>Homo sapiens sapiens</i> including San people	Typically small to minute stone tools such as arrow heads, points and bladelets.
Early Iron Age / Early Farmer Period 300 – 900 AD <b>(commonly restricted to the interior and north-east coastal areas of Southern Africa)</b>	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD <b>(commonly restricted to the interior and north-east coastal areas of Southern Africa)</b>	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.

<b>Africa)</b>			
Late Iron Age / Later Farmer Period 1400 AD -1850 AD <b>(commonly restricted to the interior and north-east coastal areas of Southern Africa)</b>	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

## 5.2 Discussion: The Waterberg and Western Limpopo: Specific Themes

The cultural landscape of the Waterberg encompasses a period of time that spans millions of years, covering human cultural development from the Stone Ages up to recent times. It depicts the interaction between the first humans and their adaptation and utilization to the environment, the migration of people, technological advances, warfare and contact and conflict. Resources, and in particular mineral resources, in what is now known as the Thabazimbi region have been extensively utilised by prehistoric and historic groups. The greater region has several important Stone Age localities with deep occupation deposits and importantly, a widespread occurrence of open-air sites. The shelter site of Olieboomspoort near Lephalale show a succession from the Earlier, Middle and Later Stone Ages (ESA, MSA and LSA) and up to historic times (van der Ryst 2006). Early Iron Age (EIA) localities such as Diamant are particularly important. At this locality in the western Waterberg the EIA facies of Diamant was first identified at the eponymous locality (Huffman 1990). This site has also delivered the earliest evidence for glass trade beads and domesticated dogs in the Limpopo Province (van der Ryst 2006). The movement of African farmers into this region is documented by their ceramics and settlements (Huffman 2007b). The later occupations of agropastoralists groups are complex (Schapera 1942, 1965; Breutz 1953, 1989; Bergh 1998). The accounts of early travellers provide important data on the fauna, flora and inhabitants of the Waterberg. The observations of travellers, missionaries and hunters who traversed the region throughout the 18th and the 19th centuries constitute a source of implicit ethnography on the late presence of hunting and gathering groups, the African farmers and incoming colonists (Baines 1872, 1877; Smith 1836; Schlömann 1896; Wallis [Baines] 1946; Burke [Mauch's journals] 1969). The region is also rich in rock art (Eastwood and Eastwood 2006).

### 5.2.1 Early History and the Stone Ages

According to archaeological research, the earliest ancestors of modern humans emerged some two to three million years ago. The remains of Australopithecine and *Homo habilis* have been found in dolomite caves and underground dwellings in the Bankeveld at places such as Sterkstroom and Swartkrans near Krugersdorp. *Homo habilis*, one of the Early Stone Age hominids, is associated with Oldowan artefacts, which include crude implements manufactured from large pebbles. The Acheulian industrial complex replaced the Oldowan industrial complex during the Early Stone Age. This phase of human existence was widely distributed across South Africa and is associated with *Homo erectus*, who manufactured hand axes and cleavers from as early as one and a half million years ago. Oldowan and Acheulian artefacts were also found four to five decades ago in some of the older gravels (ancient river beds and terraces) of the Vaal River and the Klip River in Vereeniging. The earliest ancestors of modern man may therefore have roamed the Vaal valley at the same time that their contemporaries occupied some of the dolomite caves near Krugersdorp. Middle Stone Age sites dating from as early as two hundred thousand years ago have been found all over South Africa. Middle Stone Age hunter-gatherer bands also lived and hunted in the Orange and Vaal River valleys. These people, who probably looked like modern humans, occupied campsites near water but also used caves as dwellings. They manufactured a wide range of stone tools, including blades and points that

may have had long wooden sticks as hafts and were used as spears. The Late Stone Age commenced twenty thousand years ago or somewhat earlier. The various types of Later Stone Age industries scattered across the country are associated with the historical San and Khoi-Khoi people. The San were renowned as formidable hunter-gatherers, while the Khoi-Khoi herded cattle and small stock during the last two thousand years. Late Stone Age people manufactured tools that were small but highly effective, such as arrow heads and knives.

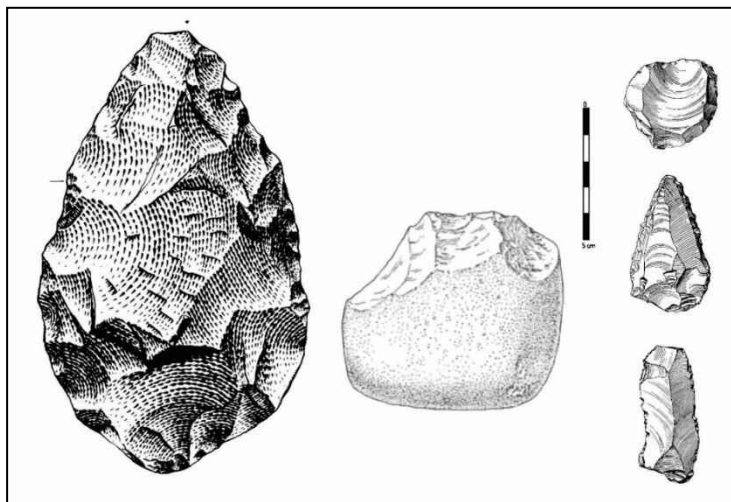


Figure 5-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

The cultural historical landscape of the Waterberg area spans million years with evidence of hominin occupation, Stone Age traditions, Iron Age farmers and historical events. Makapansgat, a deep limestone cave near Mokopane has yielded remains of *Australopithecus africanus* that dates to more than 3 million years BP and also *Homo erectus*, dating to approximately 1 million years BP. However, Earlier Stone Age (ESA) material is scarce on the Waterberg plateau. The Middle Stone Age (MSA) is abundantly represented in the Waterberg area and archaeological excavations at sites such as the Olieboomspoor Shelter in the north-western part of the Waterberg have yielded rich MSA deposits which display a large degree of specialisation and skill in stone working (Van der Ryst 1996). These groups occupied open camps which were situated in the proximity of water sources such as pans, lakes or rivers. There is a noticeable gap in the Waterberg between MSA assemblages and material from the Later Stone Age (LSA), suggesting that the Waterberg may not have seen dense human occupation for a long period of time. However, Later Stone Age groups, including the San hunter gatherers and Khoi herders frequented the area in the last few millennia, and numerous LSA sites have been discovered and excavated. Similarly, LSA evidence such as stone implements, ceramics and a wealth of rock paintings and markings are scattered over the plateau.

### 5.2.2 Iron Age / Farmer Period

The beginnings of the Iron Age (Farmer Period) in Southern Africa are associated with the arrival of a new Bantu speaking population group at around the third century AD. These newcomers introduced a new way of life into areas that were occupied by Later Stone Age hunter-gatherers and Khoekhoe herders. Distinctive features of the Iron Age are a settled village life, food production (agriculture and animal husbandry), metallurgy (the mining, smelting and working of iron, copper and gold) and the manufacture of pottery. Iron Age people moved into Southern Africa by c. AD 200, entering the area either by moving down the coastal plains, or by using a more central route. From the coast they followed the various rivers inland. Being cultivators, they preferred rich alluvial soils. The Iron Age can be divided into three phases. The Early Iron Age includes the majority of the first millennium A.D. and is characterised by traditions such as Happy Rest and Silver Leaves. The Middle Iron Age spans the 10th to the 13th Centuries A.D. and includes such well known cultures as those at K2 and Mapungubwe. The Late Iron Age is taken to stretch from the 14th Century up to the colonial period and includes traditions such as Icon and Letaba.



**Early Sotho-Tswana History**

Within a larger archaeological context, Iron Age settlement representations in the form of stone walling in the Waterberg can undoubtedly be traced back to ancestral Sotho-Tswana occupation and developments from the sixteenth century AD onwards. Diagnostic pottery assemblages are commonly used in the South African Iron Age to infer group identities and to trace movements across the landscape. Similarly, the migration of the Sotho-Tswana speakers in South Africa in the 16<sup>th</sup> century marked a new ceramic style, known as Moloko. The Moloko Tradition can be divided into two phases: an early phase (e.g. Icon) in which sites were usually located at the foot of hills and contained little or no stone walling; and a later phase characterised by extensive stone wall complexes which were often erected on hills. In the Waterberg area, this later phase manifested in the Madikwe ceramic facies with pottery typically displaying stab and fingernail impression decoration motives. At around the 17<sup>th</sup> century, Madikwe pottery developed into a tradition known as “Buispoort”, sites of which display complex and elaborate stone walling. The stone walls were erected to construct stock byres and to demarcate residential units where pole-and-dagha (clay) huts were placed.

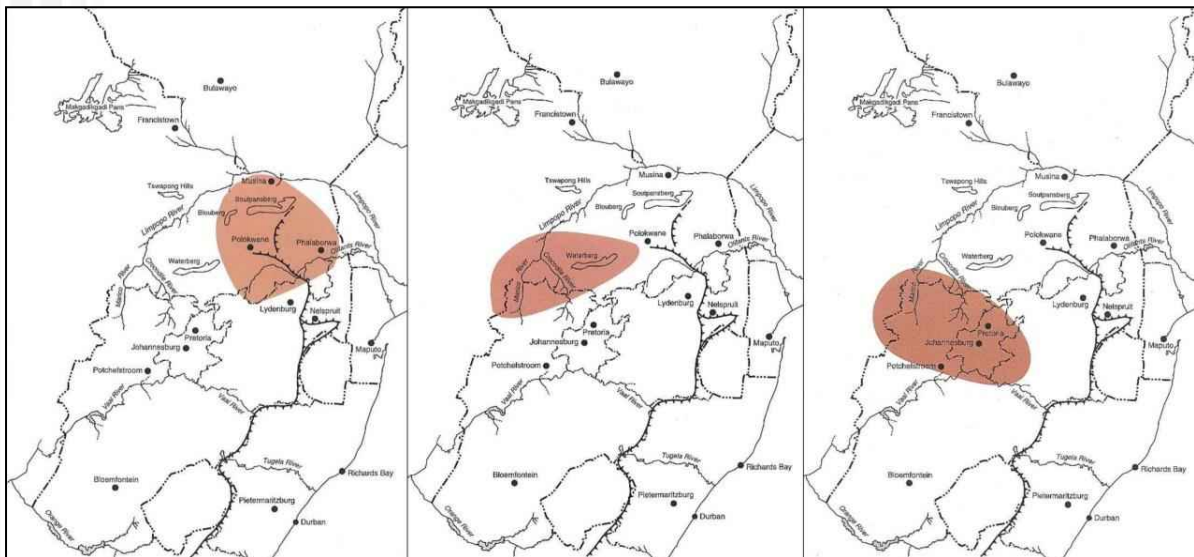


Figure 5-2: Map detailing the distribution of 16<sup>th</sup> century Maloko (left), 17<sup>th</sup> century Madikwe (centre) and 18<sup>th</sup> century Buispoort tradition sites (After Huffman 2007).



Figure 5-3: Ceramic decoration motives typical of 17<sup>th</sup> century Madikwe (left) and later Buispoort (right) facies (After Huffman 2007).

In addition, various Sotho-Tswana groups were found in the interior of the Highveld areas of South Africa by the end of the 18<sup>th</sup> century. These units occupied a large area, from present-day Botswana across large

sections of the old Transvaal, the Free State Province into the Northern Cape. Based on Sotho-Tswana oral histories various groups acted as cores from which the Sotho-speaking communities sprouted

### **5.2.3 Rock Art of the Waterberg Landscape.**

The Waterberg Plateau is rich in rock art and rock markings and many such sites are still to be described and studied. At many sites "refined" San paintings occur with cruder depictions in red or white paint (sometimes black), painted directly with fingers by later Farmer groups. Numerous paintings of people in trance positions, dance scenes of men and women, men with hunting equipment, a large variety of antelope and other animals, imaginary rain animals, handprints, and geometric designs form part of the contents of the rock art of the Waterberg (Van der Ryst 1998). Two traditions of Rock Art occur in the Waterberg. First the more "naturalised" form of fine-line art, including skilled depictions of animals and people, attributed to San Hunter Gatherers. The second tradition, often called "Late White" art, is characterised by more geometric, schematic illustrations which includes a large amount of finger painting. This tradition is associated with Iron Age farmers.

### **5.2.4 Pastoralism and the last 2000 years**

Until 2000 years ago, hunter-gatherer communities traded, exchanged goods, encountered and interacted with other hunter-gatherer communities. From about 2000 years ago the social dynamics of the Southern African landscape started changing with the immigration of two 'other' groups of people, different in physique, political, economic and social systems, beliefs and rituals. One of these groups, the Khoekhoe pastoralists or herders entered Southern Africa with domestic animals, namely fat-tailed sheep and goats, travelling through the south towards the coast. They also introduced thin-walled pottery common in the interior and along the coastal regions of Southern Africa. Their economic systems were directed by the accumulation of wealth in domestic stock numbers and their political make-up was more hierarchical than that of the hunter-gatherers.

### **5.2.5 Later History: Reorganization, Colonial Contact and living heritage.**

The Historical period in Southern Africa encompass the course of Europe's discovery of South Africa and the spreading of European settlements along the East Coast and subsequently into the interior. In addition, the formation stages of this period are marked by the large scale movements of various Bantu-speaking groups in the interior of South Africa, which profoundly influenced the course of European settlement. Finally, the final retreat of the San and Khoekhoen groups into their present-day living areas also occurred in the Historical period in Southern Africa.

The Waterberg was considered remote and inaccessible by early white migrants from the south and, with the exception of a few hunting and trading expeditions passing through, the area was one of the last regions in the former Transvaal to be permanently occupied by white farmers. Although the first Voortrekker farmers moved into the Waterberg during the 1850's, the region has been increasingly occupied on a regular basis only since the early part of the twentieth century. The early historical period of the area is dominated by the siege of Makapansgat where in September 1854, Chief Makapane and over 1 500 of his people died of hunger, dehydration and injuries after being besieged in the cave by a Boer commando in retaliation for an attack on a Voortrekker settlement. The majority of farms in the Waterberg area were surveyed in the late 1860's as part of the Transvaal government's strategy to settle white farmers in the Waterberg region. At that time, access to the Waterberg plateau was circuitous and difficult with the shortest route extending via Sandrivierspoort near present-day Vaalwater. After a railway line to Vaalwater was completed in the 1920's, maize became an economically viable crop but by the end of the 1960's, slumps in maize prices resulted in many farmers abandoning crop farming in favour of cattle. Large scale iron ore mining has emerged to become a primary economical enterprise in recent years. However, farming communities have settled in the landscape at the beginning of the 20<sup>th</sup> century.

The farm Groen Groendraai 213KQ in the Waterberg District were established at the end of the 19<sup>th</sup> century.

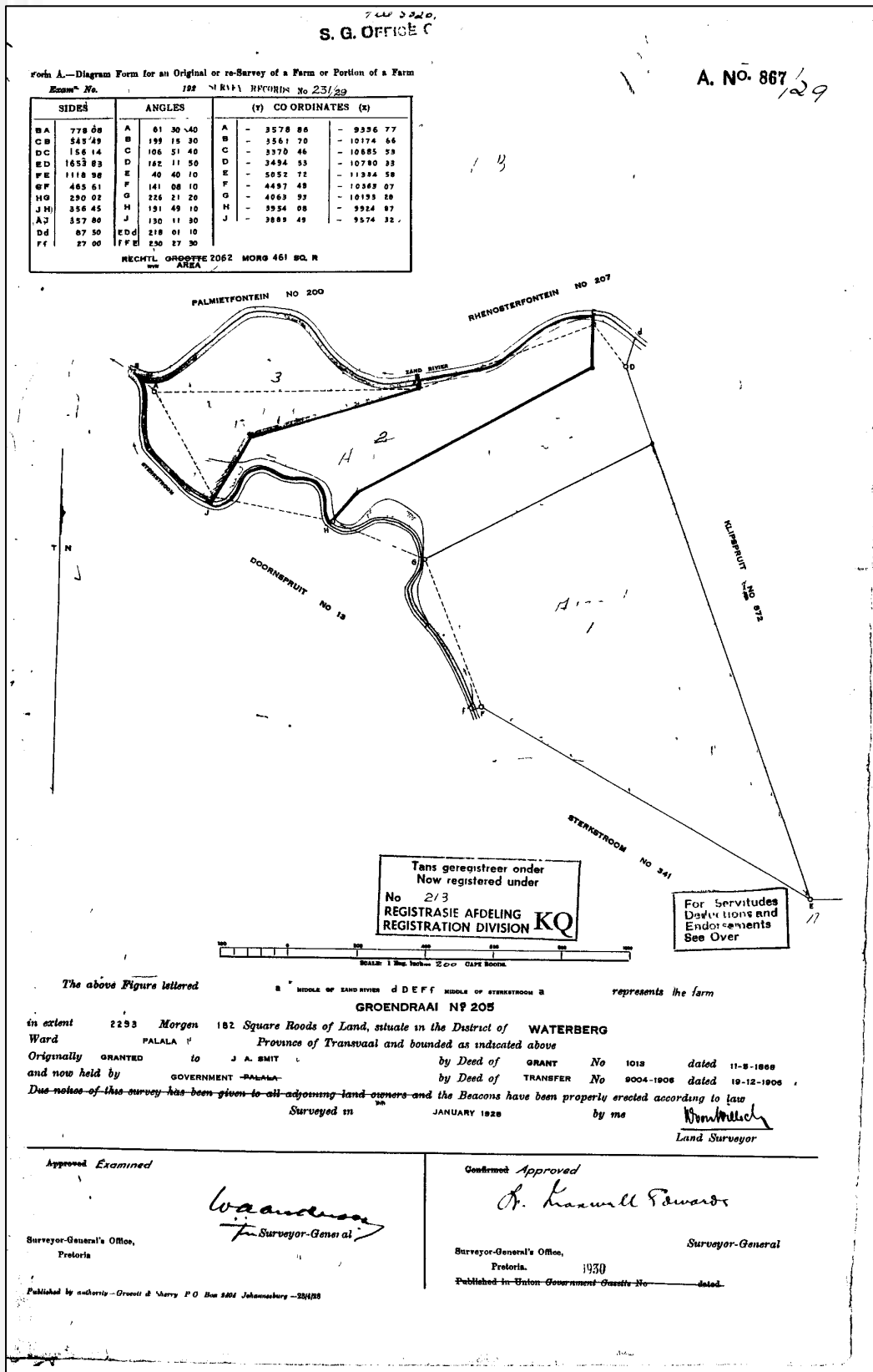


Figure 5-4: Title deed document for the farm Groendraai dating to 1894.

## 6 RESULTS: ARCHAEOLOGICAL SURVEY

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### 6.1 The Off-Site Desktop Survey

In terms of heritage resources, the landscape around Vaalwater is primarily well known for the occurrence of Iron Age Farmer and Colonial Period resources, primarily clustered in the vicinity of historical farms and settlements. However, the general landscape area has seen intensive agriculture development over the past century where portions of pristine areas have been altered largely sterilizing the area of heritage remains. An analysis of historical aerial imagery and archive maps reveals the following (see Figure 6-1 to Figure 6-5):

- The farm Groendraai is indicated on an early map of the Transvaal dating to 1899 (Jeppe).
- No man-made features are indicated within the project area on 1969 and 1981 topographic maps of the area. These maps indicate cultivated fields in the project area and across the region.
- In his "Preliminary Survey of Bantu Tribes of South Africa", Van Warmelo (1935) indicates that the project area was sparsely populated by Sotho groups during the first part of the 20<sup>th</sup> century. Settlement of these groups in the area probably represent farm workers resident on local farms.
- Aerial imagery dating to 1957 indicate that portions of the landscape and particularly areas subject to this assessment have been altered by historical farming and agriculture along the Sterkstroom River but no man-made features are visible within the proposed project area.

### 6.2 The Archaeological Site Survey

An analysis of historical aerial imagery and archive maps of areas subject to this assessment suggests a landscape which has been subjected to historical farming activities possibly sterilising the area of heritage remains.

**This inference was confirmed during an archaeological site assessment during which no *in situ* archaeological or heritage remains were encountered.**

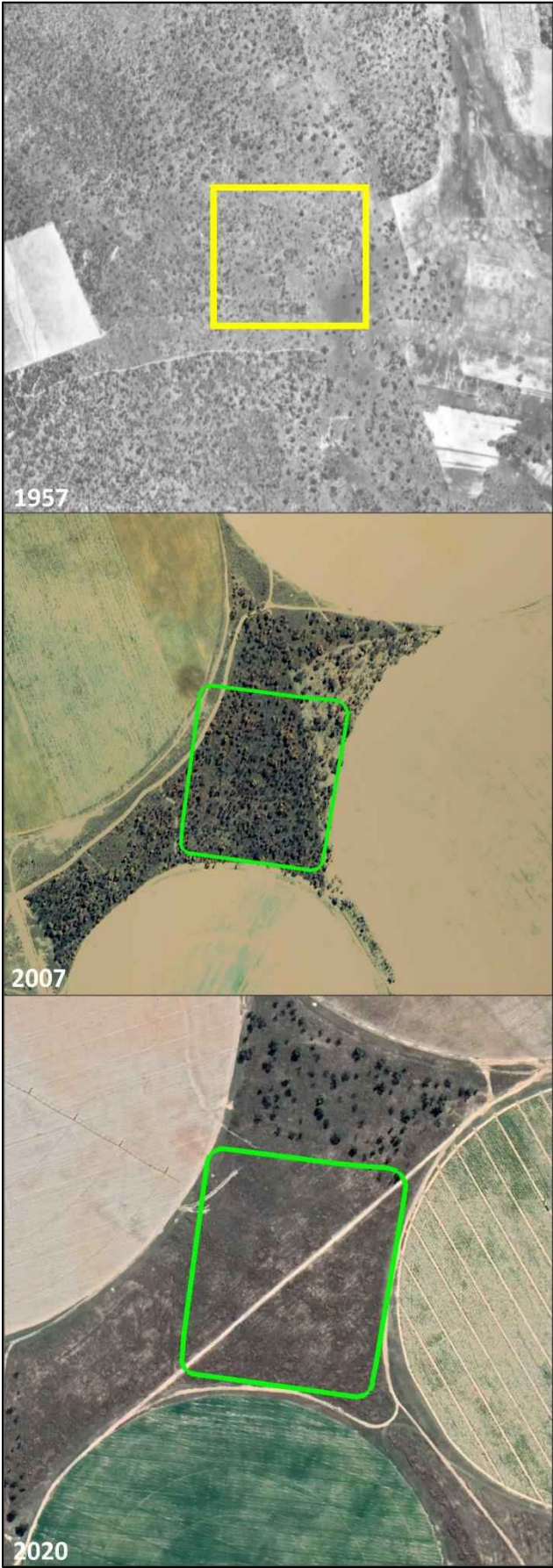


Figure 6-1: A series of aerial images indicating the dam location within the historical landscape. Note that portions of the project area was cleared of vegetation in more recent years.

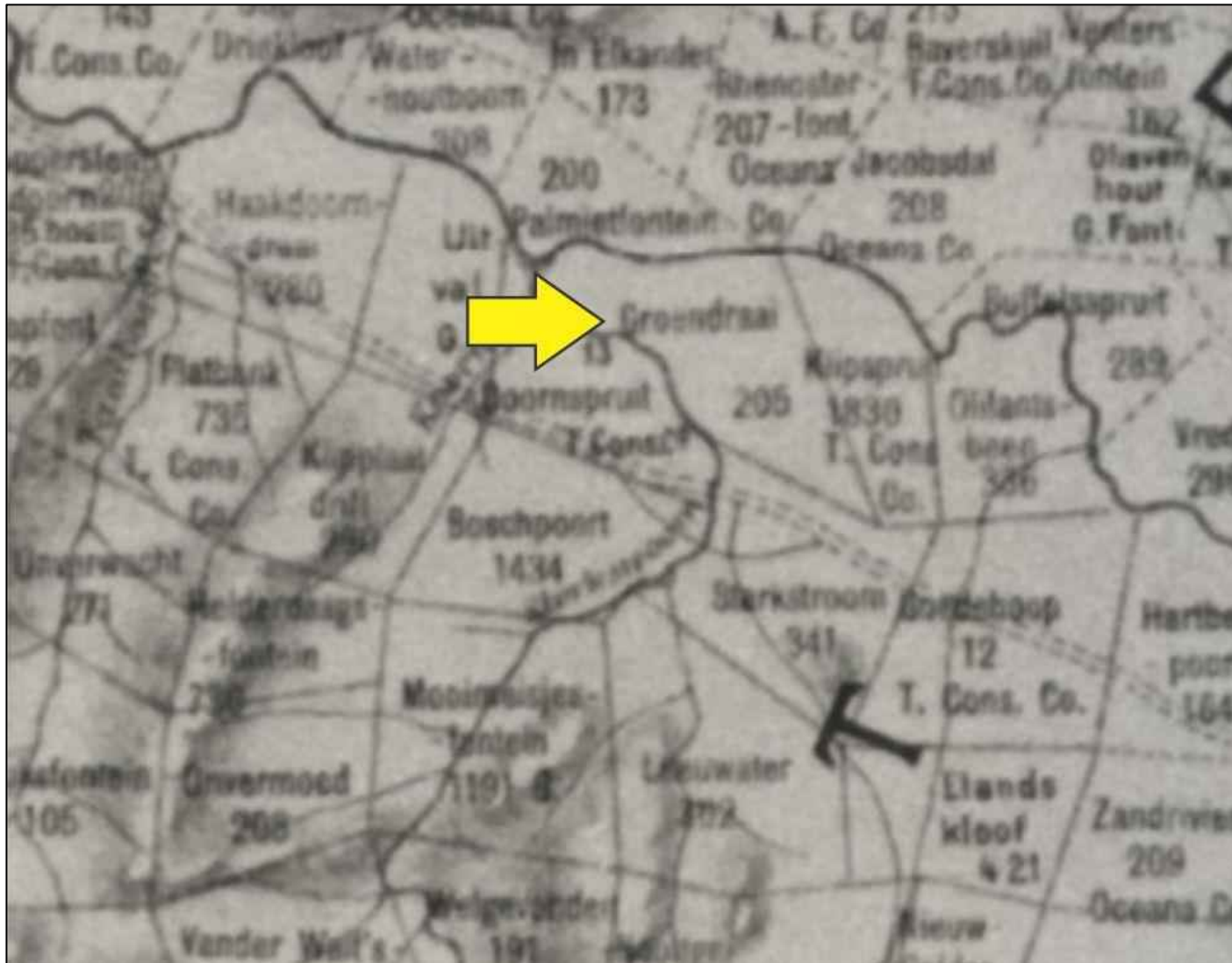


Figure 6-2: Historical map of the Transvaal dating to 1899 (Jeppe) indicating the presence of the farm Groendraai.

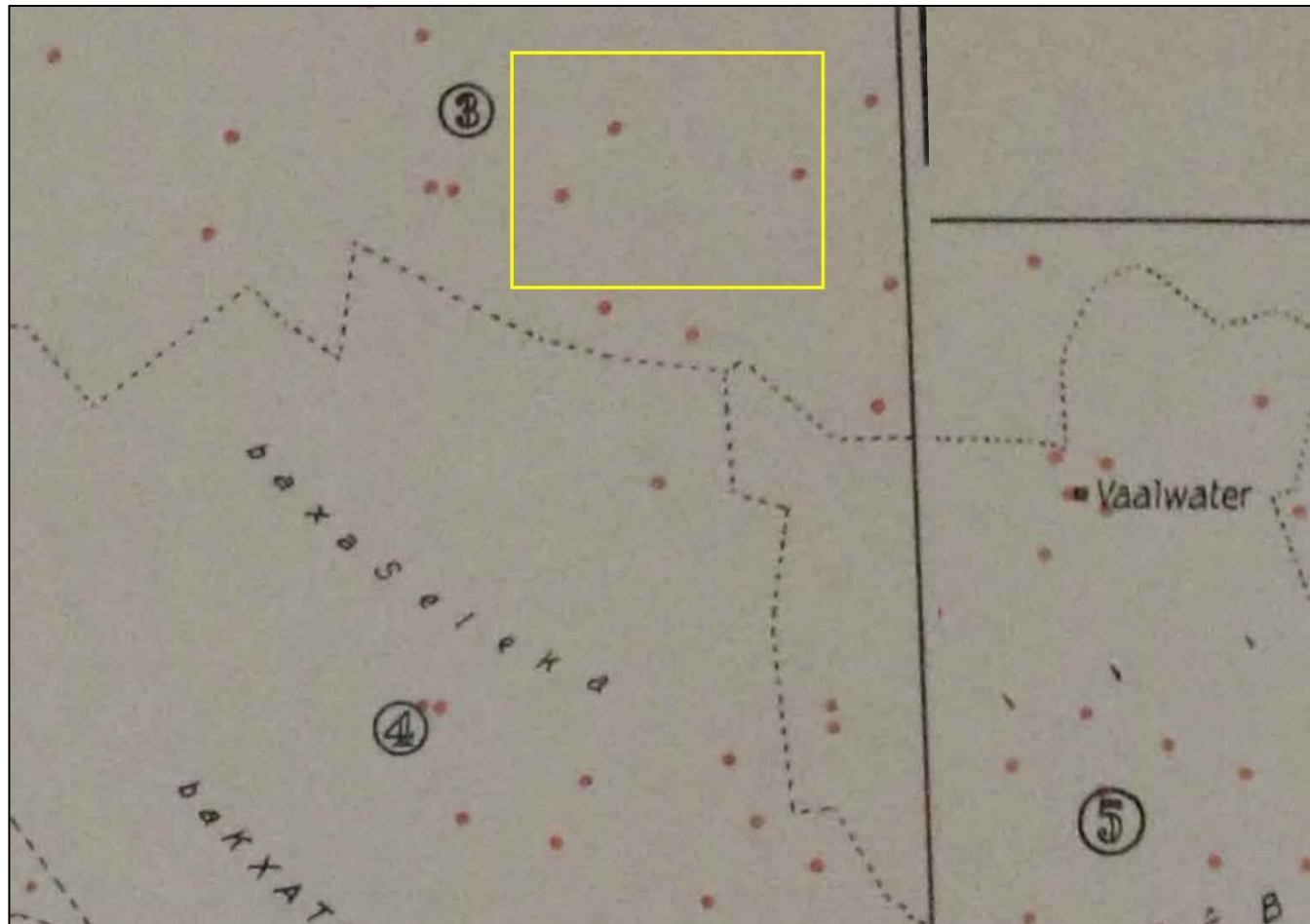
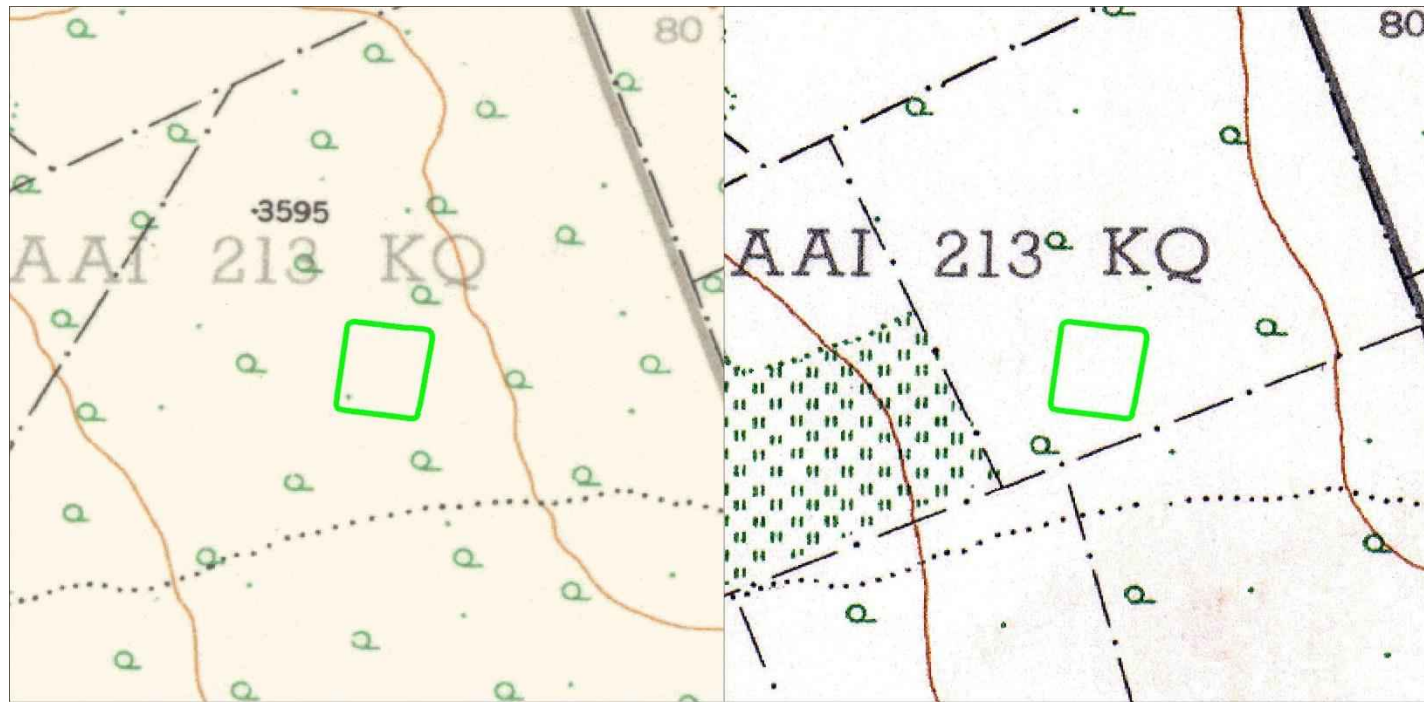


Figure 6-3: An excerpt of Van Warmelo’s Map of the project landscape dating to 1935. Each red dot represents “10 taxpayers”. Note that the project area was relatively sparsely populated by Sotho groups and settlement of these groups in the area probably represent farm workers resident on local farms.



VERKLARING	REFERENCE
Magnetiese Stasies en Grondtekens	Magnetic Stations and Ground Signs
Hulle	Huts
Monumente	Monuments
Dipbakke	Dipping Tanks
Windpomp	Windmills
Mure	Walls
Grondbewaringswalle	Anti-erosion Walls
Uitgrawings	Excavations
Standhoudende Water	Perennial Water
Nie-standhoudende Water	Non-perennial Water
Droë Panne	Dry Pans
Fonteinne, Watergate en Putte	Fountains, Springs, Waterholes and Wells
Moerasse en Vleis	Marshes, Swamps and Vleis
Pyplyne	Pipelines
Fotomiddelpeunte	Photo Centres
Uitstaende Klipbanke	Prominent Rock Outcrops
Terrasse	Terraces
Bewerkte Lande	Cultivated Lands
Boerde en Wingerde	Orchards and Vineyards
Bome en Bos	Trees and Bush

VERKLARING	REFERENCE
Magnetiese Stasies en Grondtekens	Magnetic Stations and Ground Signs
Trig. Bakens (Nommer regs en hoogte onder)	Trig. Beacons (Number to right and Height below)
Monumente	Monuments
Dipbakke	Dipping Tanks
Windpomp	Windmills
Mure	Walls
Grondbewaringswalle	Anti-erosion Walls
Uitgrawings	Excavations
Standhoudende Water	Perennial Water
Nie-standhoudende Water	Non-perennial Water
Droë Panne	Dry Pans
Fonteinne, Watergate en Putte	Springs, Waterholes and Wells
Moerasse en Vleis	Marshes, Swamps and Vleis
Pyplyne	Pipelines
Prominente Klipbanke	Prominent Rock Outcrops
Terrasse	Terraces
Bewerkte Lande	Cultivated Lands
Boerde en Wingerde	Orchards and Vineyards
Bome en Bos	Trees and Bush

Figure 6-4: Historical topographic maps of the project area dating to 1969 (left) and 1981 (right) in the past decades. Note the general absence of man-made features indicated in the project area on these maps.



## 7 STATEMENT OF SIGNIFICANCE AND IMPACT RATING

The following section provides a background to the identification and assessment of possible impacts and alternatives, as well as a range of risk situations and scenarios commonly associated with heritage resources management. A guideline for the rating of impacts and recommendation of management actions for areas of heritage potential within the study area is supplied in Section 10.2 of Addendum 3.

### 7.1 General assessment of impacts on resources<sup>1</sup>

Generally, the value and significance of archaeological and other heritage sites might be impacted on by any activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, of any archaeological material or object (as indicated in the National Heritage Resources Act (No 25 of 1999)). Thus, the destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the initial construction period. However, in the long run, the proximity of operations in any given area could result in secondary indirect impacts. The EIA process therefore specifies impact assessment criteria which can be utilised from the perspective of a heritage specialist study which elucidates the overall extent of impacts.

#### 7.1.1 Direct, indirect and cumulative effects

**Direct or primary effects** on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work. **Indirect effects or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access (refer to Section 10.3 in the Addendum for an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected).

### 7.2 Direct Impact Rating Criteria

#### 7.2.1 Extent

Local	extend only as far as the footprint of the proposed activity/development
Site	Impact extends beyond the site footprint to immediate surrounds
Regional	within which development takes place, i.e. farm, suburb, town, community
National	Impact is on a national level

#### 7.2.2 Duration

Short term	The impact will disappear with through mitigation or through natural processes
Medium term	The impact will last up to the end of the phases, where after it will be negated
Long term	impact will persist indefinitely, possibly beyond the operational life of the activity, either because of natural processes or by human intervention
Permanent	Permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient

#### 7.2.3 Magnitude severity

Low	where the impact affects the resource in such a way that its heritage value is not affected
Medium	where the affected resource is altered but its heritage value continues to exist albeit in a modified way
High	where heritage value is altered to the extent that it will temporarily or permanently be damaged or destroyed

#### 7.2.4 Probability

Improbable	where the possibility of the impact to materialize is very low either because of design or historic experience;
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<sup>1</sup> Based on: Winter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1.*

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 definitely occur regardless of any mitigation measures.

### 7.2.5 Impact Significance

Low	negligible effect on heritage – no effect on decision
Medium	where it would have a moderate effect on heritage and – influences the decision
High	high risk of, a big effect on heritage. Impacts of high significance should have a major influence on the decision
Very high	high risk of, an irreversible and possibly irreplaceable impact on heritage – central factor in decision-making

### 7.3 Weighting matrix

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

The following table summarizes impacts to the general heritage landscape of the project area:

Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude/Severity		Significance		Mitigation Measures	Mitigation Effect	Residual Impact
			Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude			
<b>Heritage Impact Assessment</b>															
<b>Planning Phase</b>															
The Local Heritage Landscape	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	No mitigation.	N/A	No
	WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible			No
<b>Construction Phase</b>															
The Local Heritage Landscape	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	No mitigation. General site monitoring by informed ECO.	N/A	No
	WM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible			No
<b>Operational Phase</b>															
The Local Heritage Landscape	WOM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible	No mitigation. General site monitoring by informed ECO.	N/A	No
	WM	Negative	Improbable	1	Long term	4	Site	2	Low	2	8	Negligible			No
<b>Decommissioning / Rehabilitation Phase</b>															
The Local Heritage Landscape	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	No mitigation. General site monitoring by informed ECO.	N/A	No
	WM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible			No

## 7.4 Evaluation of Impact: The Project

### 7.4.1 Archaeology

No archeological sites, features or artefacts were noted in the project area but the location of the proposed new dam near the Sterkstroom and Mokolo Rivers renders it is prone to alluvial deposits that could bury potential Stone Age material and *in situ* Stone Age remains might occur in previously undetected contexts of the project area.

### 7.4.2 Built Environment

The study has not identified any buildings or structures which will be impacted by the proposed project. This is confirmed by an examination of aerial photographs of the area. No impact on built environment sites is therefore anticipated. For the rest of the project area, the general landscape holds varied significance in terms of the built environment as the area comprises historical farming remnants and relatively newly established settlement areas.

### 7.4.3 Cultural Landscape

Generally, the proposed project area and its surrounds are characterized by rural farmlands and dense riparian and vegetation. Further away from the project area, the landscape displays undulating hills with flatter plains in-between. This landscape stretches over many kilometres and the proposed project is unlikely to result in a significant impact on the or the landscape sense of place.

### 7.4.4 Graves / Human Burials Sites

No human burials were documented in the project area. In the rural areas of the Limpopo Province, graves and cemeteries often occur around farmsteads in family burial grounds but they are also randomly scattered around archaeological and historical settlements. The probability of informal human burials encountered during development should thus not be excluded. In addition, human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion. In some instances packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial they would need to be exhumed under a permit from either SAHRA (for pre-colonial burials as well as burials later than about AD 1500). Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA). Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.

***In summary, no sensitive heritage receptors were found in the project area and no potential impact to heritage resources is foreseen.***

## 7.5 Management actions

Recommendations for relevant heritage resource management actions are vital to the conservation of heritage resources. The AIA did not identify heritage resources within of in close proximity to the proposed Thinus Maritz Dam Development alignment and no direct or peripheral impacts are envisaged on heritage resources. Therefore, it is the opinion of this author that the Thinus Maritz Dam Development Project may proceed from a

culture resources management perspective on the condition that mitigation measures are implemented where applicable, and provided that no subsurface heritage remains are encountered during construction. The following management measures should be considered during implementation of the proposed Thinus Maritz Dam Development Project. A general guideline for recommended management actions is included in Section 10.4 of Addendum 3.

<b>PROJECT COMPONENT/S</b>	All phases of construction and operation.		
<b>POTENTIAL IMPACT</b>	Damage/destruction of sites.		
<b>ACTIVITY RISK/SOURCE</b>	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
<b>MITIGATION: TARGET/OBJECTIVE</b>	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>	
Fixed Mitigation Procedure ( <b>required</b> )			
<b>Site Monitoring:</b> Regular examination of trenches and excavations.	ECO	Monitor	as frequently as practically possible.
<b>PERFORMANCE INDICATOR</b>	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
<b>MONITORING</b>	Successful location of sites by person/s monitoring.		

## 8 RECOMMENDATIONS

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The larger landscape around the project area indicate a rich heritage horizon where Iron Age Farmer and Colonial Period resources are known to be ample, primarily clustered in the vicinity of old farmstead and settlements. Locally, the project area has seen transformation by agriculture activities potentially sterilizing surface and subsurface of heritage remains, especially those dating to pre-colonial and prehistorical times. Cognisance should nonetheless be taken of archaeological material that might be present in surface and sub-surface deposits along drainage lines and in pristine areas. The following recommendations are made based on general observations in the proposed Thinus Maritz Dam Development Project area:

- Even though no archeological sites, features or artefacts were noted in the project area, the location of the proposed new dam in the landscape around the Sterkstroom River renders it prone to alluvial deposits that could bury potential Stone Age material and *in situ* Stone Age remains might occur in previously undetected contexts in the larger landscape. As such, it is recommended that all development activities be closely monitored in order to avoid the destruction of previously undetected heritage remains and particularly Stone Age occurrences.
- It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the project area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development. Generally, the frequent monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.

## 9 GENERAL COMMENTS AND CONDITIONS

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This AIA report serves to confirm the extent and significance of the heritage landscape of the proposed Thinus Maritz Dam Development Project area. The larger heritage horizon encompasses rich and diverse archaeological landscapes and cognisance should be taken of heritage resources and archaeological material that might be present in surface and sub-surface deposits. If, during construction, any possible archaeological material culture discoveries are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Such material culture might include:

- Formal Earlier Stone Age stone tools.
- Formal MSA stone tools.
- Formal LSA stone tools.
- Potsherds
- Iron objects.
- Beads made from ostrich eggshell and glass.
- Ash middens and cattle dung deposits and accumulations.
- Faunal remains.
- Human remains/graves.
- Stone walling or any sub-surface structures.
- Historical glass, tin or ceramics.
- Fossils.

If such sites were to be encountered or impacted by any proposed developments, recommendations contained in this report, as well as endorsement of mitigation measures as set out by AMAFA, SAHRA, the National Resources Act and the CRM section of ASAPA will be required. It must be emphasised that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, represent the area's complete archaeological legacy. Many sites/features may be covered by soil and vegetation and might only be located during sub-surface investigations. If subsurface archaeological deposits, artefacts or skeletal material were to be recovered in the area during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately (*cf. NHRA (Act No. 25 of 1999)*, Section 36 (6)). It must also be clear that Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA).

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## 11 ADDENDUM 1: HERITAGE LEGISLATION BACKGROUND

### 11.1 CRM: Legislation, Conservation and Heritage Management

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

#### 11.1.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and their provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

#### d. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act of 1999 a historical site is any identifiable building or part thereof, marker, milestone, gravestone, landmark or tell older than 60 years. This clause is commonly known as the "60-years clause". Buildings are amongst the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Iron Age settlements. "Tell" refers to the evidence of human existence which is no longer above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects, meteorites and rare geological specimens
- visual art objects
- military objects
- numismatic objects
- objects of cultural and historical significance
- objects to which oral traditions are attached and which are associated with living heritage
- objects of scientific or technological interest
- any other prescribed category

With regards to activities and work on archaeological and heritage sites this Act states that:

*"No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority." (34. [1] 1999:58)*

and

*"No person may, without a permit issued by the responsible heritage resources authority-*

- (d) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (e) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (f) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*

- (g) *bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."*

and

*"No person may, without a permit issued by SAHRA or a provincial heritage resources agency-*

- (h) *destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (i) *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (j) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."*

#### **e. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925**

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and the Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant Local Authorities.

#### **11.1.2 Background to HIA and AIA Studies**

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

The National Heritage Resources Act (Act No. 25 of 1999, section 38) provides guidelines for Cultural Resources Management and prospective developments:

**"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as:**

- (a) *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) *the construction of a bridge or similar structure exceeding 50m in length;*
- (c) *any development or other activity which will change the character of a site:*

- (i) exceeding 5 000 m<sup>2</sup> in extent; or*
- (ii) involving three or more existing erven or subdivisions thereof; or*
- (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
- (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,*

*must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”*

And:

*“The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:*

- (k) The identification and mapping of all heritage resources in the area affected;*
- (l) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (m) an assessment of the impact of the development on such heritage resources;*
- (n) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (o) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (p) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (q) plans for mitigation of any adverse effects during and after the completion of the proposed development (38. [3] 1999:64).”*

Consequently, section 35 of the Act requires Heritage Impact Assessments (HIAs) or Archaeological Impact Assessments (AIAs) to be done for such developments in order for all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual, linguistic or technological value or significance to be protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects. Heritage resources management and conservation.

## **11.2 Assessing the Significance of Heritage Resources**

Archaeological sites, as previously defined in the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people have lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people

of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and *non-renewable*. Many such sites are unfortunately lost on a daily basis through development for housing, roads and infrastructure and once archaeological sites are damaged, they cannot be re-created as site integrity and authenticity is permanently lost. Archaeological sites have the potential to contribute to our understanding of the history of the region and of our country and continent. By preserving links with our past, we may not be able to revive lost cultural traditions, but it enables us to appreciate the role they have played in the history of our country.

#### **- Categories of significance**

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites. In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

##### *- Aesthetic value:*

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

##### *- Historic value:*

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually a place has historical value because of some kind of influence by an event, person, phase or activity.

##### *- Scientific value:*

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

##### *- Social value:*

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group.

It is important for heritage specialist input in the EIA process to take into account the heritage management structure set up by the NHR Act. It makes provision for a 3-tier system of management including the South Africa Heritage Resources Agency (SAHRA) at a national level, Provincial Heritage Resources Authorities (PHRAs) at a provincial and the local authority. The Act makes provision for two types or forms of protection of heritage resources; i.e. formally protected and generally protected sites:

#### **Formally protected sites:**

- Grade 1 or national heritage sites, which are managed by SAHRA
- Grade 2 or provincial heritage sites, which are managed by the provincial HRA (MP-PHRA).
- Grade 3 or local heritage sites.

**Generally protected sites:**

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 60 years.
- Structures older than 60 years.

With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low. The significance of archaeological sites is generally ranked into the following categories.

Significance	Rating Action
No significance: sites that do not require mitigation.	None
Low significance: sites, which may require mitigation.	2a. Recording and documentation (Phase 1) of site; no further action required 2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which require mitigation.	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High significance: sites, where disturbance should be avoided.	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism
High significance: Graves and burial places	4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinterment [including 2a, 2b & 3]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

## 12 ADDENDUM 2: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE

### 12.1 Site Significance Matrix

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these. The following matrix is used for assessing the significance of each identified site/feature.

2. SITE EVALUATION			
2.1 Heritage Value (NHRA, section 2 [3])	High	Medium	Low
It has importance to the community or pattern of South Africa's history or pre-colonial history.			
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.			
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.			
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.			
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.			
It has significance relating to the history of slavery in South Africa.			
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.			
2.2 Field Register Rating			
National/Grade 1 [should be registered, retained]			
Provincial/Grade 2 [should be registered, retained]			
Local/Grade 3A [should be registered, mitigation not advised]			
Local/Grade 3B [High significance; mitigation, partly retained]			
Generally Protected A [High/Medium significance, mitigation]			
Generally protected B [Medium significance, to be recorded]			
Generally Protected C [Low significance, no further action]			
2.3 Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Local			
Specific community			

### 12.2 Impact Assessment Criteria

The following table provides a guideline for the rating of impacts and recommendation of management actions for sites of heritage potential.



**Significance of the heritage resource**

This is a statement of the nature and degree of significance of the heritage resource being affected by the activity. From a heritage management perspective, it is useful to distinguish between whether the significance is embedded in the physical fabric or in associations with events or persons or in the experience of a place; i.e. its visual and non-visual qualities. This statement is a primary informant to the nature and degree of significance of an impact and thus needs to be thoroughly considered. Consideration needs to be given to the significance of a heritage resource at different scales (i.e. site-specific, local, regional, national or international) and the relationship between the heritage resource, its setting and its associations.

**Nature of the impact**

This is an assessment of the nature of the impact of the activity on a heritage resource, with some indication of its positive and/or negative effect/s. It is strongly informed by the statement of resource significance. In other words, the nature of the impact may be historical, aesthetic, social, scientific, linguistic or architectural, intrinsic, associational or contextual (visual or non-visual). In many cases, the nature of the impact will include more than one value.

**Extent**

Here it should be indicated whether the impact will be experienced:

- On a site scale, i.e. extend only as far as the activity;
- Within the immediate context of a heritage resource;
- On a local scale, e.g. town or suburb
- On a metropolitan or regional scale; or
- On a national/international scale.

**Duration**

Here it should be indicated whether the lifespan of the impact will be:

- Short term, (needs to be defined in context)
- Medium term, (needs to be defined in context)
- Long term where the impact will persist indefinitely, possibly beyond the operational life of the activity, either because of natural processes or

by human intervention; or

- Permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Of relevance to the duration of an impact are the following considerations:

- Reversibility of the impact; and
- Renewability of the heritage resource.

**Intensity**

Here it should be established whether the impact should be indicated as:

- Low, where the impact affects the resource in such a way that its heritage value is not affected;
- Medium, where the affected resource is altered but its heritage value continues to exist albeit in a modified way; and
- High, where heritage value is altered to the extent that it will temporarily or permanently be damaged or destroyed.

**Probability**

This should describe the likelihood of the impact actually occurring indicated as:

- Improbable, where the possibility of the impact to materialize is very low either because of design or historic experience;
- 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 definitely occur regardless of any mitigation measures

**Confidence**

This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.
- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

**Impact Significance**

The significance of impacts can be determined through a synthesis of the aspects produced in terms of the nature and degree of heritage significance and the nature, duration, intensity, extent, probability and confidence of impacts and can be described as:

- Low; where it would have a negligible effect on heritage and on the decision
- Medium, where it would have a moderate effect on heritage and should influence the decision.
- High, where it would have, or there would be a high risk of, a big effect on heritage. Impacts of high significance should have a major influence on the decision;
- Very high, where it would have, or there would be high risk of, an irreversible and possibly irreplaceable negative impact on heritage. Impacts of very high significance should be a central factor in decision-making.

**12.3 Direct Impact Assessment Criteria**

The following table provides an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected

HERITAGE CONTEXT	TYPE OF DEVELOPMENT			
	CATEGORY A	CATEGORY B	CATEGORY C	CATEGORY D
<b>CONTEXT 1</b> High heritage Value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
<b>CONTEXT 2</b> Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
<b>CONTEXT 3</b> Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
<b>CONTEXT 4</b> Low to no heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	Moderate heritage impact expected

**NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.**

HERITAGE CONTEXTS	CATEGORIES OF DEVELOPMENT
<p><b>Context 1:</b> Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources</p> <p><b>Context 2:</b> Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.</p> <p><b>Context 3:</b> Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources</p> <p><b>Context 4:</b> Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage.</p>	<p><b>Category A: Minimal intensity development</b></p> <ul style="list-style-type: none"> <li>- No rezoning involved; within existing use rights.</li> <li>- No subdivision involved.</li> <li>- Upgrading of existing infrastructure within existing envelopes</li> <li>- Minor internal changes to existing structures</li> <li>- New building footprints limited to less than 1000m2.</li> </ul> <p><b>Category B: Low-key intensity development</b></p> <ul style="list-style-type: none"> <li>- Spot rezoning with no change to overall zoning of a site.</li> <li>- Linear development less than 100m</li> <li>- Building footprints between 1000m2-2000m2</li> <li>- Minor changes to external envelop of existing structures (less than 25%)</li> <li>- Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%).</li> </ul> <p><b>Category C: Moderate intensity development</b></p> <ul style="list-style-type: none"> <li>- Rezoning of a site between 5000m2-10 000m2.</li> <li>- Linear development between 100m and 300m.</li> <li>- Building footprints between 2000m2 and 5000m2</li> <li>- Substantial changes to external envelop of existing structures (more than 50%)</li> <li>- Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%)</li> </ul> <p><b>Category D: High intensity development</b></p> <ul style="list-style-type: none"> <li>- Rezoning of a site in excess of 10 000m2</li> </ul>

	<ul style="list-style-type: none"> <li>- Linear development in excess of 300m.</li> <li>- Any development changing the character of a site exceeding 5000m<sup>2</sup> or involving the subdivision of a site into three or more erven.</li> <li>- Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)</li> </ul>
--	--

**12.4 Management and Mitigation Actions**

The following table provides a guideline of relevant heritage resources management actions is vital to the conservation of heritage resources.

<p><b>No further action / Monitoring</b></p> <p>Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.</p> <p><b>Avoidance</b></p> <p>This is appropriate where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. Mitigation is not acceptable or not possible. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.</p> <p><b>Mitigation</b></p> <p>This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated to a degree of medium to low significance, e.g. the high to medium impact of a development on an archaeological site could be mitigated through sampling/excavation of the remains. Not all negative impacts can be mitigated.</p> <p><b>Compensation</b></p> <p>Compensation is generally not an appropriate heritage management action. The main function of management actions should be to conserve the resource for the benefit of future generations. Once lost it cannot be renewed. The circumstances around the potential public or heritage benefits would need to be exceptional to warrant this type of action, especially in the case of where the impact was high.</p> <p><b>Rehabilitation</b></p> <p>Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:</p> <ul style="list-style-type: none"> <li>- The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.</li> <li>- Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.</li> <li>- Where the rehabilitation process will not result in a negative impact on the intrinsic value of the resource</li> </ul>
---



**APPENDIX D\_2**  
**DAM DESIGN REPORT**

# CONCEPT DESIGN REPORT

## **KRANSKLOOF DAM** *(PROPOSED LINED OFF-CHANNEL BALANCING DAM)*



### PREPARED FOR



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**DECEMBER 2021**

**Project No: 075/2019**

**FINAL REPORT**

## DOCUMENT CONTROL SHEET

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# Concept Design Report for the proposed Kranskloof Off-channel Balancing Dam

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## LIST OF ABBREVIATIONS

APP	Approved professional person
EPP	Emergency preparedness plan
FSL	Full supply level
HRU	Hydrological Research Unit
K	Regional coefficient
MAP	Mean annual precipitation
masl	Meter above sea level
NOC	Non-overspill crest
NWA	National Water Act, Act 36 of 1998
OMM	Operation and maintenance manual
PMF	Probable maximum flood
PMP	Probable maximum precipitation
RDD	Recommended design discharge
RDF	Recommended design flood
RI	Recurrence interval
RL	Reduced level
RMF	Regional maximum flood
SANCOLD	South African National Committee on Large Dams
SCS	Soil Conservation Service
SED	Safety evaluation discharge
SEF	Safety evaluation flood

## LIST OF REFERENCES:

The references stated below were used in the report.

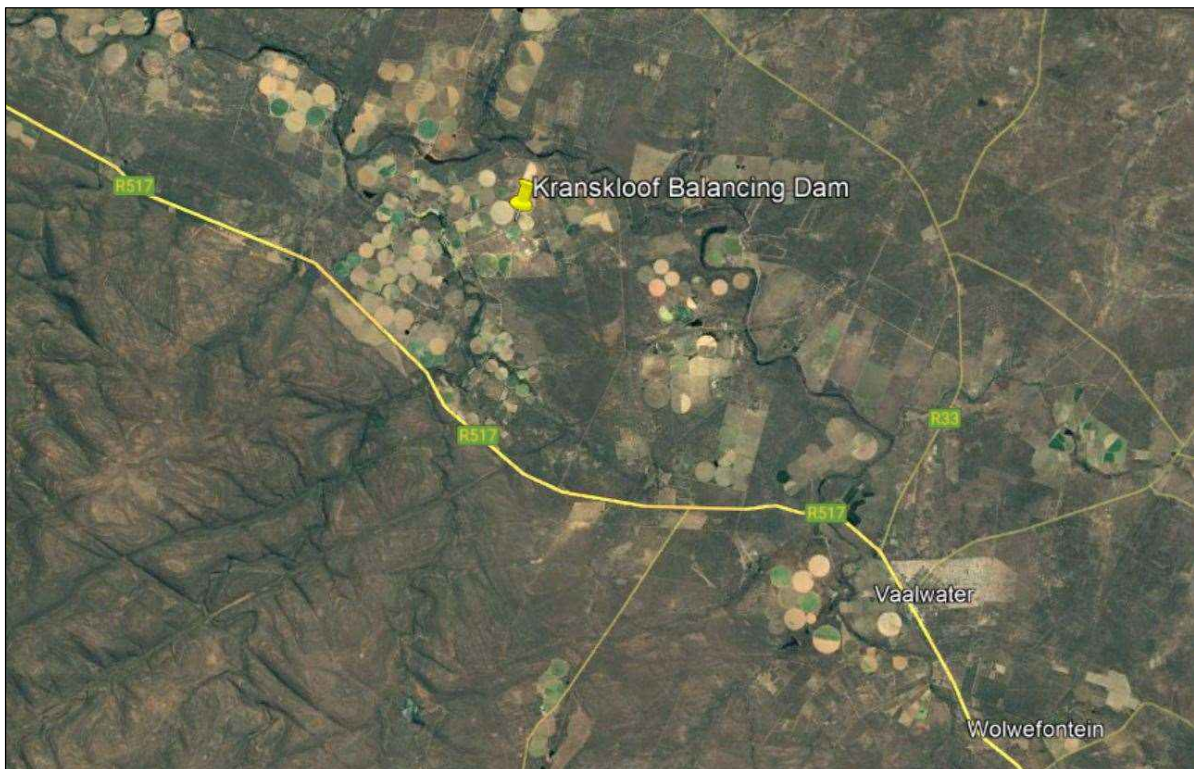
Document Title	Preparer / Author	Document Number	Revision or Date of Issue
<b>1. Legislative Requirements</b>			
[1] The National Water Act	NWA	Act of 36	1998
[2] The National Environmental Management Act	NEMA	Act of 107	1998
[3] Regulation Gazette No. 35062	NWA	Government Notice (GN) R139	2012
<b>2. National Standards and Information</b>			
[4] Guidelines on Safety in Relation to Floods	SANCOLD	Report no 4	1991
[5] GIS information: WRC2012	WRC		2012
[6] Software: Design Rainfall Estimation in South Africa	Smithers and Schulze	K5/1060	2002
[7] Regional Maximum Flood Peaks in Southern Africa, Department of Water Affairs	DWA	TR137	1988
<b>3. Technical Guidelines</b>			
[1] Drainage Manual 6 <sup>th</sup> Edition	SANRAL		2012
[2] Best Practice Guideline G1 Storm Water Management	DWAF	BPG 1	2006

# 1 INTRODUCTION

## 1.1 Background

It is the intention of the Owner to build a new balancing dam on his property. The proposed new Kranskloof Balancing Dam will be a lined, off channel storage dam, situated on portion 2 of the farm Groendraai 213 KQ, approximately 17 kilometres north-west of Vaalwater, in the Waterberg District of the Limpopo Province. The enlarged dam will mainly be fed by authorized water pumped from the Sterkfontein River.

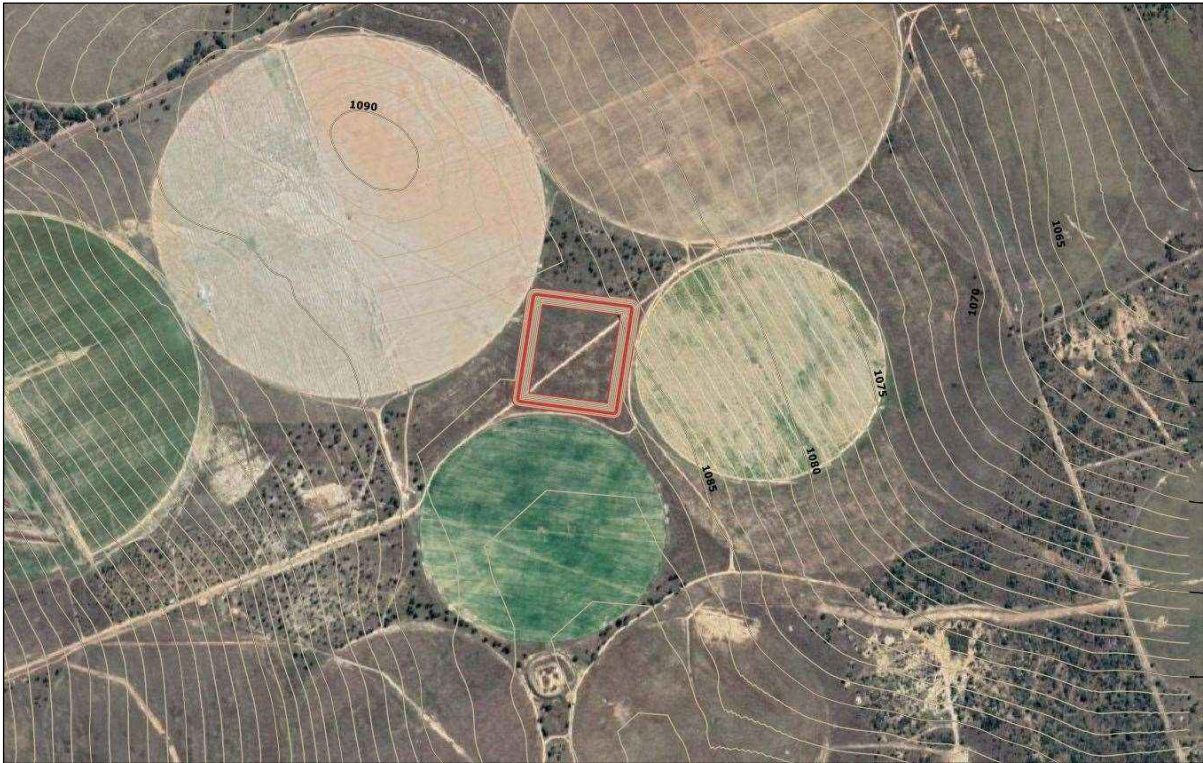
The centre co-ordinates of the dam wall are Latitude **24° 11' 51.89" S** and Longitude **27° 59' 17.63" E**. Refer to map images below as well as Appendix A (Topographical map image) for the location of the dam.



**Figure 1-1: Google Aerial Image (showing proposed dam position in relation to Vaalwater)**

The proposed dam will be lined with a HDPE liner and will cover a total surface area of roughly 4.9ha in order to store a required capacity of 150 000m<sup>3</sup>. The dam

embankment will consist of a homogenic earthfill structure with a maximum wall height above the lowest natural ground level (NGL) of approximately 4.8m. The dam was positioned between existing irrigation pivots, a plateau area as shown in the image below. It was decided on this specific location to minimize cut and fill volumes as well as to keep the maximum wall height below 5m. This was possible due to the flat topography of the specific location.



**Figure 1-2: Google Aerial Image (showing the location of the proposed lined dam)**

## **1.2 Purpose of report**

The purpose of this report is:

- To serve as a concept design document for the construction of the proposed Kranskloof Balancing Dam.
- To realistically estimate the quantities and costs of the proposed works.
- To make further decisions in this regard.
- To apply for approvals from DWS and LEDET in terms of the required licenses / authorizations.

### 1.3 Main features of the proposed dam

Gross storage capacity	<b>150 000m<sup>3</sup></b>
Water surface area at FSL	<b>35 800m<sup>2</sup></b>
Crest Level of non-overspill	<b>CL 1 088.80</b>
Full supply level	<b>CL 1 088.00</b>
Lowest ground level (outside at toe)	<b>CL 1 084.00</b>
Basin excavation level	<b>CL 1 083.10</b>
Maximum wall height above NGL	<b>4.8m</b>
NOC crest width	<b>4.0m</b>
Crest length	<b>788m</b>
Upstream (inside) slope	<b>1(V)3.0(H)</b>
Downstream (outside) slope	<b>1(V)3.0(H)</b>
Type of spillway	<b>HDPE Chute</b>
Total Freeboard	<b>0.8m</b>
Spillway control section width	<b>2.0m</b>
Outlet works	<b>suction pipe over embankment mounted on floatation structures</b>

See Appendix C for concept design drawings.

## 1.4 Stage/capacity curve

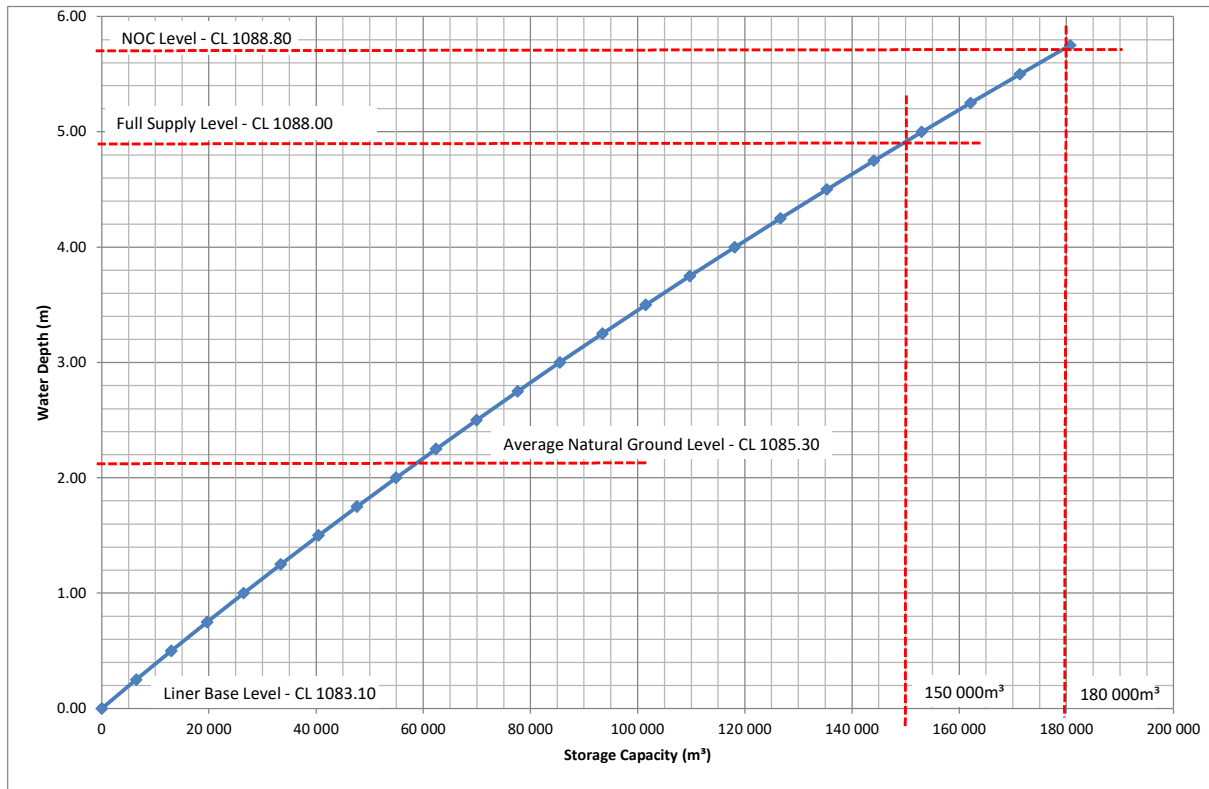


Figure 1-3 : Stage/Capacity Curve

## 1.5 SCOPE OF WORKS

The scope of work for the construction of the Kranskloof Balancing Dam will consist briefly of the following.

The proposed works to be carried out can be summarized as follows:

- a) Clear and grub area of dam footprint.
- b) Excavate new dam basin and stockpile material for reuse.
- c) Construction, forming and levelling of new embankment sections.
- d) Inside slope forming of excavated basin below NGL.
- e) Surface preparation for liner installation on all upstream slopes (inside).
- f) Installation of HDPE lining system (Environliner 1.0-1.5mm geomembrane).
- g) Construction of inlet concrete structure with silt trap - at pump line inlet (if applicable).
- h) Construction of emergency spillway structure.
- i) Establishment of grass on downstream slopes and crest section.

## **1.6 TERMS OF REFERENCE**

Mr. M.F. Joubert (Pr Tech Eng), also an approved professional person (APP), of the firm PG Consulting (Pty) Ltd, was appointed by Vaalwater Boerdery (Pty) Ltd (Mr. Thinus Maritz), to assist them with the concept design for the proposed new off-channel water storage dam on their property. Mr. Joubert will also be responsible for detail design, part-time construction supervision and quality control.

A contractor shall be appointed by the owner(s), following a tender process, once the required construction licenses have been issued.

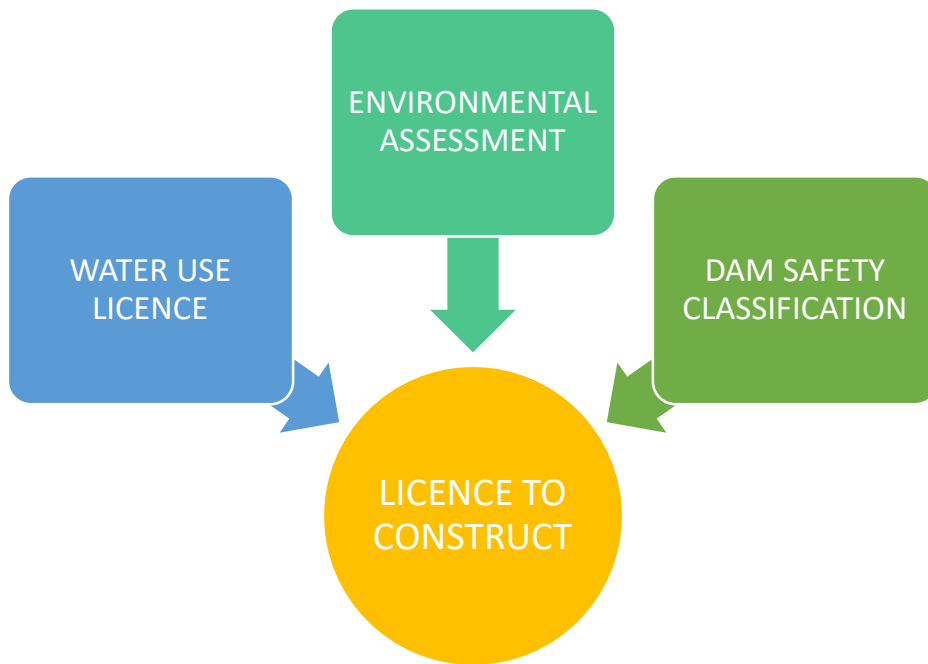
A site investigation and basic geotechnical assessment were conducted by PG Consulting Engineers on 18 February 2020.

Prior to detail design, it is recommended to conduct a proper geotechnical investigation with material testing as well as a proper basin survey.

## **2 WATER / ENVIRONMENTAL ACT REQUIREMENTS**

There are water and environmental regulatory requirements which every dam needs to adhere to. The specific legal requirements are mandatory and are presented in Figure 2-1 below. A Water Use Licence (WULA), Environmental Assessment (Environmental Impact Assessment/ Basic Assessment) and Dam Safety Classification, along with the Licence to Construct are required.

The construction of a dam can only commence once these inputs have been submitted and approved by the necessary regulatory bodies. The processes to be undertaken and entities that are responsible for the applications and the approvals are discussed hereafter.



**Figure 2-1: Requirements in the construction of a proposed dam**

## **2.1 Water Use Authorisations**

As the proposed Kranskloof Dam will be built under the new National Water Act (Act 36 of 1998), the water to be stored in these dams should be formally licensed by the Department of Water and Sanitation. It however remains the owner's responsibility to obtain the necessary license(s) for this water use(s) in terms of section 21 of the National Water Act, by applying at the Department of Water and Sanitation (Limpopo regional office - Polokwane). In view of the above, the Client had appointed Mr. J.C. van Rooyen (Spoor Environmental Consultants) to conduct a formal EIA and to obtain all the necessary environmental authorizations.

## **2.2 Dam Safety Regulations**

In terms of the Dam Safety Regulations, Chapter 12, Section 120 of the new National Water Act (Act 36 of 1998), a dam with a maximum wall height of more than 5 (five) meters and a capacity which exceeds 50 000 cubic meters, is defined as a dam with a safety hazard. Such a dam must be formally classified and registered for Dam Safety purposes with the Department of Water and Sanitation (Dam Safety Office - Pretoria).



Considering the above, as well as the characteristics mentioned in Section 2.3, it is expected that the enlarged dam can be regarded as a **Category “0-dam”** (i.e., a dam without a safety risk) due to the maximum wall height which is less than 5m.

### **2.3 Environmental Impact Assessment (EIA)**

Prior to any construction works, authorization should be received from the relevant Environmental Authority. This is to comply with the legislation promulgated in terms of Section 24G, read with Section 7 (Transitional provision) of the National Environmental Management Act (NEMA), 1989 (Act 8 of 2004) regarding the control over activities, which may have a detrimental effect on the environment.

In view of the above, the Client had appointed Mr. J.C. van Rooyen (Spoor Environmental Consultants) to conduct a formal EIA and to obtain all the necessary environmental authorizations.

### **2.4 Safety of existing development downstream**

A search of recent topographical maps as well as satellite imagery (as supplied by Google Earth) indicates that there are no infrastructure or development within the prescribed downstream flood zone which will be affected by a dambreak flood. The enlarged dam will be constructed (off-channel) some 1.8km from the Sterkfontein River and will have a maximum wall height of lower than 5m.

Hence, it is recommended that the dam be regarded as a dam without any safety risk.

## **3 GEOTECHNICAL AND FOUNDATION CONDITIONS**

With reference to the RSA Geology map, the proposed dam site can be described as fine to medium-grained, feldspathic sandstone, siltstone and shale which is part of the Vaalwater Formation of the Kransberg Sub-group of the Waterberg Group (Code “Mv”). The integrity and quality of the base / bedrock must still be further assessed during construction, when the core trench have been opened.

WATERBERG GROEP		GROEP WATERBERG			
Subgroep Kransberg Subgroep	Vaalwater	Fine-grained feldspathic and partly micaceous sandstone; arkose, siltstone and shale		Mv	
	Clermont	Fynkorrelrige veldspatiese en gedeeltelik glimmerhoudende sandsteen; arkose, siltsteen en skalie		Mc	
	Sandriviersberg (Mss)	Coarse-grained white sandstone		Mss	Mmc
	Mogalakwena (Mmc)	Grofkorrelrige wit sandsteen			
		Coarse-grained yellow cross-bedded sandstone			
Subgroep Matiaba Subgroep		Grofkorrelrige geel kruisgelaagde sandsteen			
		Sandstone, grit, conglomerate and boulder-conglomerate			
	Aasvoëlkop (Mas)	Sandsteen, grintsteen, konglomeraat en rolblokkonglomeraat		Mas	Mms
	Makgabeng (Mms)	Siltstone, mudstone; fine-grained feldspathic sandstone with conglomerate			
Subgroep Nvitiroom Subgroep		Siltsteen, moddersteen; fynkorrelrige veldspatiese sandsteen met konglomeraat			
		Fine to medium-grained, sometimes feldspathic, sandstone			
		Fyn- tot middelkorrelrige, somtyds veldspatiese, sandsteen			
	Schilpadkop	Sandstone, grit, conglomerate and boulder-conglomerate with fine-grained sandstone at top		Mag	
Subgroep Nvitiroom Subgroep		Sandsteen, grintsteen, konglomeraat en rolblokkonglomeraat met fynkorrelrige sandsteen aan top			
	Alma	Feldspathic and micaceous sandstone; graywacke, grit, mudstone, siltstone and conglomerate		Mag	
		Veldspatiese en glimmerhoudende sandsteen; growwak, grintsteen, moddersteen, siltsteen en konglomeraat			
	Swaershoek	Medium to coarse-grained sandstone; pebble-sandstone; tuffaceous graywacke; siltstone, shale and conglomerate		Ms	
		Middel- tot grofkorrelrige sandsteen; rolsteenhoudende sandsteen; tufagtige growwak; siltsteen, skalie en konglomeraat			

Figure 3-1 : Insert of RSA Geology description / legend (Mv)



Figure 3-2 : Insert of RSA Geology map and dam location in red circle

## 4 EMBANKMENT AND MATERIAL PARAMETERS

### 4.1 Materials

The proposed Kranskloof Balancing Dam will be a homogenous earthfill structure. Material testing will be done during detail design and construction to ensure all materials used in the embankment comply with the minimum recommended standards as per the table included below.

**Table 4-1 : Material Recommended Values**

	Recommend Values
Sample / hole no.	
Material description	
US Classification	
Clay content (%<0,002)	10–30
Liquid limit (%)	30–60
Plasticity index (PI) (%)	4–24
Linear shrinkage (LL) (%)	0–10
Grading modules	
PI of whole sample	
Screen analysis % (0,425mm )	40+
Maximum dry density* (kg/m <sup>3</sup> ) (MDD)	1590–1830
Optimum Moisture Content (W) (%)	13–22
Shear Strength: (i) Ø (°)	18–30
(ii) Cohesion (kN/m <sup>2</sup> ) (kPa)	12–24
Permeability (cm/s)	≤ 1 x 10 <sup>-4</sup> core
<u>MDD</u>	
PlxW	2–11

\* Standard Proctor Values

### 4.2 Embankment

Before construction of the embankment commences, all surfaces of the dam solum (dam wall footprint) shall be cleared, grubbed and wetted in order to achieve proper compaction conditions at the merging zone. The total footprint area of the dam equates to approximately **48 940m<sup>2</sup>**.

The expected volume of earthfill required for the forming of the new embankments is estimated at **34 819m<sup>3</sup>** (excluding key trench). The volume provides for a 1.2:1 compaction ratio.

The embankments will consist of a total crest length of **788m**, with a minimum crest width of **4.0m**. The upstream and downstream slopes will be constructed to a gradient of **1(V):3.0(H)**. See concept design drawings attached under Appendix C.

The expected basin cut volume is estimated at **73 202m<sup>3</sup>**. This results in a surplus of approximately **29 600m<sup>3</sup>**. It is recommended that the surplus cut earth volume be spoiled within the old existing abandoned dam near the Sterkfontein River. See image below.



**Figure 4-1 : Google Aerial Image (old dam near river)**

### **4.3 Key trench**

A key trench will be constructed at the proposed dam wall centre line, in order to provide proper founding conditions for the new embankment section above NGL. The assumed excavation depth is approximately 0.5m with a width of 3m. Actual depth and extent of the key trench to be established on site during construction.

Backfilling of the excavated trench section should be done with earthfill material having properties which meet the recommended criteria in Table 4-1. The expected volume of the key trench section is approximately **1 182m<sup>3</sup>**.

## 4.4 Engineered Liner

The proposed Kranskloof Balancing Dam will be fitted with a 1.0mm HDPE Liner (Environliner, conforming to GRI/GM13 or similar approved by Engineer). The liner should be installed by competent and approved contractors to specification and should be anchored to the crest section by means of a 500mm x 500mm anchor trench. The liner system should furthermore be installed on a prepared surface as specified by the HDPE liner supplier (See Appendix D for Gundle specifications). Total area to be covered (including allowance for anchor trench) is estimated at approximately **39 515m<sup>2</sup>**.

Refer to concept design drawings attached under Appendix C as well as Gundle specifications attached under Appendix D. Recommended liner properties are presented in the table below.

**Table 4-2 : HDPE Liner Properties Sheet**

Tested Property	Unit	Test Method	Values ( * )			
Thickness <sup>(a)</sup>	mm	ASTM D 5199	0.3	0.5	0.75	1.0
Density	g/cm <sup>3</sup>	ASTM D 792	≥ 0.94	≥ 0.94	≥ 0.94	≥ 0.94
Tensile Properties <sup>(b)</sup> (min. ave.)		ASTM D 638 / D 6693; Type IV				
Strength at Yield	N/mm	50 mm/min	4	7	11	15
Elongation at Yield	%	l <sub>0</sub> = 33 mm	12	12	12	13
Strength at Break	N/mm	200 mm/min	8	12	20	27
Elongation at Break	%	l <sub>0</sub> = 50 mm	650	700	700	700
Tear Resistance (min. ave.)	N	ASTM D 1004	35	65	95	130
Puncture Resistance (min. ave.)	N	ASTM D 4833	96	160	240	320
Carbon Black Content	%	ASTM D 1603	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0
Carbon Black Dispersion <sup>(c)</sup>	Category	ASTM D 5596	1/2	1/2	1/2	1/2
Dimensional Stability (each Direction)	%	ASTM D 1204 (120°C/1 h)	± 2	± 2	± 2	± 2
Melt Flow Index <sup>(d)</sup>	g/10 min	ASTM D 1238 (190°C / 5.0 kg) (190°C / 2.16 kg)	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0
Stress Crack Resistance (NCTL) <sup>(e)</sup>	h	ASTM D 5397; Appendix	≥ 500	≥ 500	≥ 500	≥ 500
Oxidative Induction Time (OIT)	min	ASTM D 3895 (200°C; Pure O <sub>2</sub> ; 1 atm)	≥ 100	≥ 100	≥ 100	≥ 100
<b>Reference Property</b>						
Low Temperature Brittleness	°C	ASTM D 746	- 77	- 77	- 77	- 77
Oven Aging at 85°C	%	ASTM D 5721				
Standard OIT (min. ave.) - % retained after 90 days		ASTM D 3895	≥ 55	≥ 55	≥ 55	≥ 55
UV Resistance <sup>(f)</sup>		ASTM D 7238				
HP-OIT retained after 1,600 hours <sup>(g)</sup>	%	ASTM D 5885	≥ 50	≥ 50	≥ 50	≥ 50
Roll Width (approx.) <sup>(h)</sup>	m	---	7.0		7.0	6.95 / 7 / 7.5 / 8.0
Surface	---	---	Double-sided smooth			

**NOTES:**

(\*) : All values - unless otherwise noted - are nominal values.

(a) : Minimum Average Thickness: Nominal - 5%; lowest individual ± 10% related to the actual average thickness.

(b) : Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.

(c) : Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be category 1 or 2. No more than 1 view from category 3.

(d) : Standard test conditions: 190°C / 5.0 kg.

(e) : The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.

(f) : Test-Conditions: 20 hours UV cycle at 75°C followed by 4 hours condensation at 60°C; total: 1,600 hours.

(g) : UV Resistance is based on percent retained value regardless of the original High Pressure - OIT value.

(h) : Roll widths and lengths have a tolerance of ± 1%.

#### **4.5 Compaction**

The new embankment sections must be compacted to an overall average minimum of at least 95% standard Proctor density at 2% wet of optimum moisture content (OMC). The thickness of the layers which are to be compacted should not exceed 200mm on placing. It is further suggested that a pad-foot roller be used during construction.

#### **4.6 Slope stability / analysis**

A slope stability analysis was not deemed necessary at this stage, due to the relatively low proposed wall height and because the dam is going to be lined. For practical reasons and to limit excess cut volume, the upstream and downstream slopes is specified to be 1(H):3.0(V).

#### **4.7 Slope Protection**

It is highly recommended that after the proposed construction works, the entire embankment shall be protected with a suitable indigenous grass cover, on the crest and downstream slopes (hydro-seeding can be applied).

### **5 EMERGENCY SPILLWAY**

It is required that the dam shall be equipped with an emergency spillway on the embankment crest section in order to provide for human and mechanical error (i.e., pumps not controlled and switched off in time or closing mechanisms malfunctioning). In this case an emergency spillway at each compartment. Refer to concept drawings for proposed positions (Appendix C).

Concrete orifice or HDPE lined spillways on the embankment crest with chutes constructed against the downstream slope section are proposed. It is recommended that the dimensions of the spillways will consist of a structure with at least a 2m base width on the embankment crest with an available minimum freeboard of 0.8m. See Figures 5-1 & 5-2 below for typical examples.



**Figures 5-1 & 5-2 : Typical Emergency Spillways**

## **6 OUTLET WORKS (PIPES)**

The dam will be equipped with a flexible suction pipe system which will be mounted on a floating structure within the dam basin. The pipe system will be linked to a pump station on the embankment crest which will feed the irrigation system. The suction outlet pipe shall also be utilised for the release of water for emergency situations or for drawdown during maintenance operations. Refer to Figures 6-1 & 6-2 below for typical examples.

The extent and costs of the outlet works are not included in this report.



**Figures 6-1 & 6-2 : Typical Suction Pipes with Floating Structures**

## 7 INLET WORKS (Recommended)

It is recommended that the dam be equipped with a 200mm - 300mm diameter pump line inlet structure. The inlet structure shall include a silt trap which can easily be cleaned. The structure will assist in allowing any silt contained in the pumped water to settle in the trap consequently extending the life expectancy of the dam. Refer to photos in Figures 7-1,2 & 3 below for an overview of a typical silt trap structure.



Figure 8-1, 8-2 & 8-3 : Typical Pump Inlet Structure with Silt Trap

## 8 WATER QUALITY

As the dam will be filled by means of a pump line via the Sterkfontein River, no water quality investigations were undertaken. It remains the responsibility of the owner to ensure adequate water quality for crop irrigation.



## 9 **QUALITY CONTROL**

Quality control measures during the construction period will include the analysis of additional soil samples and compaction control tests, as well as concrete cube testing at the inlet works and spillway, where applicable.

The APP will visit the site monthly to evaluate the following:

- Key trench foundation
- Spillway position
- Compaction and materials quality control
- Outlet pipe position and foundation (if applicable)
- Desilting structure position and foundation (if applicable)

The following standardised specifications are applicable to small dam construction:

- |                |                           |
|----------------|---------------------------|
| • SANS 1200 AD | General (small dams)      |
| • SANS 1200 C  | Site Clearance            |
| • SANS 1200 DE | Small Earth Dams          |
| • SANS 1200 G  | Concrete (structural)     |
| • SANS 1200 GA | Concrete (small works)    |
| • SANS 1200 L  | Medium Pressure Pipelines |
| • SANS 10409   | Geomembrane Liners        |

## 10 **SCHEDULE OF QUANTITIES / PRELIMINARY COST ESTIMATE**

Based on a Preliminary Schedule of Quantities and market related rates, the estimated cost for the construction of the proposed Kranskloof Balancing Dam is summarized as follows:



- Prior to construction, it is recommended to conduct a proper geotechnical investigation with material testing.
- It will be technically feasible to construct a balancing dam with a storage capacity of approximately **150 000m<sup>3</sup>** and with a maximum wall height of **4.8m** at the identified site. The dam embankment is estimated to be **788m** in length.
- The proposed works for the dam construction to be carried out can be summarized as follows:
  - a) Clear and grub area of dam footprint.
  - b) Excavate new dam basin and stockpile material for reuse.
  - c) Construction, forming and levelling of new embankment sections.
  - d) Inside slope forming of excavated basin below NGL.
  - e) Surface preparation for liner installation on all upstream slopes (inside).
  - f) Installation of HDPE lining system (1.0-1.5mm geomembrane).
  - g) Construction of inlet concrete structure with silt trap - at pump line inlet (if applicable).
  - h) Construction of emergency spillway structure.
  - i) Establishment of grass on downstream slopes and crest section.
- This report is also to be used as a tool to support all applicable and required license applications in terms of the Water and Environmental Acts.
- The preliminary estimated cost to construct the dam as described in the report is approximately **R7.88 million** including VAT and 10% contingencies but excluding Engineering fees and disbursements. The cost estimate is based on market related rates of similar projects in the Limpopo Province. This implies a cost rate of **R45-67/m<sup>3</sup>** of water stored.

## **APPENDIX A – TOPOGRAPHICAL MAP**



Proposed Kranskloof Dam  
2427 BB - 1:50 000

**APPENDIX B – SCHEDULE OF QUANTITIES / COST ESTIMATE**

SANS SCHEDULE OF QUANTITIES

**CONSTRUCTION OF PROPOSED LINED KRANSKLOOF BALANCING DAM**

**Special Note:**

Item No.	Payments Refers	Short Description	Unit	Quantity	Rate	Amount
<b><u>SECTION A: PRELIMINARY AND GENERAL</u></b>						
A 1	SANS 1200AD	<b>GENERAL (SMALL WORKS) (AD)</b>				
A 1.1	8.3	<b>FIXED CHARGE ITEMS</b>				
A 1.1.1	8.3.1	1. Contractual Requirements other than Contract Insurance's	Sum	1		
A 1.1.2		2. Contract Insurances	Sum	1		
A 1.1.3	8.3.2	<u>Establish Facilities on Site</u>				
	8.3.2	<u>Facilities for Contractor (SABS 1200 AB)</u>				
		a. Office and storage sheds	Sum	1		
		b. Living accommodation	Sum	1		
		c. Ablution and latrine facilities	Sum	1		
		d. Tools and equipment	Sum	1		
		e. Water supplies, electrical power and communication	Sum	1		
		f. Control of water on site (sub-surface, surface and river flow)	Sum	1		
		g. Access	Sum	1		
		h. Plant	Sum	1		
		(i) Earthmoving and compacting plant	Sum	1		
		(ii) Other Plant. (The Contractor shall state the type of plant)	Sum	1		
A 1.1.4	8.3.3	Other Fixed Charge Obligations	Sum	1		
A 1.1.5	8.3.4	Remove Engineer's and Contractor's Site Establishment on completion	Sum	1		
A 1.1.6	PAR SPEC	Health and Safety Requirements (Including all safety gear for the contract period)	Sum	1		
Sub-total carried forward to page 2						

Item No.	Payments Refers	Short Description	Unit	Quantity	Rate	Amount
Sub-total brought forward from page 1						
A 1.2	8.4	<b>TIME RELATED ITEMS</b>				
A 1.2.1	8.4.1	1. Contractual Requirements other than Contract Insurance's	Sum	1		
A 1.2.2		2. Contract Insurance's	Sum	1		
A 1.2.3	8.4.2.1	Operate and Maintain Facilities on the Site (SABS 1200AB)				
	8.4.2.2	<u>Facilities for Contractor for duration of Construction</u>				
		a. Office and storage sheds	Sum	1		
		b. Living accommodation	Sum	1		
		c. Ablution and latrine facilities	Sum	1		
		d. Tools and equipment	Sum	1		
		e. Water supplies, electrical power and communication	Sum	1		
		f. Control of water on site (sub-surface, surface and river flow)	Sum	1		
		g. Access	Sum	1		
		h. Plant	Sum	1		
		(i) Earthmoving and compacting plant	Sum	1		
		(ii) Other Plant (The Contractor shall state the type of plant)	Sum	1		
A 1.2.4	8.4.3	Supervision	Sum	1		
A 1.2.5	8.4.4	Company and Head Office Overhead Costs	Sum	1		
A 1.2.6	8.4.5	Other time related obligations	Sum	1		
A 1.3	PAR SPEC	<b>HEALTH AND SAFETY</b>				
A 1.3.1	7.2	Construction Safety Officer	No	1		
A 1.3.2		Health & Safety Plan	Sum	1		
A 1.3.3		Personal Protective Equipment (PPE) <i>for duration of the contract</i>	Sum	1		
Sub-total carried forward to page 3						



Item No.	Payments Refers	Short Description	Unit	Quantity	Rate	Amount
Sub-total brought forward from page 2						
A 1.4	SANS 1200AD	<b>SUMS STATED PROVISIONALLY BY ENGINEER</b>				
A 1.4.1		For work to be done by other concerns; <u>Miscellaneous</u>				
A 1.4.1.1		a. Testing of materials by nominated laboratory - only where directed by Engineer (Provisional). <b>Note that this item does not relieve the Contractor of his general obligations as regards testing as required by the specifications.</b>	Sum	1	R 10 000.00	R 10 000.00
A 1.4.1.2		b. Contractor's overheads, charges and profit on Item above	%			
A 1.4.2		For work to be done by Engineer;				
A 1.4.2.1		a. Compilation of Construction Completion Report with Certificate	Sum	1	R 10 000.00	R 10 000.00
A 1.5	8.8.5	<u>Survey Cost</u>				
A 1.5.1		a. "As built" survey (as directed by the engineer, provisional)	Sum	1	R 10 000.00	R 10 000.00
Sub-total carried forward to page 4						R 30 000.00

Item No.	Payments Refers	Short Description	Unit	Quantity	Rate	Amount
Sub-total brought forward from page 3						R 30 000.00
B 1	SANS 1200 C	<b><u>SECTION B: SITE CLEARANCE (C)</u></b>				
B 1.1.1	8.2.1	<u>Clear and area area to be covered by:</u> a. Dam solumn	m <sup>2</sup>	48 940	R 3.50	R 171 290.00
C 1	SANS 1200 DE	<b><u>SECTION C: EARTHWORKS (DE)</u></b>				
C 1.1	8.3.3(b)	<b><u>EXCAVATION</u></b> <u>Material suitable for embankment</u> Excavate in all materials and place in stock piles or spoil within a freehaul distance of 500m, to be used in embankment				
C 1.1.1		a. Key / foundation trench; - soft excavation	m <sup>3</sup>	1 182	R 20.00	R 23 640.00
C 1.1.2		b. Outlet works (pipe trenches) - soft excavation	m <sup>3</sup>			N/A
C 1.1.3		c. HDPE liner anchor trench 500mm x 500mm	m <sup>3</sup>	197	R 30.00	R 5 910.00
C 1.1.4		d. Dam basin below NGL (cut) - soft excavation	m <sup>3</sup>	73 202	R 20.00	R 1 464 040.00
C 1.1.5		e. Spoil of surplus material	m <sup>3</sup>	29 678	R 10.00	R 296 780.00
C 1.2	8.3.4	<b><u>PREPERATION OF EXPOSED SURFACES</u></b>				
C 1.2.1		Area to be covered by HDPE lining <i>(all slopes within dam basin below NGL and on new embankment)</i>	m <sup>2</sup>	39 515	R 5.00	R 197 575.00
C 1.3	8.1.2 (a)	<b><u>EMBANKMENT (FORMING)</u></b>				
	8.3.5	Form embankment and level embankment crest Using material from designated borrow area / stock piles for:  <i>All material to be compacted to min 95 % Proctor Density @ 2% wet of OMC.</i>  <b><i>NB: Contractor rate to include the following: The cost for obtaining samples; performing tests for Contractor quality control; performing tests for Contractor process control; providing inspection; exercising management control; submitting the records and certifications; and furnishing labor, materials, tools, equipment, and incidentals necessary to complete the work. (See SANS 1200DE - Section 7)</i></b>				
C 1.3.1		a) Embankment (Fill)	m <sup>3</sup>	34 819	R 25.00	R 870 475.00
C 1.3.2		b) Backfilling and compaction of key trench	m <sup>3</sup>	1 182	R 25.00	R 29 550.00
Sub-total carried forward to page 5						R 3 089 260.00

Item No.	Payments Refers	Short Description	Unit	Quantity	Rate	Amount
Sub-total brought forward from page 4						R 3 089 260.00
D 1	SANS 1200 GA	<b>SECTION D: CONCRETE SMALL WORKS (GA)</b>				
D 1.1	8.1.4	<b>Concrete Complete with Formwork</b>  <i><b>NB: Contractor rate to include the following: The cost for obtaining samples; performing tests for Contractor quality control; performing tests for Contractor process control; providing inspection; exercising management control; submitting the records and certifications; and furnishing labor, materials, tools, equipment, and incidentals necessary to complete the work. (See SANS 1200GA - Section 7)</b></i>				
D 1.1.1	8.1.4.2	Concrete encasing for outlet pipes Class 25/19 concrete , inclusive of shuttering	m <sup>3</sup>			N/A
D 1.2	8.4.4	<b>Uniform surface finishes</b>  Wood-floated	m <sup>2</sup>			N/A
D 1.3	8.3.1	<b>Reinforcing</b>  a) Outlet works (outlet pipe) - 12mm to 16mm	ton			N/A
Sub-total carried forward to page 6						R 3 089 260.00

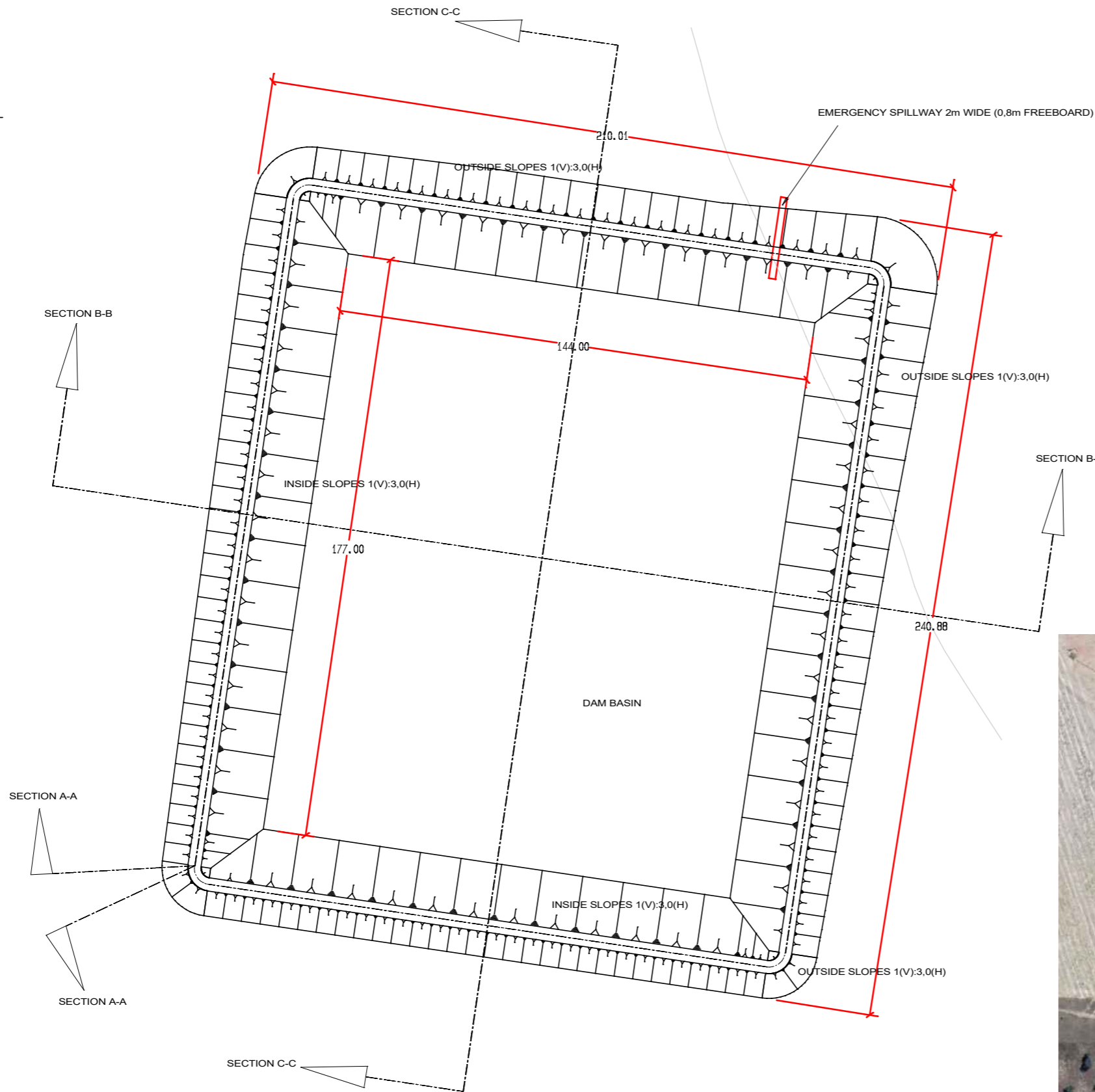
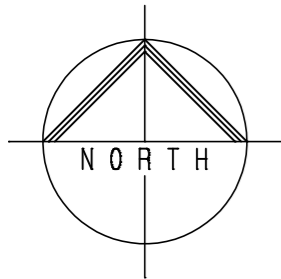
Item No.	Payments Refers	Short Description	Unit	Quantity	Rate	Amount
Sub-total brought forward from page 5						R 3 089 260.00
E 1	SABS 1200 L	<b><u>SECTION E: MEDIUM PRESSURE PIPE LINES (VALVES, OUTLET PIPES, ETC)</u></b>  Not applicable				
F 1		<b><u>SECTION F: MISCELLANEOUS &amp; LINING</u></b>				
F 1.1		<u>Emergency / Service Spillway</u> Erect concrete service spillway structure <i>(refer to drawings)</i>	Sum	1	R 15 000.00	R 15 000.00
F 1.2		<u>Landscaping</u> Landscaping of areas around newly formed dam	Sum	1	R 5 000.00	R 5 000.00
F 1.3		<u>Grass Protection</u> Hydroseeding of embankment downstream slope	m <sup>2</sup>	9 600	R 14.50	R 139 200.00
F 1.4		<u>Desilting Structure</u> Erect concrete desilting structure to specification	Sum	1	R 25 000.00	R 25 000.00
F 1.5		Supply, install and test of geomembrane liner <i>To be done by liner supplier</i>				
F 1.5.1		a. 1,0mm thick HDPE geomembrane liner	m <sup>2</sup>	39 515	R 60.00	R 2 370 900.00
F 1.5.2		b. Delivery to site	Sum	1	R 20 000.00	R 20 000.00
<b>TOTAL</b>						R 5 664 360.00

<b>SCHEDULE OF QUANTITIES: SUMMARY</b>
--

**CONSTRUCTION OF PROPOSED LINED KRANSKLOOF BALANCING DAM**

SECTION A:	GENERAL SMALL DAMS (AD) (10%)	R	593 436.00
SECTION B:	SITE CLEARANCE (C)	R	171 290.00
SECTION C:	EARTHWORKS (DE)	R	2 887 970.00
SECTION D:	CONCRETE (SMALL WORKS) (GA)	R	
SECTION E:	MEDIUM PRESSURE PIPE LINES (L)	R	
SECTION F:	MISCELLANEOUS & LINING	R	2 575 100.00
 <b>SUB-TOTAL FOR PRICED ITEMS</b>		 R	 6 227 796.00
<b>10% CONTINGENCIES</b>		R	622 779.60
<b>SUB TOTAL</b>		R	6 850 575.60
<b>15% VAT</b>		R	1 027 586.34
 <b>CARRIED FORWARD</b>		 R	 7 878 161.94

## **APPENDIX C – CONCEPT DRAWINGS**



**KRANSKLOOF HDPE LINED BALANCING DAM**  
 WATER SURFACE AREA - 3,580ha  
 STORAGE CAPACITY - 150 000m<sup>3</sup>

**NOTE: SETTING OUT COORDINATES TO BE FINALIZED DURING DETAIL DESIGN**



**DAM LAYOUT PLAN - SCALE 1:1500 (A3)**

CONCEPT DESIGN DRAWINGS

ORIGINAL SIZE A3

AMENDMENTS			
NO.	DATE	APPROVED	DESCRIPTION

**NOTES:**

**GENERAL NOTES:**

1. ALL WORK MUST COMPLY WITH THE BY-LAWS AND SPECIFICATIONS OF THE LOCAL AUTHORITY, NATIONAL BUILDING REGULATIONS AND SANS 1200
2. ALL DIMENSIONS AND LEVELS SHALL BE CHECKED ON SITE BEFORE WORK COMMENCES AND ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IN WRITING
3. THE ENGINEER WILL ASSIST THE CONTRACTOR IN STAKING LINES WHERE AFTER THE CONTRACTOR SHALL TAKE OVER ALL SETTING OUT PEGS AND SURVEY BEACONS AND MAINTAIN THEM DURING THE CONSTRUCTION PERIOD

**DAM OWNER**

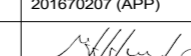
**THINUS MARITZ BOERDERY (PTY) LTD**  
**VAALWATER**

Thinus Maritz  
 P.O. Box 1034  
 VAALWATER  
 0530  
 Email: vaalwater@thinusmaritz.co.za  
 Cell: 082 524 8598

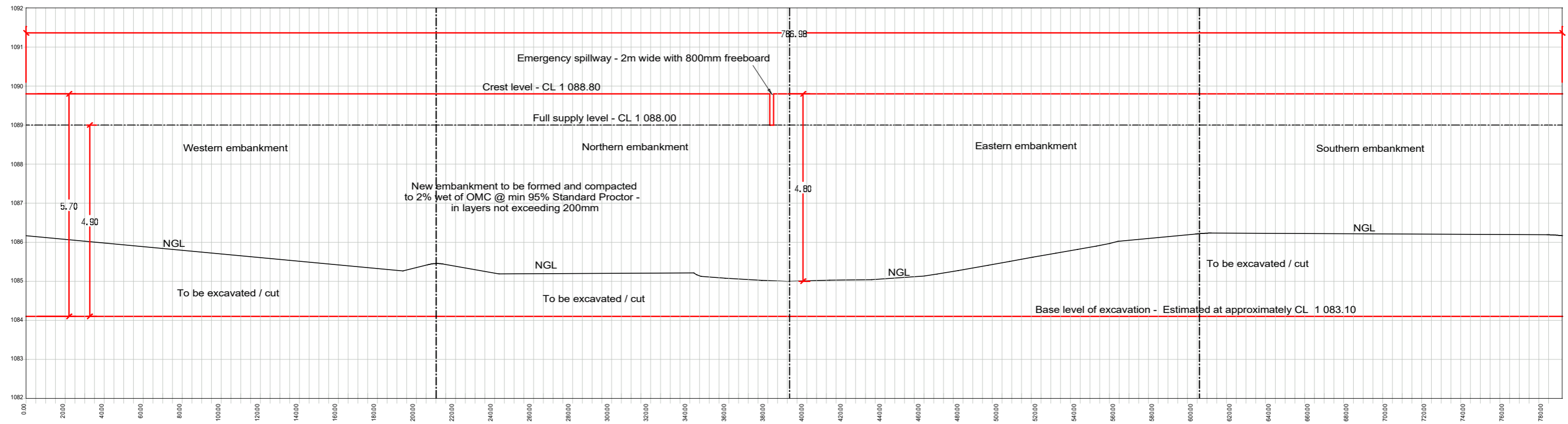
**CONSULTANTS**

Physical Address: Building 24, Sunninghill Office Park,  
 20 Peltier Drive, Sunninghill, Johannesburg, 2191  
 Postal: Postnet Suite 356, Private Bag X29,  
 Gallo Manor, 2052  
 Telephone/Mobile: +27 (0) 82 337 6905  
 E-mail: pieter@pgconsulting.co.za  
 Website: www.pgconsulting.co.za



SURVEYED	(5m GEO DATA SET)
DRAWN	MF JOUBERT Pr Tech Eng
DESIGNED	MF JOUBERT Pr Tech Eng
APPROVED PR. NO.	MF JOUBERT Pr Tech Eng 201670207 (APP)
SIGNATURE	

Project		<b>KRANSKLOOF DAM (PROPOSED)</b>	
Plan Description		PLAN LAYOUT KRANSKLOOF DAM HDPE LINED BALANCING DAM	
DATE	SCALE	DRAWING NUMBER	REVISION NUMBER
2021-12-01	AS SHOWN	075/W/KK/001	0
PROJECT NUMBER		075	
Copyright is vested in PG Consulting Engineers (Pty) Ltd in terms of the Copyright Act (98 of 1978)			



EMBankment LONG SECTION (A-A) - SCALE AS INDICATED

CONCEPT DESIGN DRAWING

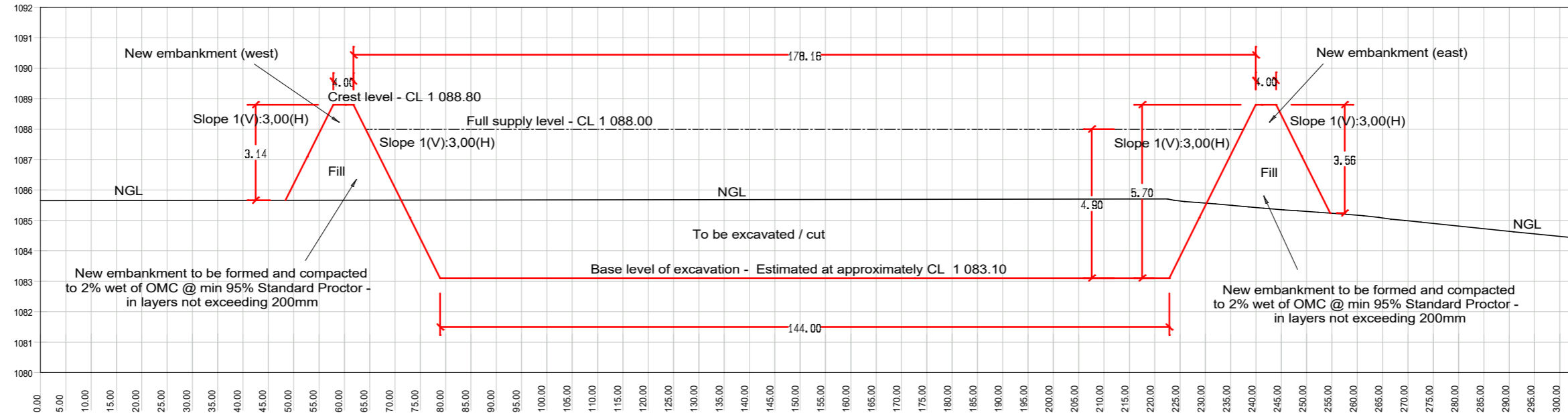
ORIGINAL SIZE A3

AMENDMENTS				NOTES:	DAM OWNER	CONSULTANTS	SURVEYED	(5m GEO DATA SET)	Project				
NO.	DATE	APPROVED	DESCRIPTION						Plan Description	DATE	SCALE	REVISION NUMBER	
				<b>GENERAL NOTES:</b> 1. ALL WORK MUST COMPLY WITH THE BY-LAWS AND SPECIFICATIONS OF THE LOCAL AUTHORITY, NATIONAL BUILDING REGULATIONS AND SANS 1200 2. ALL DIMENSIONS AND LEVELS SHALL BE CHECKED ON SITE BEFORE WORK COMMENCES AND ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IN WRITING 3. THE ENGINEER WILL ASSIST THE CONTRACTOR IN STAKING LINES WHERE AFTER THE CONTRACTOR SHALL TAKE OVER ALL SETTING OUT PEGS AND SURVEY BEACONS AND MAINTAIN THEM DURING THE CONSTRUCTION PERIOD	<b>THINUS MARITZ BOERDERY (PTY) LTD</b> <b>VAALWATER</b>  Thinus Maritz P.O. Box 1034 VAALWATER 0530 Email: vaalwater@thinusmaritz.co.za Cell: 082 524 8598	Physical Address: Building 24, Sunninghill Office Park, 20 Peltier Drive, Sunninghill, Johannesburg, 2191 Postal: Postnet Suite 356, Private Bag X29, Gallo Manor, 2052 Telephone/Mobile: +27 (0) 82 337 6905 E-mail: pieter@pgconsulting.co.za Website: www.pgconsulting.co.za	MF JOUBERT Pr Tech Eng  MF JOUBERT Pr Tech Eng  MF JOUBERT Pr Tech Eng 201670207 (APP)	<b>KRANSKLOOF DAM (PROPOSED)</b>  EMBANKMENT LONG SECTION & DETAILS KRANSKLOOF DAM HDPE LINED BALANCING DAM	2021-12-01	AS SHOWN	075/W/KK/001	0	075

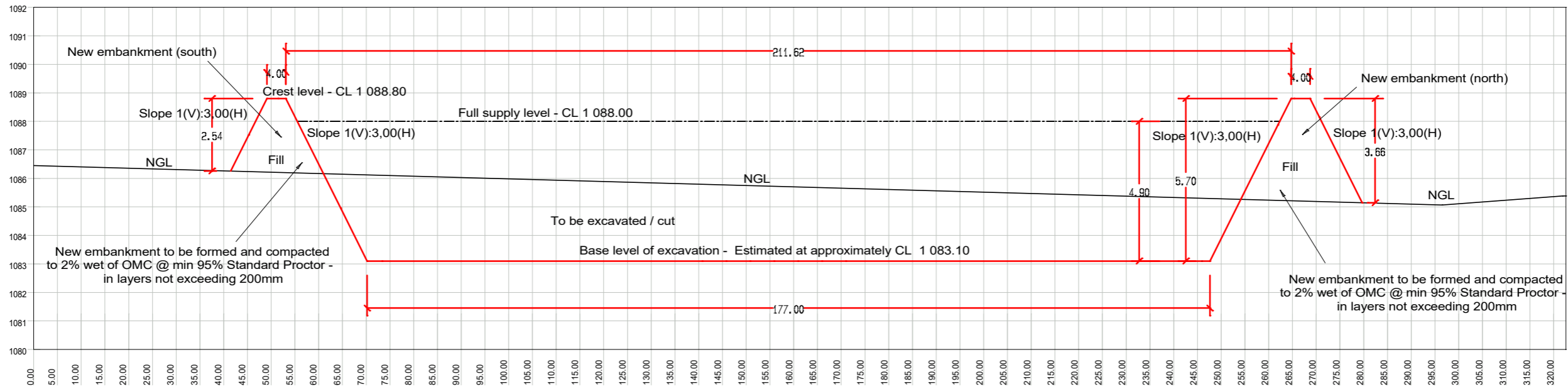


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EMBAKMENT CROSS SECTION (B-B) - SCALE AS INDICATED



EMBAKMENT CROSS SECTION (C-C) - SCALE AS INDICATED

CONCEPT DESIGN DRAWING

ORIGINAL SIZE A3

AMENDMENTS			
NO.	DATE	APPROVED	DESCRIPTION

NOTES:

GENERAL NOTES:  
 1. ALL WORK MUST COMPLY WITH THE BY-LAWS AND SPECIFICATIONS OF THE LOCAL AUTHORITY, NATIONAL BUILDING REGULATIONS AND SANS 1200  
 2. ALL DIMENSIONS AND LEVELS SHALL BE CHECKED ON SITE BEFORE WORK COMMENCES AND ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IN WRITING  
 3. THE ENGINEER WILL ASSIST THE CONTRACTOR IN STAKING LINES WHERE AFTER THE CONTRACTOR SHALL TAKE OVER ALL SETTING OUT PEGS AND SURVEY BEACONS AND MAINTAIN THEM DURING THE CONSTRUCTION PERIOD

DAM OWNER

**THINUS MARITZ BOERDERY (PTY) LTD**  
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**PG CONSULTING ENGINEERS**  
 PASSIONATE ABOUT DAMS

SURVEYED	(5m GEO DATA SET)
DRAWN	MF JOUBERT Pr Tech Eng
DESIGNED	MF JOUBERT Pr Tech Eng
APPROVED PR. NO.	MF JOUBERT Pr Tech Eng 201670207 (APP)
SIGNATURE	<i>Mf Joubert</i>

Project		<b>KRANSKLOOF DAM (PROPOSED)</b>	
Plan Description		EMBAKMENT CROSS SECTIONS & DETAILS KRANSKLOOF DAM HDPE LINED BALANCING DAM	
DATE	SCALE	DRAWING NUMBER	REVISION NUMBER
2021-12-01	AS SHOWN	075/W/KK/001	0
PROJECT NUMBER		075	
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## **APPENDIX D – GUNDEL SPECIFICATIONS**

# Gundle Geosynthetics

## SUGGESTED SUBGRADE PREPARATIONS

The Civil Contractor shall be responsible for preparing and maintaining the subgrade in a condition suitable for the installation of the liner unless specifically agreed otherwise.

1. Surfaces to be lined shall be smooth and free of debris, roots and angular or sharp rocks larger than 15 mm in diameter to a depth of 150 mm, depending on liner thickness. All fill shall consist of well graded material free of organics, trash, clay balls, sharp stones or other material that may cause damage to the liner. The subgrade shall be compacted in accordance with design specifications. It should in no event be compacted below the minimum required to provide a firm unyielding foundation, sufficient to permit the movement of vehicles or other deleterious effects. The subgrade shall have no sudden sharp or abrupt changes in grade. The maximum deviation under a 3 m straight edge should typically be less than 50 mm, depending on the liner type.

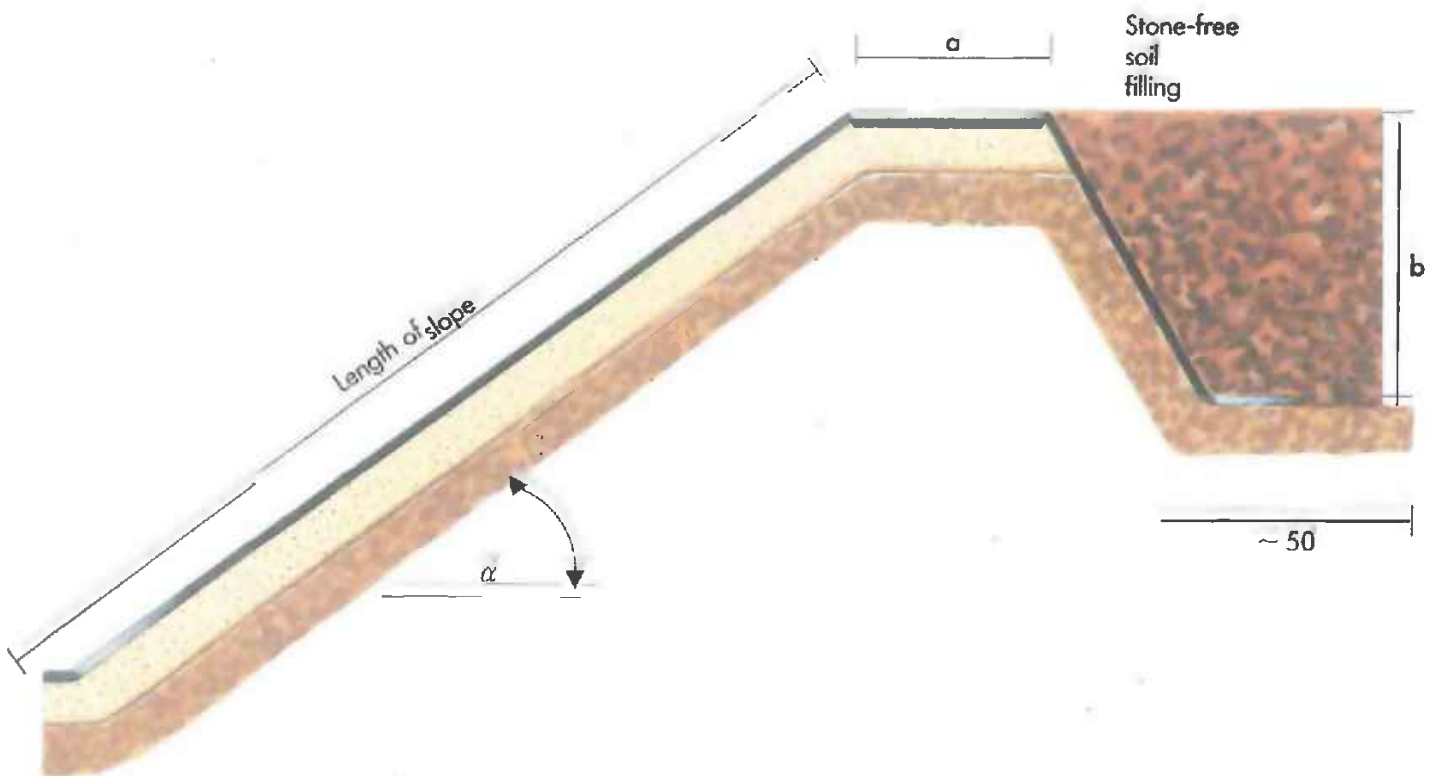
2. The Civil Contractor shall protect the subgrade from desiccation, flooding and freezing. Protection, if required, may consist of a thin plastic protective cover (or other material as approved by the Engineer) installed over the completed subgrade until such time as the placement of the geomembrane liner begins. Subgrade found to have unacceptable desiccation cracks or which exhibit swelling, heaving or other similar conditions shall be replaced or reworked by the Civil Contractor to remove these defects.

3. SURFACE ACCEPTANCE. Gundle Geosynthetics shall provide the Client/Manager with a written acceptance of the surface prior to commencing installation. Subsequent repairs to the subgrade and the surface shall remain the responsibility of the Civil Contractor.



The end of the slope lining is firmly secured in a trench. The sheet is rolled across the full width of the trench floor before the trench is filled, usually with a weakly cohesive sand and gravel mixture well compacted. The size of the trench is usually dependent on the length of the slope. For small slopes the following dimensions are adequate: depth 50 cm; width 40 cm; crown width between edge of trench and end of slope 50 cm. For

longer slopes (> 10 m) the dimensions of the trench must be larger and the creation of berms is recommended; the waterproofing sheet can then be additionally secured in intermediate trenches filled with earth.



Slope length	a	b
< 10 m	$\geq 0,5$ m	$\geq 0,5$ m
10–40 m	$\geq 0,8$ m	$\geq 0,6$ m
> 40 m	$\geq 1,0$ m	$\geq 0,8$ m

# SUGGESTED SITE SUBGRADE & BASIC OPERATIONAL & MAINTENANCE GUIDELINES for GEOMEMBRANE LINED FACILITIES

**(Please Note: This information is provided as a generic aid only to the design Engineer when incorporating Geomembrane linings into project works. It is given without prejudice, guarantee nor liability and is based on years of practical experience, extracts from the SANS 1200 D series (D, DA, DB and DE) for earthworks and the SANS 10409 :2005 for Geomembrane Liners. The Engineer will at all times have responsibility for the final design.**

## EARTHWORKS

- The Civil Contractor shall be responsible for preparing and maintaining the subgrade in a condition suitable for installation of the liner unless specifically agreed otherwise.
- Surfaces to be lined shall be smooth and free of debris, roots and angular or sharp particles that might proved detrimental to the performance of the liner system. The Maximum size of particles shall typically not exceed 3mm.
- The sub-grade shall be well compacted, dry and stable for the life of structure in accordance with design specifications. The site should be constructed with either a suitable sub surface drainage system and/or gas removal system to prevent build up of pressures from below the liner.
- If the in-situ soil is unsuitable, a sand or fine gravel layer of thickness at least 2.5X the largest dimension of the largest particle size in the in-situ soil (or 50mm whichever is the greater) or a geotextile non woven protector sufficient to meet the above requirements should be used.
- The sub-grade shall be finished to the class of planar flatness as specified by the Engineer and shall have no sudden sharp or abrupt changes in grade. The maximum deviation under a 3m straight edge should typically be less than 50 mm and no abrupt changes greater than 5mm shall be tolerated.
- The Civil Contractor shall protect the sub-grade from desiccation, flooding and freezing. Sub-grade found to have unacceptable desiccation cracks or which exhibit excessive swelling, heaving or other movements shall be replaced or reworked by the Civil Contractor and made good.
- Special attention should be given to the angle between the inside anchor trench face and the adjacent horizontal surface. This can be a location for high stress concentrations and should be radiused as appropriate.

## SURFACE ACCEPTANCE

Gundle Geosynthetics shall provide the Client/Site Manager with a written acceptance of the surface prior to commencing installation. Subsequent repairs to the sub-grade and the surface shall remain the responsibility of the Civil Contractor.

## ANCHOR TRENCHES

Anchor trenches, as designed by the engineer, should be provided around the perimeter of the lined area. These must be excavated, backfilled and compacted normally in layers by the civil contractor.

## CONCRETE WORKS, STRUCTURES & PENETRATIONS

- Structures shall be constructed being mindful of the need to connect flexible liner systems **and related fixing points**. They should be sufficiently strong, durable and smooth and surfaces should be straight and flat to accommodate any drilling and use of any steel anchors. Consideration must be made to the shutter nibs and corners and should be ground smooth as required. The use of a geotextile to protect the liner is also a consideration.
- The structure should be equipped where necessary with a concrete corbel / lip located around the structure in the plane to be occupied by the liner and should have radiused / chamfered corners. At the immediate transition zone between the structure and surrounding earthworks, this should be free of any steps and should be well compacted or **be constructed in such a manner so as to avoid differential settlement**.
- Any structures which will be required to penetrate or support the liner system shall be carefully considered, (eg. Pipes, overflows, footings, sumps, manholes, etc). These should be fitted with appropriate connections as suggested by the Lining Installer.

## MAINTENANCE & SAFETY

- The Lining is **slippery** when wet and extreme care has to be taken by all parties during installation, and especially operation. Cat ladders, knotted ropus and life jacket should be considered around lined water structures. We recommend that **fencing** be erected to safeguard people and animals from falling in.
- Regular cutting back of grassed areas adjacent to the lined structure should be done to limit the effects of fire damage.

**APPENDIX D\_3**  
**STRUCTURAL MAINTENANCE PLAN**

**APPENDIX D\_4**  
**HYDROLOGICAL STUDY**

# Quantification of the Irrigation Water Requirements and Assessment of the Ecological Water Requirements for the Thinus Maritz Vaalwater Boerdery (PTY) Ltd., Limpopo Province

*Project Number:*

**SES001**

*Prepared for:*



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**September 2019**



## DOCUMENT CONTROL

<b>Project Name</b>	Quantification of the Irrigation Water Requirements and Assessment of the Ecological Water Requirements for Mr Thinus Maritz, Vaalwater, Limpopo Province
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<b>Author</b>	Andy Pirie (Hydrologist, <i>M.Sc. Pr.Sci.Nat.</i> )
<b>Author Signature</b>	

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## ACRONYMS AND ABBREVIATIONS

DWS	Department of Water and Sanitation
EWR	Ecological Water Requirements
ha	Hectares
km	Kilometres
MAR	Mean Annual Runoff
m	Metres
m <sup>3</sup>	Cubic metres
mm	Millimetres
S-Pan	Symon's Pan
WMA	Water Management Area
WR2012	Water Resources of South Africa, 2012 Study

# 1 INTRODUCTION AND BACKGROUND

## 1.1 Terms of Reference and Study Objectives

Hydrospatial (Pty) Ltd was appointed by SPOOR Environmental Services (Pty) Ltd (hereafter referred to as SPOOR), to calculate the irrigation water requirements for crops grown by Mr Thinus Maritz, who predominantly farms with tobacco, potatoes, maize, peanuts, pasture and flowers, near Vaalwater in the Limpopo Province. In addition, SPOOR requested that the runoff of the reaches of the Mokolo and Sterkstroom Rivers, from which Mr Thinus Maritz abstracts water for irrigation, is assessed, to determine whether the Ecological Water Requirements (EWR) are being met. Based on the above, the following were study objectives:

- Calculate the irrigation water requirements; and
- Assess whether the EWRs are being met.

This report details the study undertaken to meet the above objectives.

## 1.2 Study Location

The farms on which agricultural production takes place (hereafter referred to as the study area), are located approximately 19 kilometres (km) north-west of the town of Vaalwater in the Limpopo Province (Figure 1-1). The farms include the following:

- Portion 1, 2, 3 and the Remainder of the farm Groendraai 213 KQ;
- Klipspruit 80 KR;
- Rhenosterfontein 179 KQ; and
- Inelkander 211 KQ.

The Department of Water and Sanitation (DWS) have divided South Africa into Water Management Areas (WMAs) and quaternary catchments for management purposes. The study area falls within the Limpopo WMA, predominantly in quaternary catchments A42D and A42E.

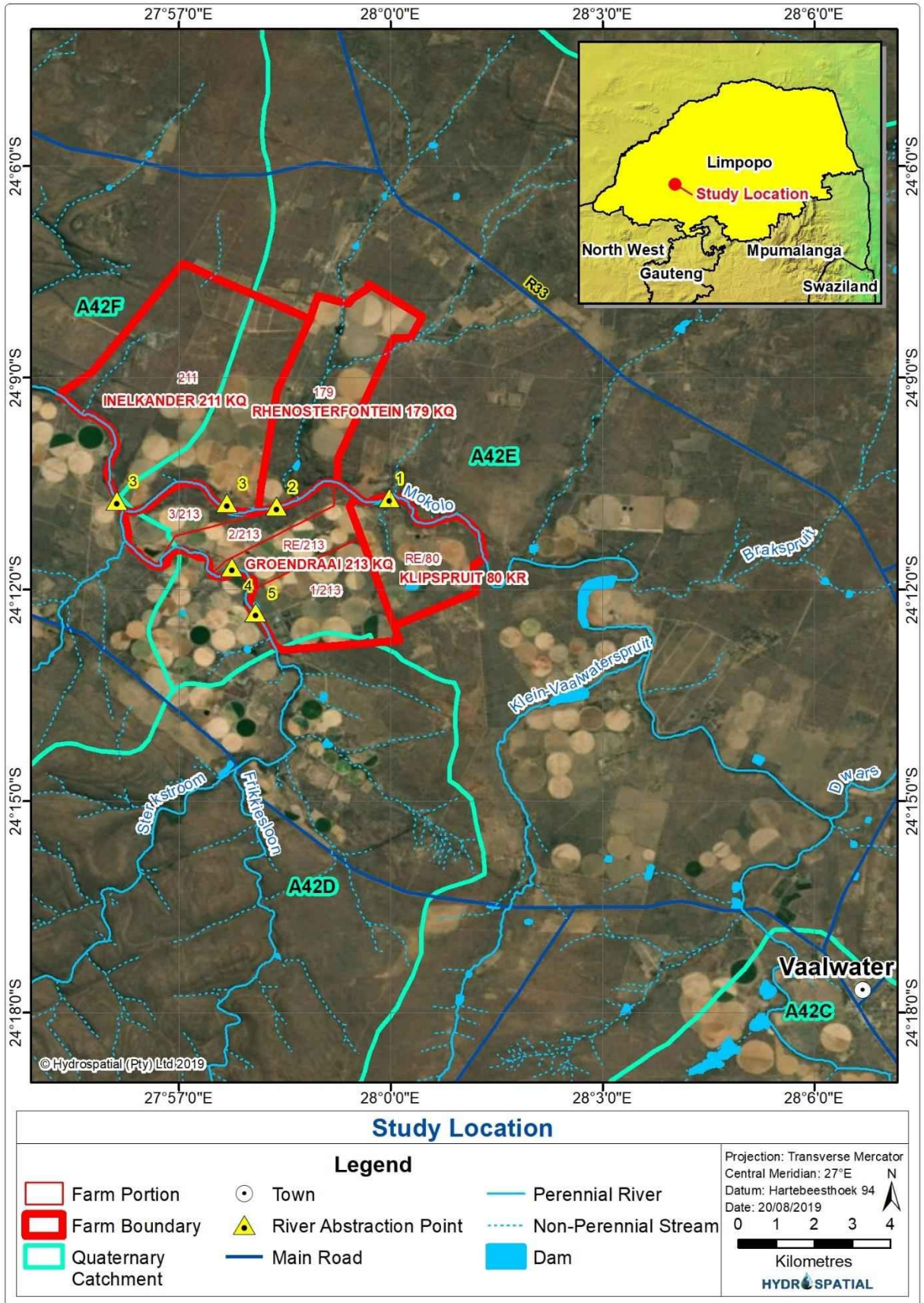


Figure 1-1: Study Location

### 1.3 Agricultural Crop Details

Details of the crops grown and irrigated by Mr Thinus Maritz were provided by SPOOR and are summarised in Table 1-1.

Table 1-1: Crop details

<b>Irrigation Source</b>	<b>Dam Group</b>	<b>Crop</b>	<b>Area Planted (ha)</b>	<b>Planted</b>	<b>Harvested</b>	<b>Crop Growth (days)</b>
100 % Mokolo River	1	Tobacco	36	September/October	March/April	180-210
100 % Mokolo River	1	Potatoes	18	July	November/December	150
100 % Mokolo River	1	Peanuts	18	December	November/December	150
100 % Mokolo River	1	Maize	9	January	May	120
100 % Mokolo River	1	Pasture	25	September	November	90
60 % Mokolo River & 40 % borehole supply	2	Tobacco	49	September/October	March/April	180-210
60 % Mokolo River & 40 % borehole supply	2	Potatoes	12.5	July	November/December	150
60 % Mokolo River & 40 % borehole supply	2	Peanuts	12.5	December	November/December	150
60 % Mokolo River & 40 % borehole supply	2	Pasture	25	September	November	90
90 % Mokolo River & 10 % borehole supply	3	Tobacco	74	September/October	March/April	180-210
90 % Mokolo River & 10 % borehole supply	3	Potatoes	50	July	November/December	150
90 % Mokolo River & 10 % borehole supply	3	Peanuts	25	December	November/December	150
90 % Mokolo River & 10 % borehole supply	3	Pasture	30	September	November	90
95 % Sterkstroom River & 5 % borehole supply	4	Tobacco	30	September/October	March/April	180-210
95 % Sterkstroom River & 5 % borehole supply	4	Potatoes	14	July	November/December	150
95 % Sterkstroom River & 5 % borehole supply	4	Peanuts	30	December	November/December	150

Irrigation Source	Dam Group	Crop	Area Planted (ha)	Planted	Harvested	Crop Growth (days)
95 % Sterkstroom River & 5 % borehole supply	4	Maize	30	January	May	120
95 % Sterkstroom River & 5 % borehole supply	4	Flowers (Hadeco Amaryllis bulbs)	30	August	April	
95 % Sterkstroom River & 5 % borehole supply	4	Pasture	25	September	November	90
95 % Sterkstroom River & 5 % borehole supply	5	Tobacco	45	September/October	March/April	180
95 % Sterkstroom River & 5 % borehole supply	5	Peanuts	45	December	November/December	150
95 % Sterkstroom River & 5 % borehole supply	5	Maize	30	January	May	120

## 1.4 Registered Water Use

The registered irrigation water use for the farms owned by Mr Maritz is summarised in Table 1-2. The lawfulness of the water use for Portion 1 of Groendraai 213 KQ and Portion 2 of Inelkander 211 KQ, still needs to be verified with the DWS, however, the water use during the qualifying period has been provided in Table 1-2.

Table 1-2: Registered irrigation water use

Farm	Irrigation Volume (m <sup>3</sup> /year)	Source
Klipspruit 80 KR	562 320	Mokolo River
	97 200	Borehole
Rhenorsterfontein 179 KQ	174 960	Mokolo River
	406 800	Borehole
Portion 1 of Inelkander 211 KQ	192 765	Mokolo River
	113 094	Borehole
Portion 2 of Inelkander 211 KQ	474 726	Mokolo River
	58 674	Borehole
Remainder of Groendraai 213 KQ	411 430	Mokolo River

Farm	Irrigation Volume (m <sup>3</sup> /year)	Source
	88 650	Borehole
Portion 1 of Groendraai 213 KQ	758 292	Sterkstroom River
	163 392	Borehole
Portion 2 of Groendraai 213 KQ	267 336	Mokolo River
	267 336	Sterkstroom River
	84 976	Borehole
Portion 3 of Groendraai 213 KQ	316 950	Mokolo River
	452 346	Sterkstroom River

## 1.5 Ecological Water Requirements

The EWRs have been defined by the DWS for the Mokolo and Sterkstroom Rivers in the document: Proposed classes of water resource and resource quality objectives for Mokolo, Matlabas, Crocodile (west) and Marico catchments (Government Gazette No. 41310, 8 December 2017) (DWS, 2017). The EWRs relevant to the river reaches where abstraction is taking place are summarised in Table 1-3.

Table 1-3: EWRs relevant to the study

Quaternary Catchment	River Reach	Natural Mean Annual Runoff (million m <sup>3</sup> /year)	EWR as % of Natural Mean Annual Runoff	EWR Annual Runoff (million m <sup>3</sup> /year)
A42D	Sterkstroom (source) to confluence with Mokolo,	43.45	52.63 %	22.87
A42E	Mokolo to confluence with Sterkstroom	135.03	13.6 %	18.36

## 1.6 Climate

Monthly rainfall and evaporation data for the region was obtained from the WR2012 study. The average monthly rainfall is indicated in Figure 1-2, whilst the average Symon's Pan (S-Pan) evaporation is indicated in Figure 1-3. The area has an average annual rainfall of 600



mm, with rainfall mostly occurring over the months of October through to March. The average annual S-Pan evaporation is 1 701 mm, with evaporation being the highest over the months of September through to March.

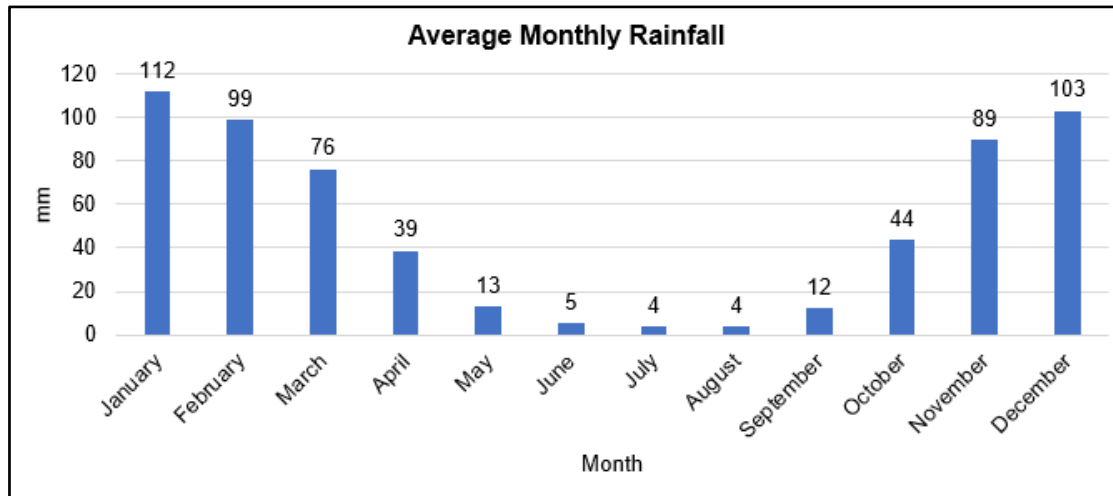


Figure 1-2: Average monthly rainfall

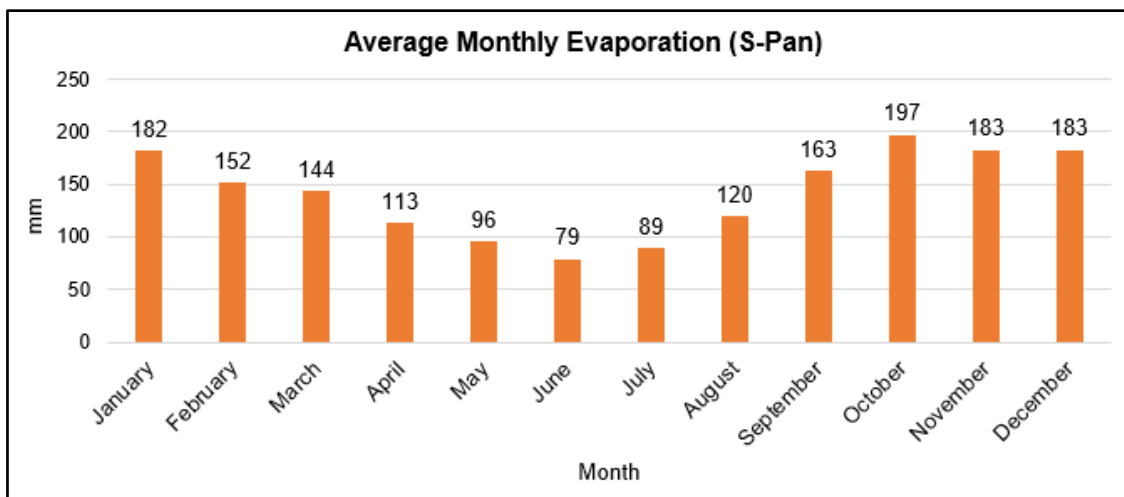


Figure 1-3: Average monthly evaporation

## 2 METHODOLOGY

The WRSM/Pitman model was used to calculate the required irrigation water requirements, as well as to simulate the monthly runoff for the Mokolo and Sterkstroom Rivers. The monthly runoff was converted to annual runoff for comparison with the annual EWRs specified by the DWS.

WRSM/Pitman is a mathematical model that simulates the movement of water through an interlinked system of catchments, river reaches, reservoirs, irrigation areas and mines. The model consists of five different types of modules (runoff, reservoir, irrigation, channel and mining) linked by means of routes. The routes represent lines along which water flows, such as river reaches. WRSM/Pitman has been used to analyse the hydrology on a monthly time

step, for a number of diverse applications, ranging from very small to very large catchments, varying in complexity from being totally undeveloped to highly developed. The model has been used throughout South Africa, SADC countries and in certain overseas countries. More details on the model can be obtained from the user manual (Pitman, Kakebeeke and Bailey, 2015).

WRSM/Pitman has been setup to simulate the monthly runoff for the Mokolo and Sterkstroom Rivers, for the period of October 1920 to September 2010, as part of the Water Resources of South Africa, 2012 Study (WR2012) (Bailey and Pitman, 2015). The model has been calibrated on river flow gauges on the Sterkstroom and Mokolo Rivers in the vicinity of the study area.

The irrigation module within WRSM/Pitman, was used to calculate the irrigation requirements for the crops, based on the information provided in Table 1-1, and the recommended crop factors from the WR90 study (Midgley, Pitman and Middleton, 1994). The irrigation requirements were simulated using climatic data for the area over the period of 1950 to 2009.

The simulated monthly runoff was extracted from WRSM/Pitman, to assess whether the runoff in the Mokolo and Sterkstroom Rivers meet the annual EWRs specified by the DWS.

### 3 ASSUMPTIONS AND LIMITATIONS

The following are assumptions and limitations for the study:

- The annual runoff was compared to the annual EWRs in this study, as the WRSM/Pitman model simulates monthly runoff, which is easily converted to annual runoff;
- The WRSM/Pitman model has been setup for the Mokolo and Sterkstroom Rivers for period of October 1920 to September 2010. Simulated river flows were therefore only available for this period.

### 4 IRRIGATION REQUIREMENTS

The simulated yearly irrigation requirements for the crops specified under Table 1-1, are indicated in Figure 4-1 to Figure 4-5. The minimum, average and maximum irrigation requirements over the simulation period (1950 – 2009) are summarised in Table 4-1.

Table 4-1: Summary of the minimum, average and maximum irrigation requirements over the simulation period

Dam Group	Simulated Minimum Irrigation Requirements (m <sup>3</sup> /year)	Simulated Average Irrigation Requirements (m <sup>3</sup> /year)	Simulated Maximum Irrigation Requirements (m <sup>3</sup> /year)
1	332 000	403 600	512 000
2	302 000	371 517	480 000
3	612 000	734 050	921 000
4	583 000	794 650	1 012 000
5	144 000	322 333	499 000

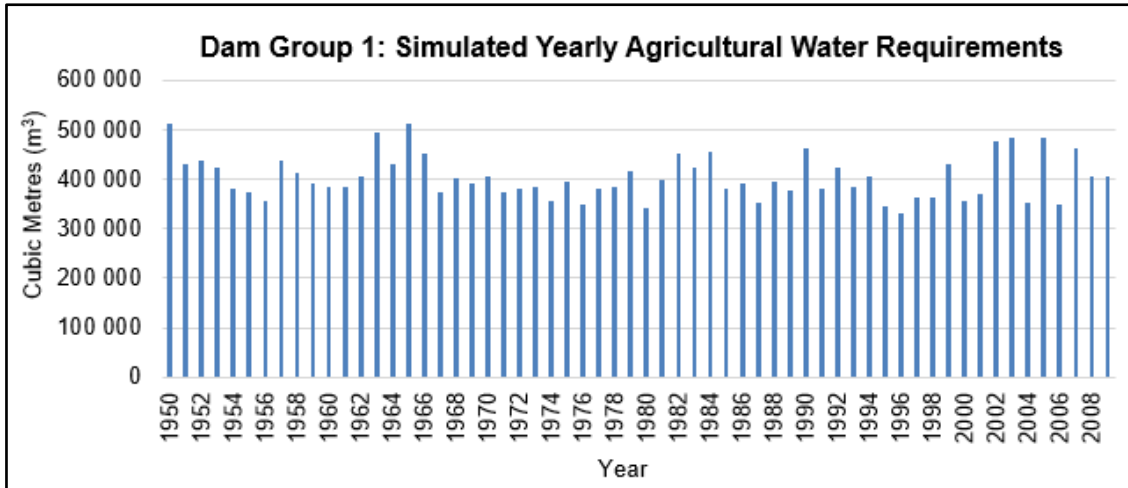


Figure 4-1: Simulated yearly water requirements for Dam Group 1 crops

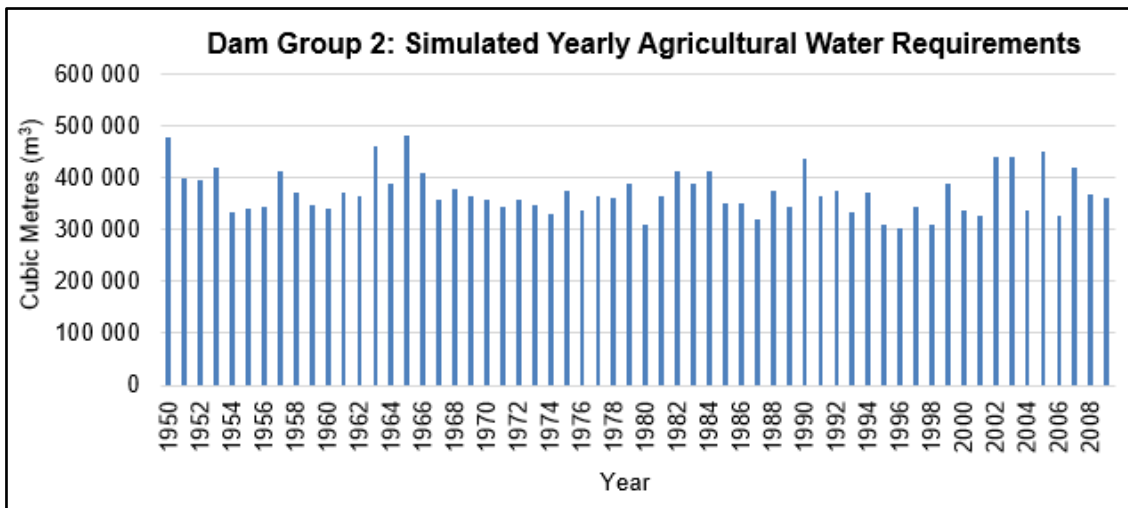


Figure 4-2: Simulated yearly water requirements for Dam Group 2 crops

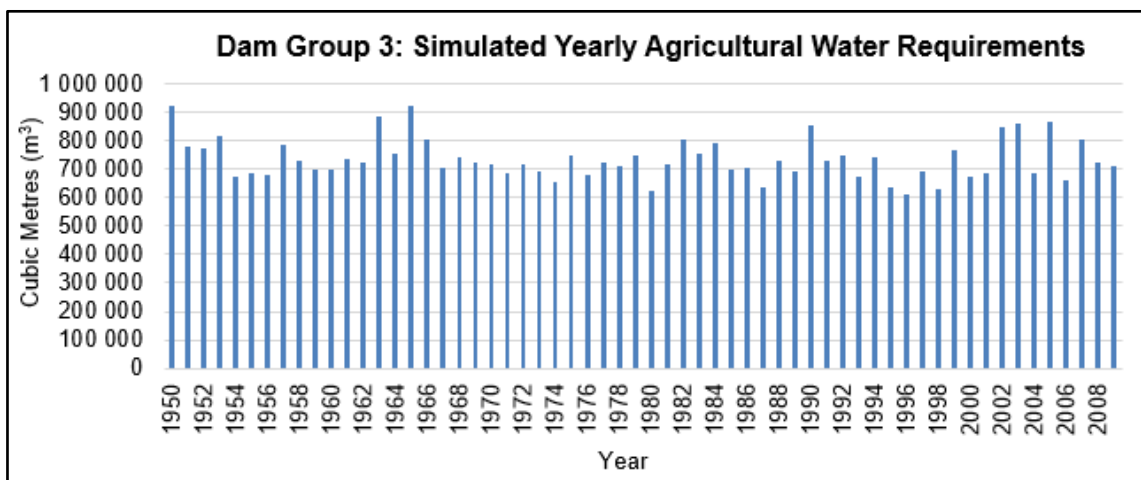


Figure 4-3: Simulated yearly water requirements for Dam Group 3 crops

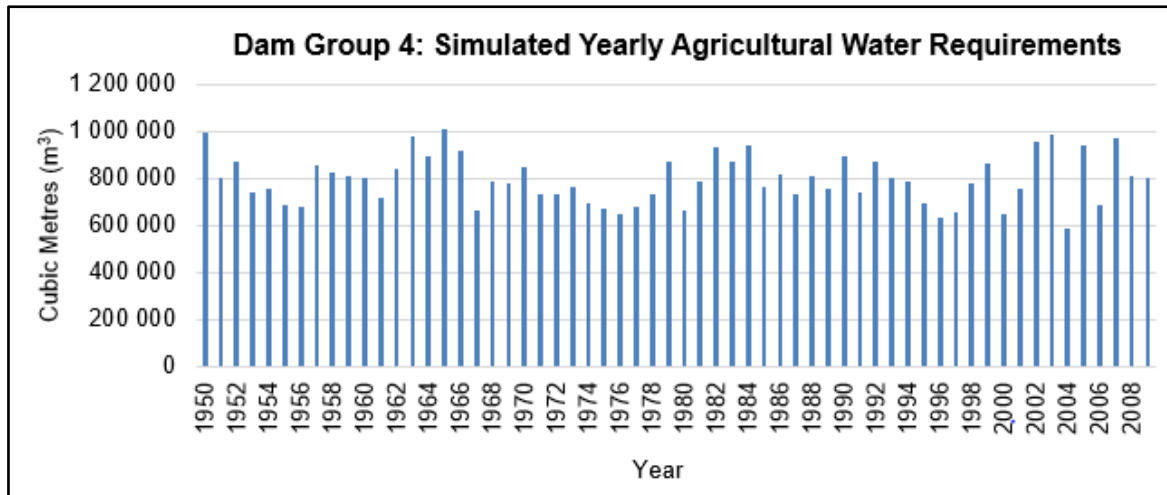


Figure 4-4: Simulated yearly water requirements for Dam Group 4 crops

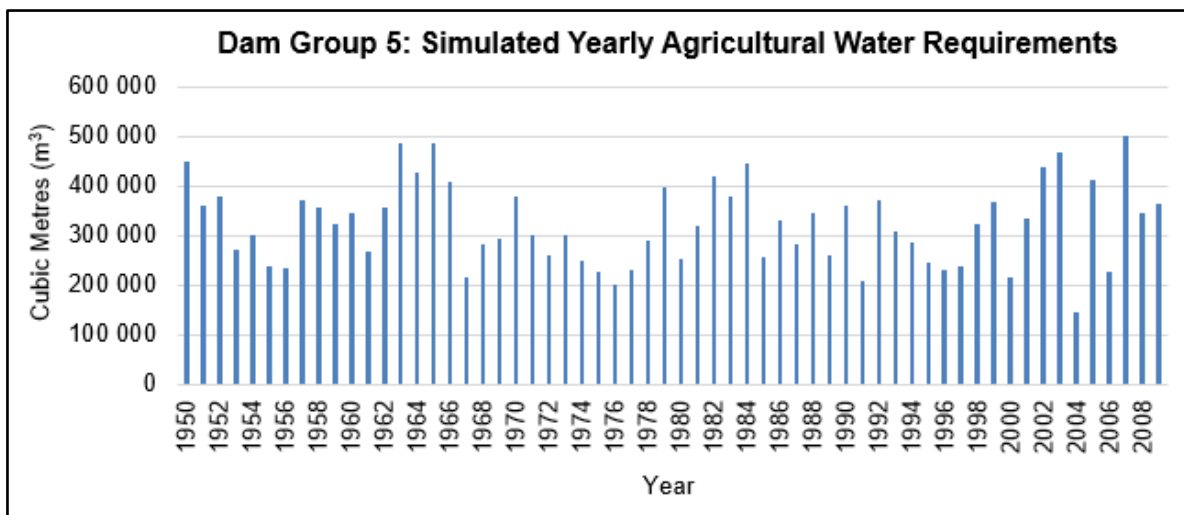


Figure 4-5: Simulated yearly water requirements for Dam Group 5 crops

## 5 ECOLOGICAL WATER REQUIREMENTS

The annual runoff for the Mokolo and Sterkstroom Rivers in comparison to the required annual EWRs, is indicated in Table 5-1 and Table 5-2 respectively. Drought years are highlighted in yellow, whilst runoff below the required EWRs are highlighted in red. A drought year was assumed to be a year where rainfall of less than 25 % of the annual average of 600 mm occurs. A drought year would therefore be a year where less than 450 mm of rainfall is received.

Table 5-1: Annual runoff for the Mokolo River compared to the required annual EWR

Year	Annual Rainfall (mm)	Required Annual EWR (million m <sup>3</sup> )	Mokolo River Annual Runoff (million m <sup>3</sup> )	Year	Annual Rainfall (mm)	Required Annual EWR (million m <sup>3</sup> )	Mokolo River Annual Runoff (million m <sup>3</sup> )
1921	889	18.36	349.55	1966	473	18.36	12.75
1922	555	18.36	89.79	1967	816	18.36	309.09
1923	597	18.36	379.04	1968	609	18.36	38.80
1924	686	18.36	93.02	1969	590	18.36	52.75
1925	698	18.36	294.66	1970	544	18.36	62.84
1926	467	18.36	43.54	1971	654	18.36	243.61
1927	569	18.36	63.17	1972	688	18.36	191.15
1928	566	18.36	71.63	1973	618	18.36	45.45
1929	719	18.36	70.59	1974	690	18.36	72.89
1930	498	18.36	39.62	1975	856	18.36	468.82
1931	676	18.36	80.59	1976	775	18.36	228.57
1932	449	18.36	26.94	1977	721	18.36	240.86
1933	485	18.36	27.92	1978	641	18.36	228.55
1934	519	18.36	39.89	1979	515	18.36	26.44
1935	308	18.36	11.18	1980	751	18.36	167.85
1936	755	18.36	92.84	1981	625	18.36	71.71
1937	736	18.36	217.29	1982	432	18.36	15.50
1938	445	18.36	60.50	1983	521	18.36	20.42
1939	731	18.36	222.11	1984	460	18.36	19.69
1940	757	18.36	170.82	1985	606	18.36	36.13
1941	419	18.36	117.62	1986	561	18.36	24.19
1942	678	18.36	95.04	1987	660	18.36	41.46
1943	704	18.36	84.72	1988	555	18.36	38.33
1944	708	18.36	299.67	1989	623	18.36	35.35
1945	357	18.36	22.95	1990	471	18.36	37.19
1946	682	18.36	297.05	1991	614	18.36	79.90
1947	554	18.36	66.50	1992	495	18.36	16.05
1948	594	18.36	58.52	1993	568	18.36	24.60
1949	613	18.36	74.03	1994	553	18.36	48.68
1950	373	18.36	31.21	1995	702	18.36	73.60
1951	605	18.36	60.10	1996	894	18.36	601.39
1952	506	18.36	26.50	1997	700	18.36	172.14
1953	666	18.36	320.79	1998	597	18.36	55.89
1954	624	18.36	89.95	1999	510	18.36	40.39
1955	804	18.36	423.23	2000	886	18.36	441.12
1956	716	18.36	162.64	2001	610	18.36	133.34
1957	627	18.36	73.00	2002	418	18.36	19.90
1958	558	18.36	30.50	2003	383	18.36	12.08
1959	573	18.36	46.49	2004	826	18.36	241.36
1960	594	18.36	103.73	2005	410	18.36	30.33
1961	649	18.36	88.31	2006	729	18.36	174.94
1962	537	18.36	32.07	2007	422	18.36	14.71
1963	433	18.36	18.46	2008	535	18.36	49.21
1964	477	18.36	26.23	2009	595	18.36	39.48
1965	348	18.36	10.86				

Table 5-2: Annual runoff for the Sterkstroom River compared to the required annual EWR

Year	Annual Rainfall (mm)	Required Annual EWR (million m <sup>3</sup> )	Sterkstroom Annual Runoff (million m <sup>3</sup> )	Year	Annual Rainfall (mm)	Required Annual EWR (million m <sup>3</sup> )	Sterkstroom Annual Runoff (million m <sup>3</sup> )
1921	889	22.87	96.01	1966	473	22.87	7.58
1922	555	22.87	27.56	1967	816	22.87	114.81
1923	597	22.87	82.26	1968	609	22.87	18.69
1924	686	22.87	43.30	1969	590	22.87	33.61
1925	698	22.87	79.45	1970	544	22.87	33.14
1926	467	22.87	13.10	1971	654	22.87	72.69
1927	569	22.87	30.82	1972	688	22.87	68.49
1928	566	22.87	38.05	1973	618	22.87	21.60
1929	719	22.87	39.18	1974	690	22.87	43.84
1930	498	22.87	25.77	1975	856	22.87	141.03
1931	676	22.87	42.74	1976	775	22.87	93.68
1932	449	22.87	9.77	1977	721	22.87	53.55
1933	485	22.87	9.41	1978	641	22.87	59.52
1934	519	22.87	17.30	1979	515	22.87	14.59
1935	308	22.87	3.56	1980	751	22.87	78.96
1936	755	22.87	56.26	1981	625	22.87	41.55
1937	736	22.87	83.19	1982	432	22.87	5.69
1938	445	22.87	34.23	1983	521	22.87	8.47
1939	731	22.87	61.52	1984	460	22.87	6.94
1940	757	22.87	42.07	1985	606	22.87	25.08
1941	419	22.87	42.08	1986	561	22.87	10.25
1942	678	22.87	35.48	1987	660	22.87	16.34
1943	704	22.87	40.05	1988	555	22.87	19.64
1944	708	22.87	77.49	1989	623	22.87	20.83
1945	357	22.87	6.31	1990	471	22.87	11.50
1946	682	22.87	90.97	1991	614	22.87	32.85
1947	554	22.87	12.38	1992	495	22.87	10.36
1948	594	22.87	26.11	1993	568	22.87	13.35
1949	613	22.87	36.44	1994	553	22.87	37.94
1950	373	22.87	8.13	1995	702	22.87	24.34
1951	605	22.87	26.05	1996	894	22.87	155.31
1952	506	22.87	8.62	1997	700	22.87	47.53
1953	666	22.87	83.17	1998	597	22.87	32.40
1954	624	22.87	39.79	1999	510	22.87	26.18
1955	804	22.87	119.90	2000	886	22.87	137.52
1956	716	22.87	64.73	2001	610	22.87	51.34
1957	627	22.87	35.78	2002	418	22.87	8.86
1958	558	22.87	21.26	2003	383	22.87	4.64
1959	573	22.87	24.37	2004	826	22.87	103.40
1960	594	22.87	42.77	2005	410	22.87	18.89
1961	649	22.87	53.94	2006	729	22.87	72.06
1962	537	22.87	21.15	2007	422	22.87	7.91
1963	433	22.87	9.64	2008	535	22.87	24.32
1964	477	22.87	16.26	2009	595	22.87	20.78
1965	348	22.87	4.61				

From the above, it is apparent that for the Mokolo River, the EWRs are mostly met on an annual basis, except during drought and low rainfall years, when it is expected that the annual runoff would be low.

For the Sterkstroom River, the EWR is not met on a number of occasions, going back as far as the 1930s, when abstractions from the river are expected to be low. This is the case even during normal rainfall years. The high EWR specified by the DWS for the Sterkstroom River (52.63 % of the natural mean annual runoff), appears to be unrealistic. A separate assessment indicated that the naturalised annual runoff (virgin catchment runoff i.e. no river abstractions or other human influences) for the Sterkstroom, was below the EWR on 28 occasions out of 90, between 1920 – 2009. A comparison between the annual runoff and EWR can therefore not be taken seriously, until the EWR is recalculated.

## 6 CONCLUSION AND RECOMMENDATIONS

In conclusion, the calculated irrigation requirements have been summarized in Table 4-1. In terms of the required annual EWR for the Mokolo River, this has mostly been met except during low rainfall and drought years. For the Sterkstroom River, the annual EWR has not been met on a regular basis, going back as far as the 1930s. The EWR specified for the Sterkstroom River appears to be high and unrealistic and should be reassessed.

The following is recommended:

- A catchment level study is undertaken to accurately determine the abstraction volumes from the Mokolo and Sterkstroom Rivers. This should involve a process whereby the crops and irrigation sources (river or borehole) for each farmer in the catchment is verified. If the abstraction volumes are monitored by the farmers, then these records should be obtained. The irrigation requirements can then be calculated and compared to the registered allocated volumes, to determine the lawful water use for each farmer. The WRSM/Pitman model should then be updated, to assess the impact of abstractions on river flows and the EWRs;
- The lawfulness of the water use for Portion 1 of Groendraai 213 KQ and Portion 2 of Inelkander 211 KQ, must be verified with the DWS;
- It is recommended that the pumps are metred and regularly monitored, to verify the volumes of water abstracted for irrigation from the rivers and boreholes; and
- It is recommended that a desktop reserve study is undertaken for the Sterkstroom River, as the current EWR set by the DWS is unrealistic.

---

## 7 REFERENCES

Pitman W.V., Kakebeeke J.P. and Bailey A.K. 2015. WRSM/Pitman Water Resources Simulation Model for Windows: User's Manual.

Bailey A.K. and Pitman W.V. 2015. Water Resources of South Africa, 2012 Study: Executive Summary. WRC Report K5/2143/1.

DWS. 2017. Proposed classes of water resource and resource quality objectives for Mokolo, Matlabas, Crocodile (west) and Marico catchments. Government Gazette No. 41310. 8 December 2017.

Midgley D.C., Pitman W.V. and Middleton B.J. 1994. Surface Water Resources of South Africa 1990. WRC Report No. 298/1/94 to 298/6.2/94. Water Research Commission, Pretoria, South Africa.



**APPENDIX E**

**PUBLIC PARTICIPATION INFORMATION**

**APPENDIX E\_1**  
**SITE NOTICES**

## NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Notice is given in terms of Regulations 39-44 of the Regulations published in Government Notice No. R982 of the 4<sup>th</sup> of December 2014 (as amended) and under section 24(5), read with section 44 of the National Environmental Management Act (NEMA) 1998 (Act No. 107 of 1998), of the intent to submit a Basic Assessment application for the proposed **Construction of a Dam for the Storage of Water** on Portion 1 of the Farm Groendraai 213 KQ. The proposed dam is situated on the eastern border of the Lephalale Local Municipality in the Vaalwater Area, Limpopo Province. The application will be submitted to the Polokwane office of the Limpopo Department of Economic Development, Environment and Tourism (LDEDET). A Basic Assessment Report will be submitted to the same in due course. In addition, a Water Use Licence Application (WULA) will also be lodged in terms of Section 21 and 22 of the National Water Act (NWA) (Act 36 of 1998). The activity includes;

### THE PROPOSED CONSTRUCTION OF A DAM FOR THE STORAGE OF WATER, PORTION 1 OF THE FARM GROENDRAAI 213 KQ VAALWATER AREA, LEPHALALE LOCAL MUNICIPALITY, LIMPOPO PROVINCE

#### Description of proposed activity:

Mr Thinus Maritz is applying for environmental authorization as required for the storing of water in a dam. The said farm portion is owned by Thinus Maritz Kranskloof (PTY) Ltd. of which Mr Maritz-(the Applicant) is a Co-Director. The application constitute the storing of the existing lawful water allocation in a dam on the said farm portion. The proposed infrastructure includes;

- ❖ A squire dam with compacted earth dam walls and lined with a plastic lining;
- ❖ Dam volume of 150 000m<sup>3</sup>;
- ❖ Covering an area of 3,062 hectares;
- ❖ Maximum dam wall height of 2,5 meters;
- ❖ Associated outlet infrastructure.

**PLEASE NOTE:** This application does **NOT** constitute an application for the taking of additional water but only for the storing of the existing lawful water allocation in a dam on the said farm portion.

#### Location:

The application site is located 18km's to the west of Vaalwater in the Lephalale Local Municipality, Limpopo Province. The dam is situated on Portion 1 of the Farm Groendraai 213 KQ.

#### Name of Applicant:

Thinus Maritz Vaalwater (PTY) Ltd.  
 PO Box 103, Vaalwater, 0530

#### Name of Environmental Assessment Practitioner:

**SPOOR Environmental Services (PTY) Ltd.**

J.C. van Rooyen  
 Postnet Suite 448  
 Private Bag X025  
 Lynnwood Ridge  
 0040

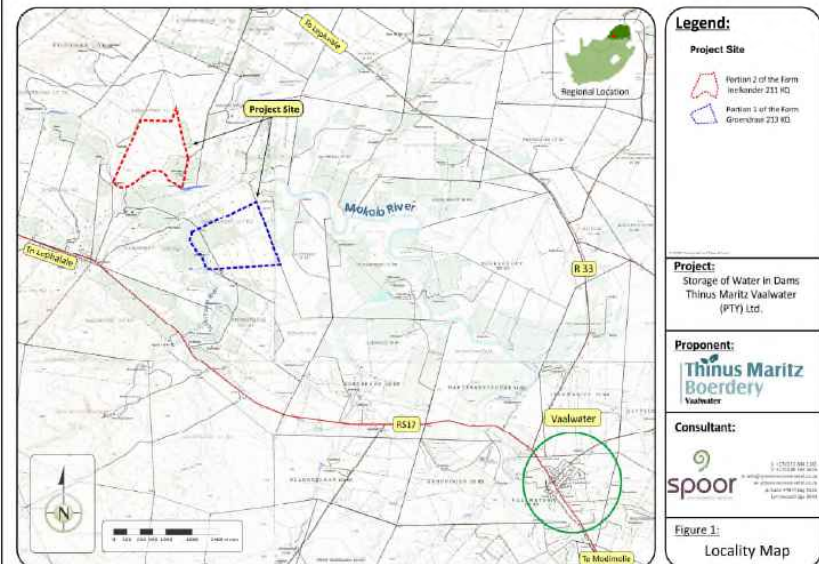
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#### Date of Publication of Press Advertisement:

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Interested and affected parties (I&APs) are invited to provide written comments on the proposed development. I&APs must provide their comments together with their name, contact details (preferred method of notification, e.g., e-mail address or fax number) and an indication of any direct business, financial, personal, or other interest which they have in the application. Comments must be sent to the environmental assessment practitioner indicated above on or before the 22<sup>nd</sup> of November in terms of the BA process and the 14<sup>th</sup> of January 2022 in terms of the WULA process.

#### Locality Map:





**APPENDIX E\_2**

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**PUBLIC NOTICE**

**FINAL MODIMOLLE-MOOKGOPHONG LOCAL  
MUNICIPALITY SPATIAL DEVELOPMENT  
FRAMEWORK (SDF)**

Notice is hereby given in terms of Section 20(1) of the Spatial Planning and Land Use Management Act, 2013 (Act No.16 of 2013), read together with Section 8(8) of the Modimolle- Mookgophong Spatial Planning and Land Use Management By-Law (2019). That the Council of Modimolle-Mookgophong Local Municipality has adopted the Final Municipal Spatial Development Framework (SDF) on 1 October 2021.

The Municipal Spatial Development Framework represents the spatial development vision of the municipality, and guides planning and development decisions of the municipality.

The Final Municipal Spatial Development Framework is available on the municipal website at [www.modimolle.gov.za](http://www.modimolle.gov.za). The Final Municipal Spatial Development Framework is also available at all municipal libraries in Modimolle and Mookgophong, and the municipal offices located at Modimolle, Mookgophong and Vaalwater.

For enquiries, contact M D Sinthumule at [sinthumuled@modimolle.gov.za](mailto:sinthumuled@modimolle.gov.za) or 014 718 2031.

**PROVIDE**  
Description of proposed activity: MR THINUS MARITZ is applying for environmental authorisation as required for the clearing of water on a dam. The said dam project is owned and owned by MR MARITZ - the Applicant. The application includes the setting of the existing water away allocation on a dam on the said farm. The proposed environmental authorisation includes:  
A new dam with a capacity of 100,000m<sup>3</sup> covering an area of 1,583 hectares.  
Maximum dam wall height of 2,5 metres.  
Associated building structures.  
**PLEASE NOTE:** This authority does not constitute an application for the taking of additional water but only for the storage of the existing water allocation on a dam on the said farm. Location:  
The applicant site is located 10km to the west of Vaalwater in the Lephalale Local Municipality, Limpopo Province. The dam is situated on portion 1 of the farm Groendraai 213 KQ.  
Name of Applicant: THINUS MARITZ, Naturalist, Vaalwater (PTY) Ltd.  
P.O. Box 101, Vaalwater, 0201  
Name of Environmental Assessment Practitioner: SPOOR ENVIRONMENTAL SERVICES (PTY) LTD  
Environmental Assessment Practitioner:  
MR JC VAN ROOYEN  
Private Suite 402, Private Bag 402, Lephalale, 0202  
Tel: 014 804 1187, Fax: 014 804 1434, E-Mail: [jc@spoorenvironmental.co.za](mailto:jc@spoorenvironmental.co.za)  
Date of publication of newspaper advertisement: 20 October 2021 Die Pos, newspaper and affected parties (IAAPs) are invited to provide written comments on the proposed development IAAPs must provide their comments together with their name, contact details (preferred method of contact), e.g. e-mail address or fax number and an indication of any other business, financial, personal or other interest which they have in the application. Comments must be sent to the environmental assessment practitioner indicated above on or before the 20th of November in terms of the BA process and the 31st of January 2022 in terms of the WIA process.  
M.M.C. (2021/08/0005)

**SOEK 'N WERK** Die Pos maak opsoek na werkers op ons kletsopies-ediërye.



Roelf Vorster, skoolhoof van Laerskool Nylstroom in Modimolle, het op sy verjaardag, Dinsdag 12 Oktober, 'n groot verrassing gebring toe die 2021-leiers vroegoggend vir hom 'n erewag gevorm het. Die personeel en lede van die beheerliggaam het heerlike verskaf en elke klas in die skool het saam partytjie gehou met heerlike koek en koolwyntjies.

**Bela-Bela Local Municipality**

Chris Hani Drive, Bela-Bela, Limpopo: Private Bag X1609 Bela-Bela 0480  
Tel: 014 736 8000 Fax: 014 736 3288 Website: [www.belabela.gov.za](http://www.belabela.gov.za)

**NOTICE  
ORDINARY MUNICIPAL  
COUNCIL MEETING**

NOTICE IS HEREBY GIVEN IN TERMS OF SECTION 18(2) OF THE LOCAL GOVERNMENT: MUNICIPAL STRUCTURES ACT NO 117 OF 1998 AS AMENDED THAT THE VIRTUAL (ZOOM) ORDINARY MUNICIPAL COUNCIL MEETING WILL BE HELD ON THURSDAY, 28TH OF OCTOBER 2021 AT 10:00 AS PER THE STANDING RULES AND ORDERS.

COUNCILLOR MOELETSI RZ  
SPEAKER

NOTICE NUMBER: 88/21

**Notice of a Section 24G Rectification under the National Environmental Management Act (no 107 of 1998)**

**Applicant:**  
Imerys Refractory Minerals South Africa (Pty) Ltd: Rhino Antalusite Mine.

**Location of the activities:**  
Portion 3 of the farm Groenfontein 352 KQ, Waterberg District Municipality, Thabazimbi Local Municipality, Limpopo Province.

**Nature of proposed activity, applicable legislation, and listed activity applied for:**

- National Environmental Management Act No. 107 of 1998 (NEMA), Activity 34 of GN 983 of 2014 (as amended) - The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent, or pollution.
- Please note that a separate Atmospheric Emissions Licence (AEL) application is also done.

**Competent authority and relevant reference number:**  
Section 24G application and report:  
DMR reference number - 74MRC

**Register as an interested and affected party (IAAP):**  
To register as an IAAP of this project, to obtain more information, or submit comments, please request a Registration Form from BECS Environmental and return it to the details provided below, on or before the 22nd of November 2021. There will be no public meeting held due to Covid-19.

**Contact details for more information:**  
To obtain additional information, please contact the Environmental Assessment Practitioner (EAP) at the details provided below:  
BECS Environmental (Pty) Ltd,  
Aqeelah Carrim Janoo, (Call) 079 772 0102, email: [aqeelah@becsenv.co.za](mailto:aqeelah@becsenv.co.za)

Die toptienatlete van Laerskool Nylstroom het op Saterdag 16 Oktober aan die Laerskool Elandus Erasmus-atletiekbyeenkoms op die baan van Hoërskool Hans Strijdom in Mookgophong deelgeneem. Altesame 17 laerskole van Limpopo en Gauteng het deelgeneem. Volgens die afrigters het die Klein Nylies se atleetspanne besonder goed gevaar. Op die foto is Danelie Roos wat met 'n hoogte van 1,39 m in die hoogspring die trofee vir die beste springatleet van die byeenkoms ontvang het.



**"LIKE"**

Die Pos se Facebook-blad (by Die Pos-koerant).

WORD DEEL VAN ONS WERELD.

**MotorPos**

MotorPos verskyn elke eerste Vrydag van die maand.

Vir toestelbestuur, motordae, 4x4-roetes ensovoorts kontak vir Maria Oberholzer (082 558 7184) of Lesley Bernard (072 795 1989) in Bela-Bela en vir Petrus Greeff (082 421 4429) in Modimolle.

## **APPENDIX E\_3**

WRITTEN NOTICES ISSUED TO

I&APs



spoor reference: 15/10 tmaritz kranskloof\_ba&wul

date: 22<sup>nd</sup> of October 2021

## BACKGROUND INFORMATION DOCUMENT

### THE PROPOSED CONSTRUCTION OF A DAM FOR THE STORAGE OF WATER, THINUS MARITZ VAALWATER (PTY) LTD., PORTION 1 OF THE FARM GROENDRAAI 213 KQ VAALWATER AREA, LEPHALALE LOCAL MUNICIPALITY, LIMPOPO PROVINCE

#### 1. INTRODUCTION

The purpose of this Background Information Document (BID) is to provide information to potential Interested and/or Affected Parties (I&APs) regarding the proposed construction and operation of a dam for the storage of water. The proposed dam will be situated 18km's to the west of Vaalwater on portion 1 of the farm Groendraai 213- KQ, Lephale Local Municipality, Limpopo Province. See locality map attached.

An application for environmental authorization (Basic Assessment Process (BA)) for the proposed dam will be made in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and the associated 2014 regulations, as amended. The application will be submitted to the Polokwane offices of the Limpopo Department of Economic Development, Environment and Tourism (LDEDET). In addition, a Water Use Licence Application will also be submitted to the Department of Water and Sanitation (DWS) in terms of Section 21(c) and (i) of the National Water Act, 1998, (Act 36 of 1998).

**PLEASE NOTE:** The aforementioned applications do **NOT** constitute applications for the taking/abstracting of additional water but only for the storing of the existing lawful water allocation in a dam on the said farm portion. This application furthermore constitutes an effort to relocate the proposed dam from an original position alongside the Sterkstroom River to a position further away to satisfy the requirements of the DWS.

This BID explains the proposed project and the regulatory processes that will need to be complied with, while providing I&APs with the opportunity to:

- ❖ Register as stakeholders in the public participation process; and
- ❖ Make comments on and contribute to the proposed project.

#### 2. LOCATION:

The proposed dam will be situated 18km's to the west of the town of Vaalwater on portion 1 of the farm Groendraai 213- KQ, Lephale Local Municipality, Limpopo Province. See locality map attached.

#### 3. PROJECT DESCRIPTION AND BACKGROUND

The application constitute the storing of the existing lawful water allocation in a dam on the said farm

portion. The proposed infrastructure includes;

- ❖ A squire dam with compacted earth dam walls and lined with a plastic lining;
- ❖ Dam volume of 150 000m<sup>3</sup>;
- ❖ Covering an area of 3,062 hectares;
- ❖ Maximum dam wall height of 2,5 meters;
- ❖ Associated outlet infrastructure.

Original applications was lodged with the LDEDET and the DWS in terms of a set of dam for the Thinus Maritz Vaalwater (PTY) Ltd. farming operations. As part of this applications, application was also made for the clearance of the area where said dam would have been located as well as for the proposed dam itself. The original application area was in a position of an existing dam which was to be enlarged. The DWS was however not satisfied with this location and the Applicant decided to relocate the proposed dam to a position further away from the Sterkstroom River to the current proposal site.

#### **4. LISTED ACTIVITIES IN TERMS OF NEMA (ACT 107 OF 1998)**

In terms of Sections 24 and 24(D) of NEMA, as read with Government Notice R 982, R 983, R 984, and R 985 of the 8<sup>th</sup> of December 2014 (as amended), environmental authorisation is required for the following listed activities:

- ❖ NEMA (Act 107 of 1998) GN 983 Listing Notice 1 (8<sup>th</sup> of December 2014) - Activity 13

A new Water Use Licence Application will also be submitted to the Department of Water and Sanitation in terms of Section 21(c) and (i) of the National Water Act, 1998, (Act 36 of 1998). The infrastructure falls under the following listed activities in terms of Section 21 and 22 of the National Water Act (NWA), 1998 (Act 36 of 1998);

- ❖ Section 21(a) – Abstraction of water
- ❖ Section 21(b) – Storing of water
- ❖ Section 21(c) – Impeding or diverting the flow of water in a watercourse
- ❖ Section 21(i) – Altering the bed, banks, course, or characteristics of a watercourse

**PLEASE NOTE:** During the original WUL application, one of the Dams applied for (Dam 8 or Plastiekdam S1) was accidentally omitted from being licenced the DWS. The re-application for this dam is also included in the current application.

#### **5. DETAILS OF THE APPLICANT**

**Project Applicant:** Thinus Maritz Vaalwater (PTY) Ltd

**Contact person:** Mr. Thinus Maritz

**Postal Address:** PO Box 1034, Vaalwater, 0530

#### **6. WHAT IS A BA**

In order for the Applicant to commence with the proposed construction activities, a Basic Assessment (BA) process must be conducted, and a Basic Assessment Report (BAR) submitted to the competent authority (LDEDET) in support of the application. The BA process is a well-defined and regulated process in terms of

the NEMA, involving technical and scientific specialist studies, impact assessment and public participation to identify issues of concern and to evaluate the environmental and socio-economic impacts of a proposed project.

The product of an BA is a report (BAR), which must:

- ❖ Identify the potential impacts of the proposed activity;
- ❖ Outline the public participation process undertaken;
- ❖ Illustrate the issues, concerns and suggestions raised by I&APs; and
- ❖ Outline the environmental management and mitigation measures that must be taken to avoid or reduce negative impacts and enhance positive impacts.

## **7. PUBLIC PARTICIPATION**

The public participation process will enable I&APs to influence the course of the technical investigations and to review the findings of the independent studies that are undertaken. The EAP will correspond directly with registered I&APs at various stages during the process to keep them informed of opportunities to be involved. The steps in the public participation process are outlined below;

- ❖ Letters of invitation accompanied by this BID and a comment sheet to be distributed to adjacent landowners of the proposed development, key individuals, and organisations, announcing the project, and inviting their comment;
- ❖ Advertisements will be placed in a local newspaper (Die Pos) announcing the proposed project and providing opportunity to comment;
- ❖ A Site notice will be erected on the property boundary in accordance with the requirements of the 2014 EIA Regulations;
- ❖ Key stakeholders in the area will be informed via telephone, mail, e-mail, or facsimile;
- ❖ All issues received from stakeholders will be captured in the comments and response report which will be used to screen and prioritise issues for evaluation.

## **8. REGISTRATION**

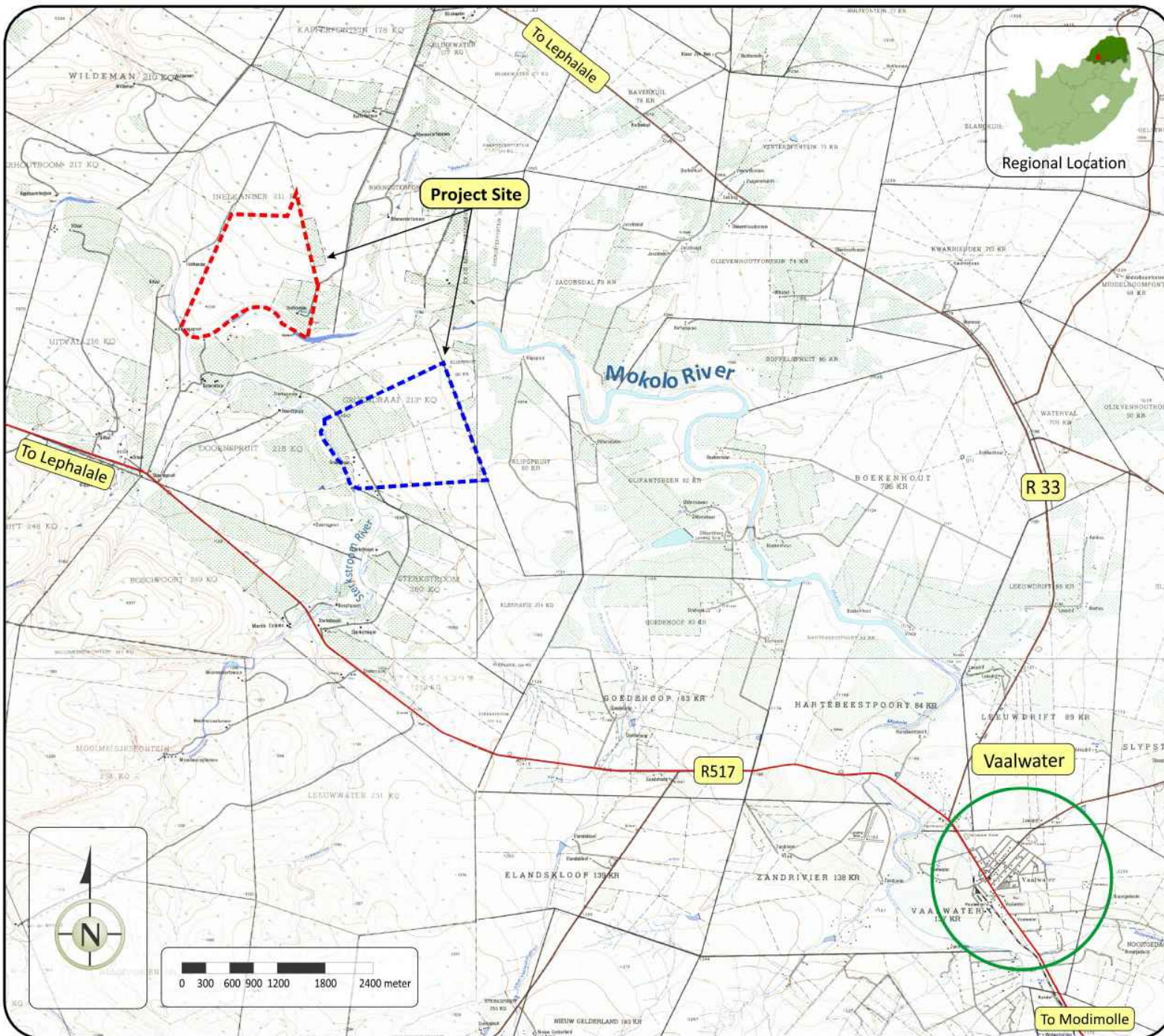
To ensure that you are registered as an interested and/or affected party (I&AP), or if you require further information on the application and/or activity, please submit your name, contact information, interest and relevant issues in the matter on the form attached to this BID within 30 days (in terms of the BA process) and 60 days (in terms of the WULA process) of receipt of this information (22<sup>nd</sup> of October 2021) in terms of the NEMA (Act 107 of 1998) regulations.

Please do not hesitate to contact us should you require additional information.

Kind regards.

---

JC van Rooyen  
Environmental Assessment Practitioner (EAP)



## Legend:

### Project Site

-  Portion 2 of the Farm Inelkander 211 KQ
-  Portion 1 of the Farm Groendraai 213 KQ

242788 Topographical Map Sheets

### Project:

Storage of Water in Dams  
Thinus Maritz Vaalwater  
(PTY) Ltd.

### Proponent:

  
Vaalwater


### Consultant:

  
 t: +27(0)12 804 1181  
 f: +27(0)86 763 5635  
 e: info@spoorenvironmental.co.za  
 w: spoorenvironmental.co.za  
 p: Suite 448 P/Bag X025  
 Lynnwoodridge 0040

### Figure 1:

Locality Map

**REGISTRATION AND COMMENT SHEET**

<p align="center"><b>INVITATION TO PARTICIPATE:</b> Basic Assessment Application and Water Use Licencing Process for the:</p> <p align="center"><b>THE PROPOSED CONSTRUCTION OF A DAM FOR THE STORAGE OF WATER, THINUS MARITZ VAALWATER (PTY) LTD., PORTION 1 OF THE FARM GROENDRAAI 213 KQ VAALWATER AREA, LEPHALALE LOCAL MUNICIPALITY, LIMPOPO PROVINCE</b></p> <p align="center">October 2021</p>	<div align="center">  <p>t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 e: info@spoorenservices.co.za w: www.spoorenservices.co.za a: Postnet Suite 448, Private Bag X025 Lynnwood Ridge, 0040, Pretoria, South Africa</p> <p><b>Environmental Assessment Practitioner</b> Contact Person: Mr. JC van Rooyen E mail: jcvr@spoorenservices.co.za</p> </div>
---	--

<b>TITLE</b>		<b>FIRST NAME</b>	
<b>INITIALS</b>		<b>SURNAME</b>	
<b>ORGANISATION</b>			
<b>POSTAL ADDRESS</b>			
		<b>POSTAL CODE</b>	
<b>LAND LINE TEL NO</b>		<b>CELL NO</b>	
<b>FAX NO</b>		<b>EMAIL</b>	

Please formally register me as an interested and affected party (I&AP) during this BA process.	YES	NO
I would like my notifications and documents for comment as follows:		
LETTER (MAIL)	E-MAIL	FAX
ON CD	INTERNET	
In terms of this Public Participation process I disclose below any direct business, financial, personal, or other interest that I may have in the approval or refusal of the application:		
.....		
.....		

**COMMENTS** (please use separate sheets to add additional information)

I suggest that the following issues of concern be investigated:

.....

I suggest the following for the public participation process:

.....

Any other comments:

.....

I/we request the following person/s also to be contacted as I&APs for this process (please include sufficient contact details i.e., email address, telephone number, postal address, etc.):

.....

.....

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

ADJACENT LANDOWNERS

**List of REGISTERED LETTERS**  
**Lys van GEREGEREERDE BRIEWE**  
 (with an insurance option/met 'n versekeringsopsie)



Post Office

**Full tracking and tracing/Volledige volg en spoor**

Name and address of sender: *Star Environmental Services*  
 Naam en adres van afsender: *Star Environmental Services*  
*Postnet Suite 448, Protea Bay x025*  
*Lynnwood Ridge 0040*

Enquiries/Navrae  
 Sharecall  
 number/nommer  
**0860 111 502**  
 www.postoffice.co.za

No	Name and address of addressee Naam en adres van geadreseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-Kliëntafskrif
1	<i>West Dues Properties (PTY) Ltd. PO Box 2473, Pretoria, 0001</i>					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za <b>RC282580083ZA</b> CUSTOMER COPY 301028R
2	<i>Moss River Game Farm P.O. Box 3 Udalwater 0530</i>					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za <b>RC282580070ZA</b> CUSTOMER COPY 301028R
3						
4						
5						
6						
7						
8						
9						
10						

Number of letters posted *2 / Two* Total  
 Getal briewe gepos *2 / Two* Totaal

R R R R

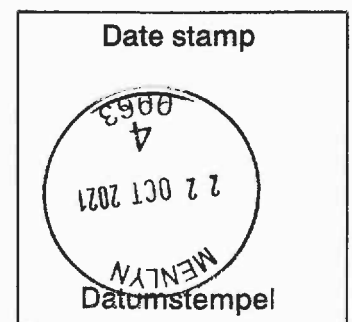
Signature of client  
 Handtekening van kliënt.....

Signature of accepting officer  
 Handtekening van aanneembeampte.....

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100.00. No compensation is payable without documentary proof.

Optional insurance of up to R200.00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100.00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000.00 is beskikbaar en is slegs in-landse geregistreerde briewe van toepassing.



**WARD COUNCILLOR**



---

## Assistance with Ward Councillor Detail: Councillor Ward 5 Lephale Local Municipality

---

JC van Rooyen <jcvr@spoorensvironmental.co.za>

Thu, Nov 11, 2021 at 4:21 PM

To: Bertie van Zyl <munic@lephalale.gov.za>, Riekie Coetzee <Riekie.coetzee@lephalale.gov.za>

Good day,

I sincerely hope you can assist me. I am looking for the contact details of the ward councillor of ward 5 of the Lephale local municipality. By law (NEMA Act 107 of 1998) I need to get a notice through to the Councillor.

Kind regards.



### JC van Rooyen (Director)

Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932 e: [jcvr@spoorensvironmental.co.za](mailto:jcvr@spoorensvironmental.co.za)

t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 w: [www.spoorensvironmental.co.za](http://www.spoorensvironmental.co.za)

a: Postnet Suite 448, Private Bag X025 Lynnwood Ridge, 0040, South Africa

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## Assistance with Ward Councillor Detail: Councillor Ward 5 Lephale Local Municipality

---

JC van Rooyen <jcvr@spoorenvironmental.co.za>

Thu, Nov 11, 2021 at 4:29 PM

To: Nozi Molteno <nmolteno@waterberg.gov.za>, nozibele.molteno@hotmail.com

Good day,

I sincerely hope you can assist me. I am looking for the contact details of the ward councillor of ward 5 of the Lephale local municipality. By law (NEMA Act 107 of 1998) I need to get a notice through to the Councillor.

Kind regards



### JC van Rooyen (Director)

Pr LA Techno M.Sc (Env Soc) SACLAP

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---

## Assistance with Ward Councillor Detail: Councillor Ward 5 Lephalale Local Municipality

---

JC van Rooyen <jcvr@spoorensvironmental.co.za>  
To: Station Manager <Lim.vaalwater.unif@saps.gov.za>

Thu, Nov 11, 2021 at 4:30 PM

Good day,

I sincerely hope you can assist me. I am looking for the contact details of the ward councillor of ward 5 of the Lephalale local municipality. By law (NEMA Act 107 of 1998) I need to get a notice through to the Councillor.

Kind regards.



### JC van Rooyen (Director)

Pr LA Techno M.Sc (Env Soc) SACLAP

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---

## Assistance with Ward Councillor Contact Detail: Councillor Ward 5 Lephalale Local Municipality

---

JC van Rooyen <jcvr@spooenvironmental.co.za>

Thu, Nov 11, 2021 at 4:50 PM

To: maria.molko@lephalale.gov.za, Frans.Mabotja@lephalale.gov.za, Victor.Monyepao@lephalale.gov.za

Good day,

I sincerely hope you can assist me. I am looking for the contact details of the ward councillor of ward 5 of the Lephalale local municipality. By law (NEMA Act 107 of 1998) I need to get a notice through to the Councillor.

Kind regards.



### JC van Rooyen (Director)

Pr LA Techno M.Sc (Env Soc) SACLAP

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LOCAL AUTHORITY

---

## NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: STORAGE OF WATER IN A DAM - THINUS MARITZ VAALWATER (PTY) LTD.

---

JC van Rooyen <jcvr@spoorensvironmental.co.za>

Fri, Oct 22, 2021 at 8:00 AM

To: Edith Tukakgomo <Edith.Thukakgomo@lephalale.gov.za>, Bertie van Zyl <munic@lephalale.gov.za>, Maria Cocquyt <mariacocquyt720@gmail.com>, Riekie Coetzee <Riekie.coetzee@lephalale.gov.za>, Thomas Tshivhandekano <Thomas.Tshivhandekano@lephalale.gov.za>, Rudzani.Ngobeli@lephalale.gov.za, Nozi Molteno <nmolteno@waterberg.gov.za>, Station Manager <Lim.vaalwater.unif@saps.gov.za>

Dear Interested and/or Affected Party,

Attached, please find the Background Information Document (BID) regarding the proposed Construction of a Dam for the Storage of Water for Irrigation, in terms of Section 24(G) and 24(F) of the National Environmental Management Amendment Act (NEMA) (as amended) as well as Sections 21 & 22 of the National Water Act (NWA). The purpose of this BID is to notify potential Interested and/or Affected Parties (I&APs) of the proposed project and to provide an opportunity to participate in the process. Also note that the proposed project is in the Notification stage and that more detail in terms of the project will be provided in the Draft Basic Assessment Report that will be made available for review and comment.

**PLEASE NOTE:** The application's related to this notification are **NOT** for additional abstraction of water or for the building of additional dams but for the relocation of a dam that were already applied for but not constructed and to reapply for a second dam that was accidentally omitted from licencing during the original applications.

Kindly confirm receipt of the BID and your intention to register as an interested and/or affected party (I&AP) by filling out the Registration and Comment sheet attached to the BID. Also contact us for any additional information that you may require.

Kind regards



**JC van Rooyen (Director)**

Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932 e: [jcvr@spoorensvironmental.co.za](mailto:jcvr@spoorensvironmental.co.za)

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**2021-10-22 Thinus Maritz Kranskloof BID.pdf**  
1759K

STATE DEPARTMENTS

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**NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: STORAGE OF WATER IN A DAM - THINUS MARITZ VAALWATER (PTY) LTD.**

---

JC van Rooyen &lt;jcvr@spoorensvironmental.co.za&gt;

Fri, Oct 22, 2021 at 8:00 AM

To: Pulane Matswi <MatswiP@dws.gov.za>, Love Hlekane <HlekaneL@dws.gov.za>, PP Mokgadi <Malulekeev@ledet.gov.za>, Jackie Phosa <phosamj@gmail.com>, Jackie Phosa <phosamj@agric.limpopo.gov.za>, Nokukhanya Khumalo <nkhumalo@sahra.org.za>, Ms Maphuti Ramalla <maphuti.ramalla@drrlr.gov.za>, newsroom@dpw.gov.za

Dear Interested and/or Affected Party,

Attached, please find the Background Information Document (BID) regarding the proposed Construction of a Dam for the Storage of Water for Irrigation, in terms of Section 24(G) and 24(F) of the National Environmental Management Amendment Act (NEMA) (as amended) as well as Sections 21 & 22 of the National Water Act (NWA). The purpose of this BID is to notify potential Interested and/or Affected Parties (I&APs) of the proposed project and to provide an opportunity to participate in the process. Also note that the proposed project is in the Notification stage and that more detail in terms of the project will be provided in the Draft Basic Assessment Report that will be made available for review and comment.

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Kind regard

**JC van Rooyen (Director)**

Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932 e: [jcvr@spoorensvironmental.co.za](mailto:jcvr@spoorensvironmental.co.za)t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 w: [www.spoorensvironmental.co.za](http://www.spoorensvironmental.co.za)

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**2021-10-22 Thinus Maritz Kranskloof BID.pdf**  
1759K



## SERVICES PROVIDERS

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## NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: STORAGE OF WATER IN A DAM - THINUS MARITZ VAALWATER (PTY) LTD.

---

JC van Rooyen &lt;jcvr@spoorenvironmental.co.za&gt;

Fri, Oct 22, 2021 at 8:00 AM

To: Vuyo Nyamane &lt;NyamanVP@eskom.co.za&gt;, marellem@eskom.co.za

Dear Interested and/or Affected Party,

Attached, please find the Background Information Document (BID) regarding the proposed Construction of a Dam for the Storage of Water for Irrigation, in terms of Section 24(G) and 24(F) of the National Environmental Management Amendment Act (NEMA) (as amended) as well as Sections 21 & 22 of the National Water Act (NWA). The purpose of this BID is to notify potential Interested and/or Affected Parties (I&APs) of the proposed project and to provide an opportunity to participate in the process. Also note that the proposed project is in the Notification stage and that more detail in terms of the project will be provided in the Draft Basic Assessment Report that will be made available for review and comment.

**PLEASE NOTE:** The application's related to this notification are **NOT** for additional abstraction of water or for the building of additional dams but for the relocation of a dam that were already applied for but not constructed and to reapply for a second dam that was accidentally omitted from licencing during the original applications.

Kindly confirm receipt of the BID and your intention to register as an interested and/or affected party (I&AP) by filling out the Registration and Comment sheet attached to the BID. Also contact us for any additional information that you may require.

Kind regards.

**JC van Rooyen (Director)**

Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932 e: [jcvr@spoorenvironmental.co.za](mailto:jcvr@spoorenvironmental.co.za)t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 w: [www.spoorenvironmental.co.za](http://www.spoorenvironmental.co.za)

a: Postnet Suite 448, Private Bag X025 Lynnwood Ridge, 0040, South Africa

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**2021-10-22 Thinus Maritz Kranskloof BID.pdf**

1759K

NGO'S, CBO'S, CONSERVANCIES, RESIDENT ASSOCIATIONS ETC.

---

## NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: STORAGE OF WATER IN A DAM - THINUS MARITZ VAALWATER (PTY) LTD.

---

JC van Rooyen <jcvr@spoorensvironmental.co.za>

Fri, Oct 22, 2021 at 8:00 AM

To: Ian van der Merwe <mogbes@xsinet.co.za>, Ben Mostert <benmostert@gmail.com>, Dr Rupert Baber <rupertbaber@yebo.co.za>, info@welgevonden.org, Ian van der Merwe <ianjvdm@gmail.com>, vlw.wua@gmail.com

Dear Interested and/or Affected Party,

Attached, please find the Background Information Document (BID) regarding the proposed Construction of a Dam for the Storage of Water for Irrigation, in terms of Section 24(G) and 24(F) of the National Environmental Management Amendment Act (NEMA) (as amended) as well as Sections 21 & 22 of the National Water Act (NWA). The purpose of this BID is to notify potential Interested and/or Affected Parties (I&APs) of the proposed project and to provide an opportunity to participate in the process. Also note that the proposed project is in the Notification stage and that more detail in terms of the project will be provided in the Draft Basic Assessment Report that will be made available for review and comment.

**PLEASE NOTE:** The application's related to this notification are **NOT** for additional abstraction of water or for the building of additional dams but for the relocation of a dam that were already applied for but not constructed and to reapply for a second dam that was accidentally omitted from licencing during the original applications.

Kindly confirm receipt of the BID and your intention to register as an interested and/or affected party (I&AP) by filling out the Registration and Comment sheet attached to the BID. Also contact us for any additional information that you may require.

Kind regards.



**JC van Rooyen (Director)**

Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932 e: [jcvr@spoorensvironmental.co.za](mailto:jcvr@spoorensvironmental.co.za)

t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 w: [www.spoorensvironmental.co.za](http://www.spoorensvironmental.co.za)

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---

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## **APPENDIX E\_4**

### COMMUNICATIONS TO AND FROM I&APs

ADJACENT LANDOWNERS

WARD COUNCILLOR



JC van Rooyen <jcvr@spoorensvironmental.co.za>

---

## Assistance with Ward Councillor Detail: Councillor Ward 5 Lephale Local Municipality

---

Riekie Coetzee <Riekie.Coetzee@lephale.gov.za>  
To: JC van Rooyen <jcvr@spoorensvironmental.co.za>

Mon, Nov 15, 2021 at 9:49 AM

Good morning

Unfortunately I don't know which Councillor will be in the mentioned ward, because the Inaugural Council Meeting will only take place on Monday, 22 November 2021, where the Ward Councillors will be elected!

Regards

Riekie

---

**From:** JC van Rooyen <jcvr@spoorensvironmental.co.za>  
**Sent:** Thursday, 11 November 2021 16:21  
**To:** Bertie Schutte <Bertie.Schutte@lephale.gov.za>; Riekie Coetzee <Riekie.Coetzee@lephale.gov.za>  
**Subject:** Assistance with Ward Councillor Detail: Councillor Ward 5 Lephale Local Municipality

Good day,

I sincerely hope you can assist me. I am looking for the contact details of the ward councillor of ward 5 of the Lephale local municipality. By law (NEMA Act 107 of 1998) I need to get a notice through to the Councillor.

Kind regards.

**JC van Rooyen (Director)**  
Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932 e: [jcvr@spoorensvironmental.co.za](mailto:jcvr@spoorensvironmental.co.za)  
t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 w: [www.spoorensvironmental.co.za](http://www.spoorensvironmental.co.za)  
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---

## Assistance with Ward Councillor Detail: Councillor Ward 5 Lephalale Local Municipality

---

JC van Rooyen <jcvr@spoorensvironmental.co.za>  
To: Riekie Coetzee <Riekie.Coetzee@lephalale.gov.za>

Mon, Nov 15, 2021 at 10:07 AM

Thank you for the response. Will you be so kind as to send the contact detail of the elected councillor through to me when he/she is elected.

Thanks.



### JC van Rooyen (Director)

Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932    e: [jcvr@spoorensvironmental.co.za](mailto:jcvr@spoorensvironmental.co.za)  
t: +27 (0)12 804 1181    f: +27 (0)86 763 5635    w: [www.spoorensvironmental.co.za](http://www.spoorensvironmental.co.za)  
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---

## Assistance with Ward Councillor Detail: Councillor Ward 5 Lephalale Local Municipality

4 messages

---

**JC van Rooyen** <jcvr@spoorensvironmental.co.za>  
To: Nozi Molteno <nmolteno@waterberg.gov.za>, nozibele.molteno@hotmail.com

Thu, Nov 11, 2021 at 4:29 PM

Good day,

I sincerely hope you can assist me. I am looking for the contact details of the ward councillor of ward 5 of the Lephalale local municipality. By law (NEMA Act 107 of 1998) I need to get a notice through to the Councillor.

Kind regards



### JC van Rooyen (Director)

Pr LA Techno M.Sc (Env Soc) SACLAP

c: +27 (0)83 280 5932 e: [jcvr@spoorensvironmental.co.za](mailto:jcvr@spoorensvironmental.co.za)  
t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 w: [www.spoorensvironmental.co.za](http://www.spoorensvironmental.co.za)  
a: Postnet Suite 448, Private Bag X025 Lynnwood Ridge, 0040, South Africa

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---

**nozibele molteno** <nozibele.molteno@hotmail.com> Tue, Nov 16, 2021 at 3:20 PM  
To: "jcvr@spoorensvironmental.co.za" <jcvr@spoorensvironmental.co.za>  
Cc: Joshua Hlapa <joshua.hlapa@lephalale.gov.za>, Winnie Baloyi <winnietsakane@gmail.com>

Good Day Sir,

Kindly communicate with Mr. Hlapa, the Manager responsible for Environmental Management in Lephalale LM.  
He will gladly assist you.

With Kind Regards,

**Nozi Molteno**  
CEO Grade A : LOCAL GOVERNMENT SUPPORT (LGS)  
Department of Forestry, Fisheries & the Environment  
Local Government Support  
Waterberg District Municipality  
Limpopo Province  
Cell: 066 4200 065



forestry, fisheries  
& the environment

Department:  
Forestry, Fisheries and the Environment  
REPUBLIC OF SOUTH AFRICA

**From:** JC van Rooyen <[jcvr@spoorenservices.co.za](mailto:jcvr@spoorenservices.co.za)>  
**Sent:** Thursday, 11 November 2021 16:29  
**To:** Nozi Molteno <[nmolteno@waterberg.gov.za](mailto:nmolteno@waterberg.gov.za)>; [nozibele.molteno@hotmail.com](mailto:nozibele.molteno@hotmail.com)  
<[nozibele.molteno@hotmail.com](mailto:nozibele.molteno@hotmail.com)>  
**Subject:** Assistance with Ward Councillor Detail: Councillor Ward 5 Lephalale Local Municipality

[Quoted text hidden]

---

**JC van Rooyen** <[jcvr@spoorenservices.co.za](mailto:jcvr@spoorenservices.co.za)>  
To: [nozibele molteno <nozibele.molteno@hotmail.com>](mailto:nozibele.molteno@hotmail.com)

Tue, Nov 16, 2021 at 3:54 PM

Thank you very much.

Kind regards.



**JC van Rooyen (Director)**  
Pr LA Techno M.Sc (Env Soc) SACLAP

**c:** +27 (0)83 280 5932    **e:** [jcvr@spoorenservices.co.za](mailto:jcvr@spoorenservices.co.za)  
**t:** +27 (0)12 804 1181    **f:** +27 (0)86 763 5635    **w:** [www.spoorenservices.co.za](http://www.spoorenservices.co.za)  
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[Quoted text hidden]

---

**nozibele molteno** <[nozibele.molteno@hotmail.com](mailto:nozibele.molteno@hotmail.com)>  
To: JC van Rooyen <[jcvr@spoorenservices.co.za](mailto:jcvr@spoorenservices.co.za)>

Tue, Nov 16, 2021 at 3:57 PM

You are welcome Sir.

---

**From:** JC van Rooyen <[jcvr@spoorenservices.co.za](mailto:jcvr@spoorenservices.co.za)>  
**Sent:** Tuesday, 16 November 2021 15:54  
**To:** nozibele molteno <[nozibele.molteno@hotmail.com](mailto:nozibele.molteno@hotmail.com)>  
**Subject:** Re: Fw: Assistance with Ward Councillor Detail: Councillor Ward 5 Lephalale Local Municipality

[Quoted text hidden]

## Original Message

Message ID	<AM6PR05MB5174EBF7AEF988CF3431DCEDBB609@AM6PR05MB5174.eurprd05.prod.outlook.com>
Created at:	Tue, Nov 23, 2021 at 10:38 AM (Delivered after 3 seconds)
From:	Joshua Hlapa <Joshua.Hlapa@lephalale.gov.za>
To:	"jcvr@spooreenvironmental.co.za" <jcvr@spooreenvironmental.co.za>
Subject:	Read: NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: STORAGE OF WATER IN A DAM - THINUS MARITZ VAALWATER (PTY) LTD.
SPF:	PASS with IP 40.107.6.130 <a href="#">Learn more</a>
DKIM:	'PASS' with domain lephalalegovza.onmicrosoft.com <a href="#">Learn more</a>

[Download Original](#)

[Copy to clipboard](#)

Delivered-To: jcvr@spooreenvironmental.co.za  
Received: by 2002:adf:d0c6:0:0:0:0 with SMTP id z6csp7960001wrh;  
Tue, 23 Nov 2021 00:38:20 -0800 (PST)  
X-Google-Smtp-Source:  
ABdhPJzzym8SkJiNkC+q9kUJyf+zLT08Q1gEGS0qexFm2gowUW3Zgh0EiDi+QXAIunWP8SpfZW//  
X-Received: by 2002:a05:600c:4ed2:: with SMTP id g18mr893559wmq.25.1637656700259;  
Tue, 23 Nov 2021 00:38:20 -0800 (PST)  
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stEA==  
ARC-Authentication-Results: i=2; mx.google.com;  
dkim=pass header.i=@lephalalegovza.onmicrosoft.com header.s=selector1-  
lephalalegovza-onmicrosoft-com header.b=bEMC2mQS;  
arc=pass (i=1 spf=pass spfdomain=lephalale.gov.za dkim=pass  
dkdomain=lephalale.gov.za dmarc=pass fromdomain=lephalale.gov.za);  
spf=pass (google.com: domain of joshua.hlapa@lephalale.gov.za designates  
40.107.6.130 as permitted sender) smtp.mailfrom=Joshua.Hlapa@lephalale.gov.za  
Return-Path: <Joshua.Hlapa@lephalale.gov.za>  
Received: from EUR04-DB3-obe.outbound.protection.outlook.com (mail-  
eopbgr60130.outbound.protection.outlook.com. [40.107.6.130])  
by mx.google.com with ESMTPS id bd17si617866wmb.75.2021.11.23.00.38.19  
for <jcvr@spooreenvironmental.co.za>

LOCAL AUTHORITY

STATE DEPARTMENTS

SERVICE PROVIDERS

NGO'S, CBO'S, CONSERVANCIES, RESIDENT ASSOCIATIONS ETC.



## **APPENDIX E\_5**

NOTICES, COMMENTS AND RESPONSES IN TERMS OF THE  
DRAFT BASIC ASSESSMENT REPORT

(Not Applicable)

**APPENDIX E\_6**  
COMMENTS AND RESPONSES REPORT

**COMMENTS AND RESPONSES REPORT:  
PROPOSED CONSTRUCTION OF A  
DAM FOR THE STORAGE OF WATER FOR  
THINUS MARITZ VAALWATER (PTY) LTD.  
VAALWATER, LEPHALALE  
LOCAL MUNICIPALITY,**

**SUBMITTED TO:**

Limpopo Department of Economic  
Development, Environment &  
Tourism

20 Hans van Rensburg Street/  
19 Biccard Street  
Polokwane  
Limpopo  
0699

**APPLICANT:**

The logo for Thinus Maritz Boerdery Vaalwater features a stylized green leaf icon above the company name. 'Thinus Maritz' is in a large, bold, blue sans-serif font, 'Boerdery' is in a slightly smaller blue font, and 'Vaalwater' is in a smaller, bold, black font below a thin blue horizontal line.



**spoor**  
environmental services

t: +27 (0)12 804 1181 f: +27 (0)86 763 5635 e: [info@spooenvironmental.co.za](mailto:info@spooenvironmental.co.za)

p: Postnet Suite 448, Private Bag X025, Lynnwood Ridge, 0040, Pretoria,

South Africa

w: [www.spooenvironmental.co.za](http://www.spooenvironmental.co.za)

**December 2021**

<b>REPORT TITLE</b>	:	Comments and Responses Report in terms of the Proposed Construction of a Dam for the Storage of Water: Thinus Maritz Vaalwater (PTY) Ltd., Lephalale Local Municipality, Limpopo Province
<b>CLIENT</b>	:	Thinus Maritz Vaalwater (PTY) Ltd.
<b>REPORT STATUS</b>	:	Draft
<b>PLACE AND DATE</b>	:	Pretoria, December 2021

**APPLICANT**

<b>Applicant:</b>	Thinus Maritz Vaalwater (PTY) Ltd.
<b>Contact Person:</b>	Mr Thinus Maritz
<b>Postal address:</b>	PO Box 1034 Vaalwater 0530

**ENVIRONMENTAL ASSESSMENT PRACTITIONER**

<b>Consultant:</b>	SPOOR Environmental Services (PTY) Ltd.
<b>Contact Person:</b>	JC van Rooyen
<b>Postal address:</b>	Postnet Suite 448, Private Bag X025, Lynnwood Ridge, 0040
<b>Telephone:</b>	012 804 1181
<b>Fax:</b>	086 763 5635
<b>Email:</b>	jcvr@spooreenvironmental.co.za

**DECLARATION OF INDEPENDENCE**

I, JC van Rooyen as authorised representative of SPOOR Environmental Services (PTY) Ltd. hereby confirm my independence as an Environmental Assessment Practitioner and declare that neither I nor SPOOR Environmental Services (PTY) Ltd. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which SPOOR Environmental Services (PTY) Ltd. was appointed as Environmental Assessment Practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Basic Assessment Application for the Proposed Construction of a Dam for the Storage of Water for Thinus Maritz Vaalwater (PTY) Ltd., Vaalwater, Lephhalale Local Municipality.

Signed:           JC van Rooyen          

Date:                           2021-12-06

**DOCUMENT HISTORY**

Report	Date	Version	Status
Comments and Responses Report in terms of the Proposed Construction of a Dam for the Storage of Water: Thinus Maritz Vaalwater (PTY) Ltd., Lephalale Local Municipality, Limpopo Province	December 2021	1.0	Draft

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## DISTRIBUTION OF BASIC ASSESSMENT REPORT

Municipal, Provincial and State Departments	
Name	Institution
Mr E. V. Maluleke Mrs. M C Rodgers	Limpopo Department of Economic Development, Environment & Tourism: Sustainable Utilization of the Environment Branch
Mr D M Nethengwe	Department of Water and Sanitation: Limpopo WMA
Pulane Matswi	Department of Water and Sanitation: Limpopo WMA
Mr. J Hlapa	Lephalale Local Municipality – Environmental Management

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## ABBREVIATIONS

AH	-	Agricultural Holding
BID	-	Background Information Document
CPF	-	Community Policing Forum
CLO	-	Community Liaison Officer
DEA	-	Department of Environmental Affairs
DEAT	-	Department of Environmental Affairs and Tourism
DWS	-	Department of Water and Sanitation
EAP	-	Environmental Assessment Practitioner
ECA	-	Environment Conservation Act
EMPr	-	Environmental Management Programme
IEM	-	Integrated Environmental Management
IDP	-	Integrated Development Plan
I&AP	-	Interested and Affected Parties
ISDF	-	Integrated Spatial Development Framework
LDEDET	-	Limpopo Department of Economic Development, Environment and Tourism
MAMSL	-	Metres Above Mean Sea Level
NEMA	-	National Environmental Management Act
NEMBA	-	National Environmental Management Biodiversity Act
NEMWA	-	National Environmental Management Waste Act
NFEPA	-	National Freshwater Ecosystems Priority Areas
NHRA	-	National Heritage Resources Act
OHS	-	Occupational Health and Safety
QDSG	-	Quarter Degree Square Grid
SABS	-	South African Bureau of Standards
SAHRA	-	South African Heritage Resources Agency
SDF	-	Spatial Development Framework
WUA	-	Water Users Association
WULA	-	Water Use Licence Application

## 1. INTRODUCTION

SPOOR Environmental Services (Pty) Ltd was appointed as the independent environmental assessment practitioner (EAP) to manage the Basic Assessment application in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998). The Application is for the proposed construction of a dam for the storage of water on Portion 1 of the Farm Groendraai 213 KQ, Vaalwater Area, Lephalale Local Municipality, Limpopo Province.

This report provides a chronological account of the Public Participation Process conducted by the Environmental Assessment Practitioner (EAP) to date.

The process included:

- ❖ Creating initial awareness to the relevant Interested and Affected Parties (I&AP's) by distribution of Background Information Documents, putting up of site notices and placing an advertisement in a prescribed newspaper;
- ❖ Giving an opportunity to register as a stakeholder in the public participation process and make comments on and contributions;
- ❖ Responding to the comments received from the I&AP in the initial awareness process.

## 2. PUBLIC PARTICIPATION PROCESS (PPP)

The PPP forms a fundamental part of the Basic Assessment process. Its aim is to provide an opportunity for all interested and affected parties (I&APs) to obtain clear, accurate and comprehensive information about the proposed development and the anticipated environmental impacts thereof. In addition, the process provides I&APs with the opportunity to indicate their viewpoints, issues, and concerns regarding the proposal and/or alternatives. All inputs from the public and interested and/or affected groups are considered in the planning stages of the project. As a result, a clear recording of all issues raised, and comments made is maintained in the register of comments and responses. This register is updated as and when new comments and concerns are raised and considered.

The following phases allow I&APs to make comments during the BA process:

- Phase 1: Initial Public Notification and Awareness;
- Phase 2: Comment on the Draft BA Report;
- Phase 3: Environmental Authorisation

The image below illustrates the PPP phases diagrammatically. At the time of submission of this report Phase 1 of the PPP was completed and the process was at the beginning of Phase 2. In Phase 2, comment will be requested on the Draft BAR and the responses on these comments and included in the Final BAR as well as any amendments to the BAR as a result of the public involvement process.

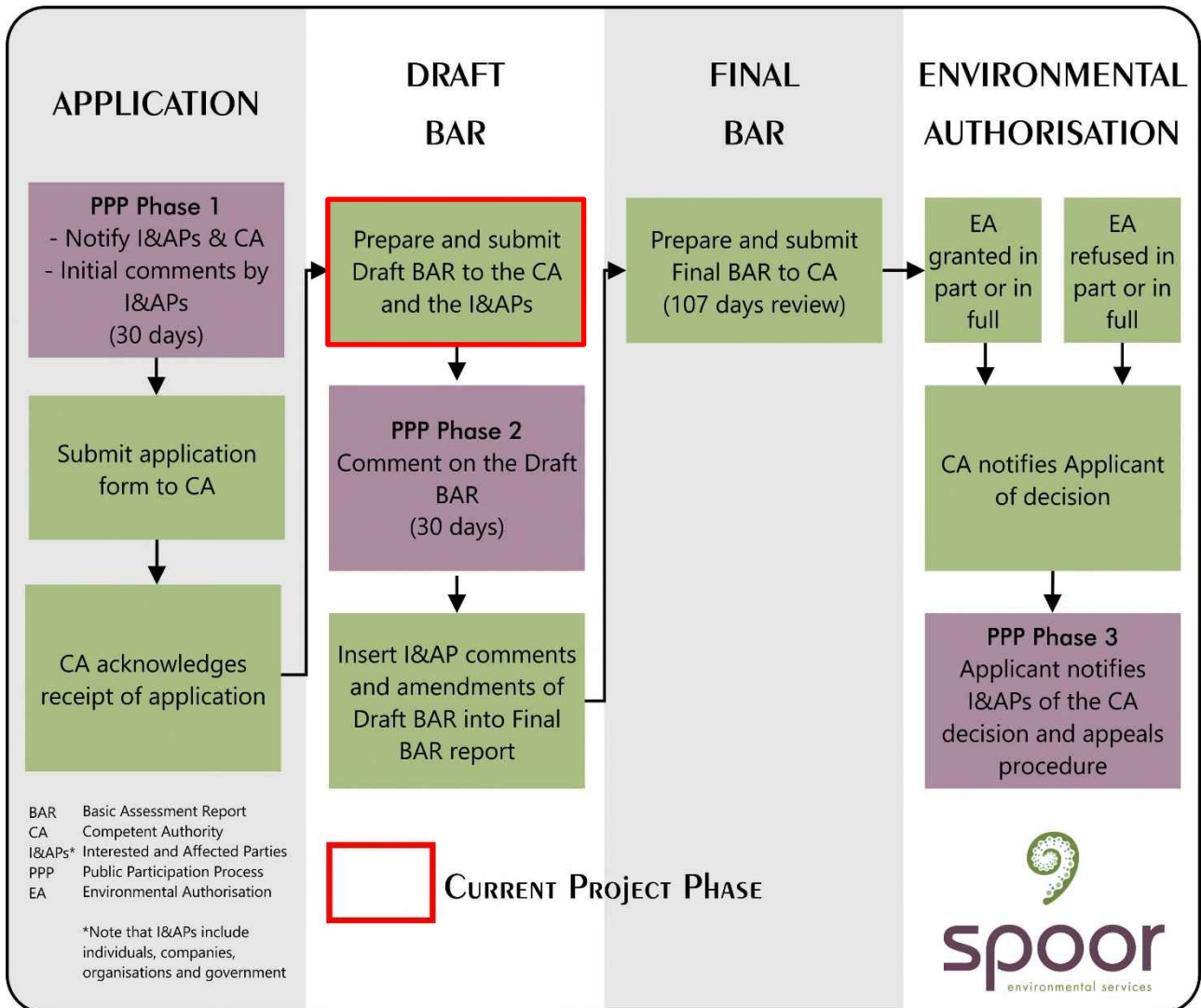


Figure 1: Public Participation Process

### **3. PUBLIC PARTICIPATION PROCESS PHASES**

#### **3.1. Phase 1: Initial Public Awareness**

Initial awareness of the dam developments was created via the distribution of the Background Information Documents, the placement of site notices on the property boundary and the placement of a newspaper advertisement in a locally distributed newspaper (Die Pos).

##### **3.1.1. Background Information Document (BID)**

A BID was drafted that informed potential I&APs of the following:

- ❖ The background of the project;
- ❖ Proposed development description;
- ❖ Project location;
- ❖ Listed Activities in terms of NWA (Act 36 of 1998)
- ❖ Explanation of what the WULA process entails;
- ❖ I&AP involvement in the process;
- ❖ Details of the Applicant;
- ❖ Contact details of the EAP;
- ❖ A locality map of the proposed development area; and
- ❖ A form for I&APs to register.

The BID was initially distributed to the relevant identified I&APs during October 2021. BIDs were also forwarded to other I&APs at the time of receiving additional requests for information from parties that came across the notices in the press and the on-site advertisements. The BID was distributed to the following stakeholders:

##### *Immediate Neighbours and Adjacent Landowners*

Adjacent landowners and property owners received the BID notices via registered letters, email notifications and telephonic discussions.

##### *Directly Affected Properties*

Property Owners of properties affected by the dam project were notified via, email, site visits and telephone discussions and informed about the dam project.

##### *Ward Councillors*

CLlr K Mogohloana (Ward 5) was contacted via email and telephone provided with the project BID. In terms of the new councillors elected during the 2021 Municipal elections, the EAP reached out to the local municipality in order to obtain the detail of the new ward councillor of ward 5. At the date of the finalization of this report, the detail of the new ward councillor was not yet available.

##### *Local Authorities*

The BID was forwarded to the relevant Departments of the Lephhalale Municipality as well as to the Waterberg District Municipality and the Vaalwater SAPS.

#### *Government Departments*

The Department of Water and Sanitation, the Limpopo Province Department of Economic Development, Environment and Tourism, the Limpopo Department of Agriculture and Rural Development, the Limpopo Department of Rural Development and Traditional Affairs, the South African Heritage Resources Agency (SAHRA), the and the Limpopo Department of Public Works, Roads and Infrastructure were notified.

#### *Other I&AP's, NGOs, CBOs, Conservancies, Resident Associations & Service Providers*

The BID notices were distributed to the relevant service providers and other I&AP's including Eskom and Eskom Vaalwater Branch, the Mokolo and Vaalwater Water Users Associations, Local Farmer's Association, The Waterberg Biosphere Reserve, and the Welgevonden Nature Reserve.

### **3.1.2. Site Notices**

Detailed site notices in accordance with the requirements of the NEMA regulations were placed at a strategic and visible place on the boundary fence of the entrance to the farm on the 22<sup>nd</sup> of October 2021.

### **3.1.3. Newspaper Advertisements**

A newspaper advertisement including all relevant information and a description of WULA process was placed in *Die Pos* paper of the 22<sup>nd</sup> of October 2021.

### **3.2. I&AP Registration and Initial Comments**

I&APs were registered on an I&AP database in line with their responses to the BID, the press advertisements and site notices. Concerns, requests, and suggestions from I&APs were listed in the Comments and Responses register. The EAP communicated relevant information to all registered I&AP throughout the BA process to date, for them to respond and comment on the proposal.

### **3.3. Summary of Comments Received During Phase 1**

#### *Immediate Neighbours, Adjacent Landowners and Landowners*

In short, the following aspects were noted by the adjacent landowners:

- ❖ No comments were received to date.

#### *Ward Councillors*

- ❖ In terms of the new councillors elected during the 2021 Municipal elections, the EAP reached out to the local municipality in order to obtain the detail of the new ward councillor of ward 5. At the date of the finalization of this report, the detail of the new ward councillor was not yet available.

#### *Government Departments*

- ❖ No comments were received from any State Department.

#### *Local Authorities*

- ❖ No comments were received from any Municipal Department.

#### *NGOs, CBOs, Conservancies, Residential Associations, Service Providers*

- ❖ No comments were received to date.

### **3.4. Summary of Responses During Phase 1**

The summary below provides an overview of the responses made by the EAP on the principal comments raised by the stakeholders. Feedback in this section represents that included up to the submission of the Draft BAR Report.

No comment was received to date from any party. The only logical reason for this is believed to be associated with the fact that the EAP has been involved with the impact assessments and water use licences for the Thinus Maritz Vaalwater (PTY) Ltd and the Joe Kloppers farming operations and that the local I&AP's are accustomed to the projects and the associated issues. The EAP will continue to raise awareness regarding the proposed project throughout the remainder of the BA process.

## **4. CONCLUSION**

The overarching aim of the PPP is not only to adhere to the required legislation, but also to give as many stakeholders as possible an opportunity to be actively involved in this process. SPOOR Environmental Services (Pty) Ltd. identified and contacted the relevant I&APs as far as possible to inform them of the proposed development and relevant procedures as well as to provide opportunity to raise issues and concerns about the proposed dam development.

SPOOR believes that I&APs were given sufficient opportunity to participate in the environmental process to date. I&APs that registered because of the advertisements and subsequent notices were logged and provided with additional information where this was requested. All of these responses (to and from the EAP) were included in the assessment to guide the studies to reach the most productive solutions for the dam project.

## **APPENDIX E\_7**

### **I&AP DATABASE**

## INTERESTED AND AFFECTED PARTIES DATABASE

<b>PROJECT NAME</b>	<b>Thinus Maritz Vaalwater (PTY) Ltd Kranskloof Dam, Lephalale Local Municipality, Limpopo Province</b>
<b>Name &amp; Surname</b>	<b>Organisation</b>
<b>CLIENT</b>	
Mr. T Maritz	Thinus Maritz Vaalwater (Pty) Ltd.
<b>PROJECT TEAM</b>	
Mr. J.C. van Rooyen	SPOOR Environmental Services - EAP
<b>IMMEDIATE NEIGHBOURS AND ADJACENT LANDOWNERS</b>	
AE Sullivan M Sullivan	BONGELA 955 KR WEST DUNES PROPERTIES 94 (PTY) LTD.
R VAN WYK	ELSERAFIE 214 KQ Radie van Wyk
Mr. Joe Kloppers	REM DOORNSPRUIT 215 KQ
Mr A Kruger	PTN 1 DOORNSPRUIT 215 KQ ANDRIES KRUGER TRUST
Mr. Joe Kloppers	PTN 2 DOORNSPRUIT 215 KQ
A Gunn	REM INELKANDER 211 KQ MOGOLRIVER GAME FARM
M A Odendaal	PTN 7 INELKANDER 211 KQ WILLOW VALLEY GAME BREEDERS PTY LTD
<b>WARD COUNCILLORS</b>	
Cllr K Mogohloana	Lephalale Local Municipality Councillor Ward 5
<b>LOCAL GOVERNMENT</b>	
Ms. Edith Tukakgomo	Lephalale Local Municipality - MM
Me Maria Cocquyt	Lephalale Local Municipality - MM (Acting)
Me Riekie Coetzee	MM Secretary
Mr. Joshua Hlapa	Lephalale LM - Environmental Management
Nozi Molteno	Waterberg District Municipality
Station Manager	Vaalwater Police Department



<b>STATE DEPARTMENTS</b>	
<b>Name &amp; Surname</b>	<b>Organisation</b>
Pulane Matswi Love Hlekane	Limpopo Department of Water and Sanitation
PP Mkgadi For attention Mr Maluleke EV	Limpopo Department of Economic Development, Environment and Tourism
Mr Jackie Phosa	Limpopo Department of Agriculture and Rural Development
Ms. Nokukhangya Khumalo	South African Heritage Resources Agency
Ms Maphuti Ramalla	Limpopo Department of Rural Development and Land Reform Deputy Director: Capricorn & Waterberg District (REID)
<b>OTHER NGOs, CBOs, CONSERVANCIES, RESIDENTS ASSOCIATIONS, ETC.</b>	
Francois van der Berg	Mokolo Water User Association
Marietjie Marx	Water Irrigation Association
Ben Mostert	Local Farmers Association
Dr Rupert Baber	Chair: Waterberg Biosphere Reserve
Andre Burger	Welgevonden Nature Reserve
Ian van der Merwe	Vaalwater Water Users Association
<b>SERVICE PROVIDERS</b>	
Mr Christo Louw Mr Vuyo Nyamane	Eskom Wayleaves
Emile Marell	Eskom Vaalwater

**APPENDIX F**

ENVIRONMENTAL MANAGEMENT PROGRAMME

**ENVIRONMENTAL MANAGEMENT PROGRAMME  
FOR THE PROPOSED CONSTRUCTION OF A  
DAM FOR THE STORAGE OF WATER FOR  
THINUS MARITZ VAALWATER (PTY) LTD.**

**VAALWATER, LEPHALALE  
LOCAL MUNICIPALITY,  
LIMPOPO PROVINCE**

**SUBMITTED TO:**

**Limpopo Department  
of Economic Development,  
Environment & Tourism**

**20 Hans van Rensburg Street  
/19 Biccard Street  
Polokwane  
Limpopo  
0699**

**APPLICANT:**

  
**Thinus Maritz  
Boerdery**  
Vaalwater



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South Africa

**December 2021**

<b>REPORT TITLE:</b>	EMPr for the Construction of a Dam for the Storage of Water: Thinus Maritz Vaalwater (PTY) Ltd., Lephalale Local Municipality, Limpopo Province
<b>APPLICANT:</b>	Thinus Maritz Vaalwater (PTY) Ltd
<b>SPOOR PROJECT REFERENCE:</b>	08/05_t maritz kranskloof_ba

### DOCUMENT HISTORY

REPORT	DATE	VERSION	STATUS
T Maritz Kranskloof EMPr	December 2021	1.0	Draft

### APPLICANT

<b>APPLICANT:</b>	Thinus Maritz Vaalwater (PTY) Ltd
<b>CONTACT PERSON:</b>	Mr. Thinus Maritz
<b>POSTAL ADDRESS:</b>	PO Box 1034 Vaalwater 0530

### ENVIRONMENTAL ASSESSMENT PRACTITIONER

<b>CONSULTANT:</b>	SPOOR Environmental Services (Pty) Ltd
<b>CONTACT PERSON:</b>	Mr. JC van Rooyen
<b>POSTAL ADDRESS:</b>	Postnet Suite 448, Private Bag X025, Lynnwood Ridge, 0040
<b>TELEPHONE:</b>	012 804 1181
<b>FAX:</b>	086 763 5635
<b>EMAIL:</b>	jcvr@spoorenvironmental.co.za

### DECLARATION OF INDEPENDENCE

I, JC van Rooyen as authorised representative of SPOOR Environmental Services (PTY) Ltd. hereby confirm my independence as an Environmental Assessment Practitioner and declare that neither I nor SPOOR Environmental Services (PTY) Ltd. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which SPOOR Environmental Services (PTY) Ltd. was appointed as Environmental Assessment Practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with Basic Assessment Application for the Proposed Construction of a Dam for the Storage of Water, Vaalwater Area, Lephalale Local Municipality.

Signed:                     JC van Rooyen                    

Date:                     2021-12-06

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## EXECUTIVE SUMMARY

### Introduction

SPOOR Environmental Services (PTY) Ltd. was appointed by Thinus Maritz Vaalwater (PTY) Ltd. as the Environmental Assessment Practitioner to manage the Environmental Management process relevant to the construction and operation of a proposed dam for the storage of water for irrigation. Application was originally made for this dam as part of a Section 24(G) NEMA (Act 107 of 1998) application, for a set of dams and subsequently authorized (12/1/9/S24G-W31). The specific dam was subject to an enlargement of an existing dam alongside the Sterkstroom River, in a different location to the south east of the current proposed position but on the same farm portion A portion of the proposed dam fell within the 1:100 year floodline of the Sterkstroom and was subsequently not licenced by the Department of Water and Sanitation (DWS). As a result of this, the Client decided to move the proposed dam north eastward and outside of the 1:100 year floodline area.

### Locality

The proposed dam will be situated 24km's to the west of the town of Vaalwater on portion 1 of the farm Groendraai 213 KQ, Limpopo Province, South Africa and falls under the jurisdiction of the Lephhalale Local Municipality as well as the Waterberg District Municipality. The project furthermore falls in the A42E quaternary drainage region (QDR) of the Limpopo Water Management Area (WMA). Access to the property are gained via the R517 which runs on the southern border of the application area.

### Discussion

South Africa is situated in a semi-arid region and as such, is classified as a water-scarce country. Due to the high variability in river water storage needs to be implemented in order to assure the water availability for crop irrigation during dry-spells. In addition, the Limpopo Employment, Growth and Development Plan (LEGDP), which culminates from the revision of the Provincial Growth and Development Strategy (PGDS), includes the policy framework that contains the strategic vision of the province with the aim of growing the economy and enhancing sustained economic growth and job creation.

### Environmental Impacts Identified

Anticipated impacts have been identified and described because of the abovementioned processes and the pertinent impacts are summarized in the table below.

### Impact Summary

Potential Impacts	Impact Significance with Mitigation
<b>Geology and Soils:</b>	
❖ Possible scouring and erosion	Low
❖ Possible loss of topsoils	Low
❖ Contaminations	Low
<b>Hydrology:</b>	
❖ ELU volumes	Low
❖ Surface water contaminations	Low
❖ Sedimentation and siltation	Low

Potential Impacts	Impact Significance with Mitigation
<b>Stormwater Management:</b>	
❖ Erosion and siltation	Low
<b>Fauna and Flora</b>	
❖ EWR	Medium
❖ Proliferation of alien vegetation	Low
<b>Local Employment:</b>	
❖ Additional local job opportunities	High (positive)

The Thinus Maritz Vaalwater (PTY) Ltd. farming operations is one of a number of other irrigation farms along the Sterkstroom River where pivot irrigation is used for crop farming. In terms of the general ecological impacts, it can be reported that the proposed irrigation dam is not situated in or alongside sensitive watercourses and also not within any Critical Biodiversity Areas (CBA) or Ecological Support Areas (ESA) areas. The proposed dam will be situated predominantly on previously disturbed areas.

The Specialist Hydrologist reported that for the Sterkstroom River, the Ecological Water Reserve (EWR) is not met on a number of occasions, going back as far as the 1930s. This is the case even during normal rainfall years. The high EWR specified by the DWS for the Sterkstroom River (52.63 % of the natural mean annual runoff), appears to be unrealistic. A comparison between the annual runoff and EWR can therefore not be taken seriously, until the EWR is recalculated.

#### **Environmental Management Programme**

The aim of this Environmental Management Programme is to ensure that the planning, assessment, and construction phases of the dam development comply with the relevant environmental management procedures. The Environmental Management Programme furthermore aims to organise and coordinate the proposed environmental management and mitigation measures and to describe these measures in order to prevent, reduce or otherwise manage the potential negative social and environmental impacts and to add to the favourable impacts.

The Applicant and the rest of the Stakeholders will carry the responsibility of duty of care towards the site and this Environmental Management Programme. It is believed that the identified impacts can be significantly minimised provided that the mitigation and rehabilitation measures included in section 7 of this EMPr are strictly adhered to.



## DETAILS AND EXPERTISE OF SPOOR ENVIRONMENTAL SERVICES

<b>Name:</b>	JC van Rooyen
<b>Company:</b>	SPOOR Environmental Services (Pty) Ltd
<b>Qualifications:</b>	Pr LA Techno B.L. M.Sc. (Env Soc)
<b>Professional Registration:</b>	SACLAP (20187)

In accordance with Appendix 4 (1) (a) (ii) of Government Notice No. R. 982 of December 2014, this section provides an overview of SPOOR Environmental Service's experience with EMPr's. SPOOR Environmental Services (Pty) Ltd. has been in operation since 2011. The Director, Mr. JC van Rooyen, has been involved in an array of environmental consultation and planning projects in various spheres of the landscape design, development, and environmental management disciplines over the past 20 years. SPOOR Environmental Service's approach towards projects is to strive for sustainable environments that not only reflect artistic and aesthetic quality but also hold diverse ecological and cultural value. The Company can conduct environmental applications and landscape development planning and design for various projects including:

- ❖ Scoping & Environmental Impact Assessment Reports,
- ❖ Visual Impact Assessments,
- ❖ Environmental Management Systems/ Plans,
- ❖ Environmental Management Programmes (EMPr),
- ❖ Environmental Audits & Monitoring,
- ❖ Waste Management Licence Applications,
- ❖ Air Emission Licences (AEL's),
- ❖ Water Use Licence Applications (WULA),
- ❖ Integrated Environmental Management (IEM),
- ❖ Tree Removal Permits,
- ❖ Environmental Rehabilitation,
- ❖ Conservation Planning / Eco-tourism Developments,
- ❖ Landscape Design and Development, and
- ❖ Landscape/ Environmental Project Management.

### PROJECT TEAM

The environmental assessment practitioner working on the project will be:

- ❖ **Mr. J.C. Van Rooyen** (*BL., M.Sc. (Env. Soc) (SACLAP) (Principle EAP)*)  
Landscape Technologist and Environmental Assessment Practitioner

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## ABBREVIATIONS

CBA	-	Critical Biodiversity Area
CLO	-	Community Liaison Officer
COIDA	-	Compensation for Occupational Injuries and Diseases Act (No 130 of 1993)
DWS	-	Department of Water and Sanitation
EAP	-	Environmental Assessment Practitioner
ECA	-	Environment Conservation Act
ECO	-	Independent Environmental Control Officer acting on behalf of the Client
EIA	-	Environmental Impact Assessment
ELU	-	Existing Lawful Use
EMPr	-	Environmental Management Programme
ESA	-	Ecological Support Area
EWR	-	Ecological Water Requirement
H&S Rep	-	Health and Safety Representative
IEM	-	Integrated Environmental Management
IDP	-	Integrated Development Plan
I&AP	-	Interested and Affected Parties
LLM	-	Lephalale Local Municipality
MAMSL	-	Metres Above Mean Sea Level
NEMA	-	National Environmental Management Act
NEMBA	-	National Environmental Management Biodiversity Act
NEMWA	-	National Environmental Management Waste Act
NFEPA	-	National Freshwater Ecosystems Priority Areas
NHRA	-	National Heritage Resources Act (Act 25 of 1999)
NWA	-	National Water Act (Act 36 of 1998)
OHS	-	Occupational Health and Safety
OHS Act	-	Occupational Health and Safety Act (No 85 of 1993)
PC	-	Principal Contractor
PHRA	-	Provincial Heritage Resources Authority
PM	-	Project Manager
PPE	-	Personal Protective Equipment
QDR	-	Quaternary Drainage Region
QDSG	-	Quarter Degree Square Grid
SABS	-	South African Bureau of Standards
SAHRA	-	South African Heritage Resources Agency
SANS	-	South African National Standards
SDF	-	Spatial Development Framework
SHE	-	Safety, Health and Environment
SME	-	Small and Medium Enterprise
SSC	-	Species of Special Concern
TDS	-	Total Dissolved Solids
WDM	-	Waterberg District Municipality
WMA	-	Water Management Area
WUA	-	Water Users Association
WULA	-	Water Use Licence Application

## 1. INTRODUCTION

SPOOR Environmental Services (Pty) Ltd. (*hereafter referred to as SPOOR*) was appointed by Thinus Maritz Vaalwater (PTY) Ltd., to manage the Basic Assessment application in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998). The Application is for the proposed construction of a dam for the storage of water on Portion 1 of the Farm Groendraai 213 KQ, Vaalwater Area, Lephalale Local Municipality, Limpopo Province.

## 2. EMPr OBJECTIVES

The aim of the EMPr is to ensure that the design, planning, construction, and operational phases of the dam development comply with the relevant environmental legislation, regulations, and guidelines. The EMPr furthermore aims to organise and coordinate the proposed environmental management and mitigation measures and to describe these measures to prevent, reduce or otherwise manage the potential negative social and environmental impacts associated with the dam development and to add to the favourable impacts of the project. In brief, the EMPr therefore aims to ensure that:

- ❖ activities arising as a consequence of the design, planning and construction on the site of the developments are managed in a way that reduces or avoids negative social and environmental impacts and to enhance its positive effects;
- ❖ impacted environments are restored per the recommendations of the EMPr;
- ❖ ensuring that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- ❖ efficient information sharing is maintained, and a clear understanding exists of all the responsibilities of all the relevant stakeholders;
- ❖ the necessary precautions are taken against damages and claims that occur because of the implementation of the development in a timeous fashion;
- ❖ accurate records are kept of the progress of the development during its various stages as well as of the ongoing monitoring of all its associated social and environmental impacts;
- ❖ stakeholders respond to unforeseen events;
- ❖ feedback is provided for continual improvement in environmental performance; and
- ❖ timeous completion occurs of all the implementation activities on account of generally sound management.

### 3. PROJECT DESCRIPTION

#### 3.1 Project Overview

Thinus Maritz Vaalwater (PTY) Ltd. is applying for environmental authorization as required for the storing of water in a dam. The said farm portion is owned and farmed by Thinus Maritz Vaalwater (PTY) Ltd.- the Applicant. The application constitute the storing of the existing lawful water allocation in a dam on the said farm portion for the purposes of agricultural irrigation. The proposed infrastructure includes;

- ❖ A square dam with compacted earth dam walls and lined with a plastic lining;
- ❖ Dam volume of 150 000m<sup>3</sup>;
- ❖ Covering an area of 3,580 hectares;
- ❖ Maximum dam wall height of 4,8 meters;
- ❖ Associated outlet infrastructure.

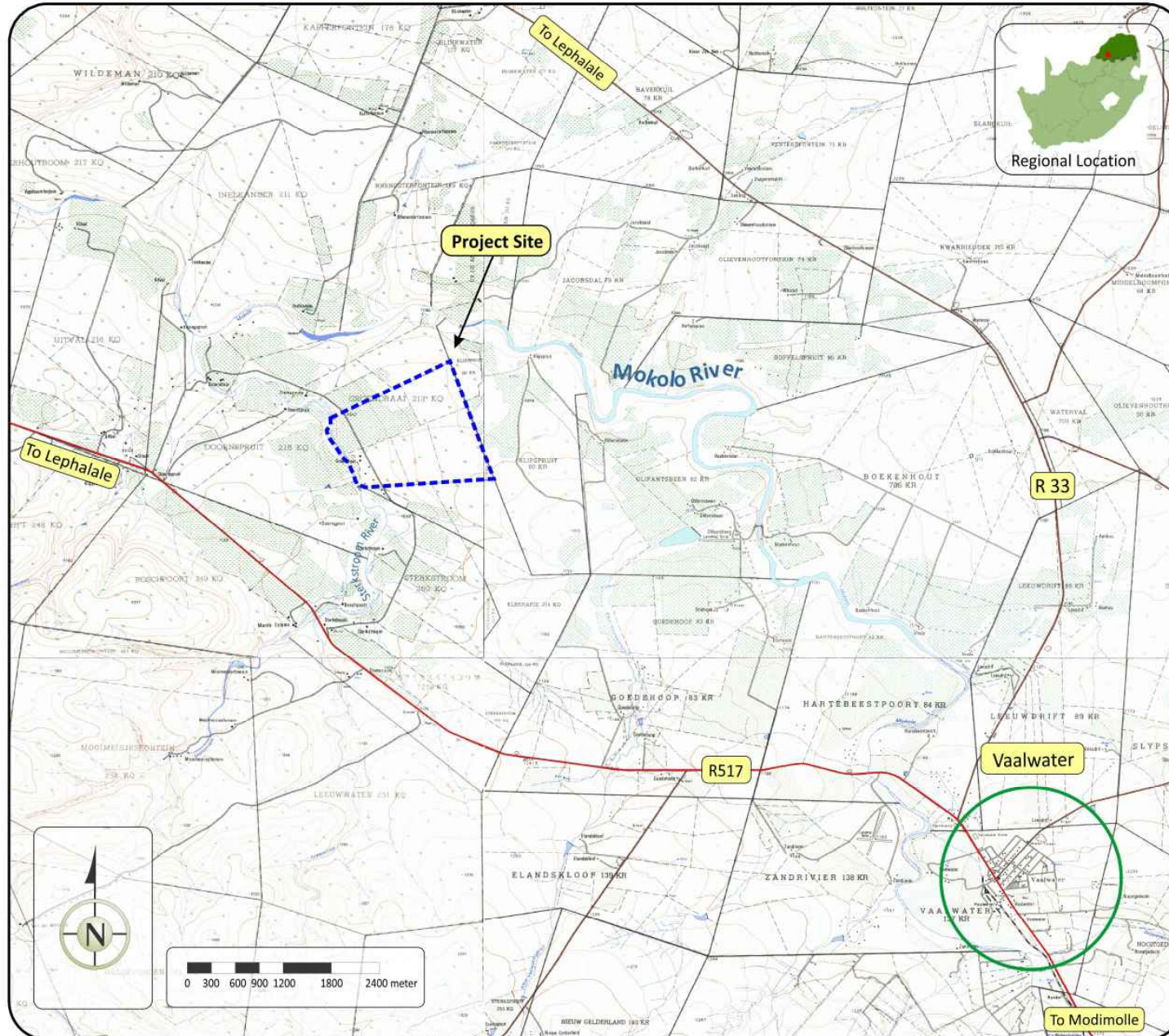
**Table 1: Storage Dam Detail**

Vaalwater Dams - Thinus Maritz Vaalwater (PTY) Ltd.						
No.	Dam ID	Farm name	Volume	Size	Status	Coordinate
1	Kranskloof Dam	Groendraai 213 KQ Ptn 1	150 000m <sup>3</sup>	3,580 ha	New	24°11'51.90"S 27°59'17.80"E

#### 3.2 Locality


The subject property is located approximately 24km's northwest of the town Vaalwater, Limpopo Province, South Africa and falls under the jurisdiction of the Lephalale Local Municipality as well as the Waterberg District Municipality . See Figure 1 &

Figure 2.



**Legend:**

**Project Site**

 Portion 1 of the Farm Groendraai 213 KQ

242788 Topographical Map Sheets

**Project:**  
 Storage of Water in Dams  
 Thinus Maritz Vaalwater (PTY) Ltd.

**Proponent:**



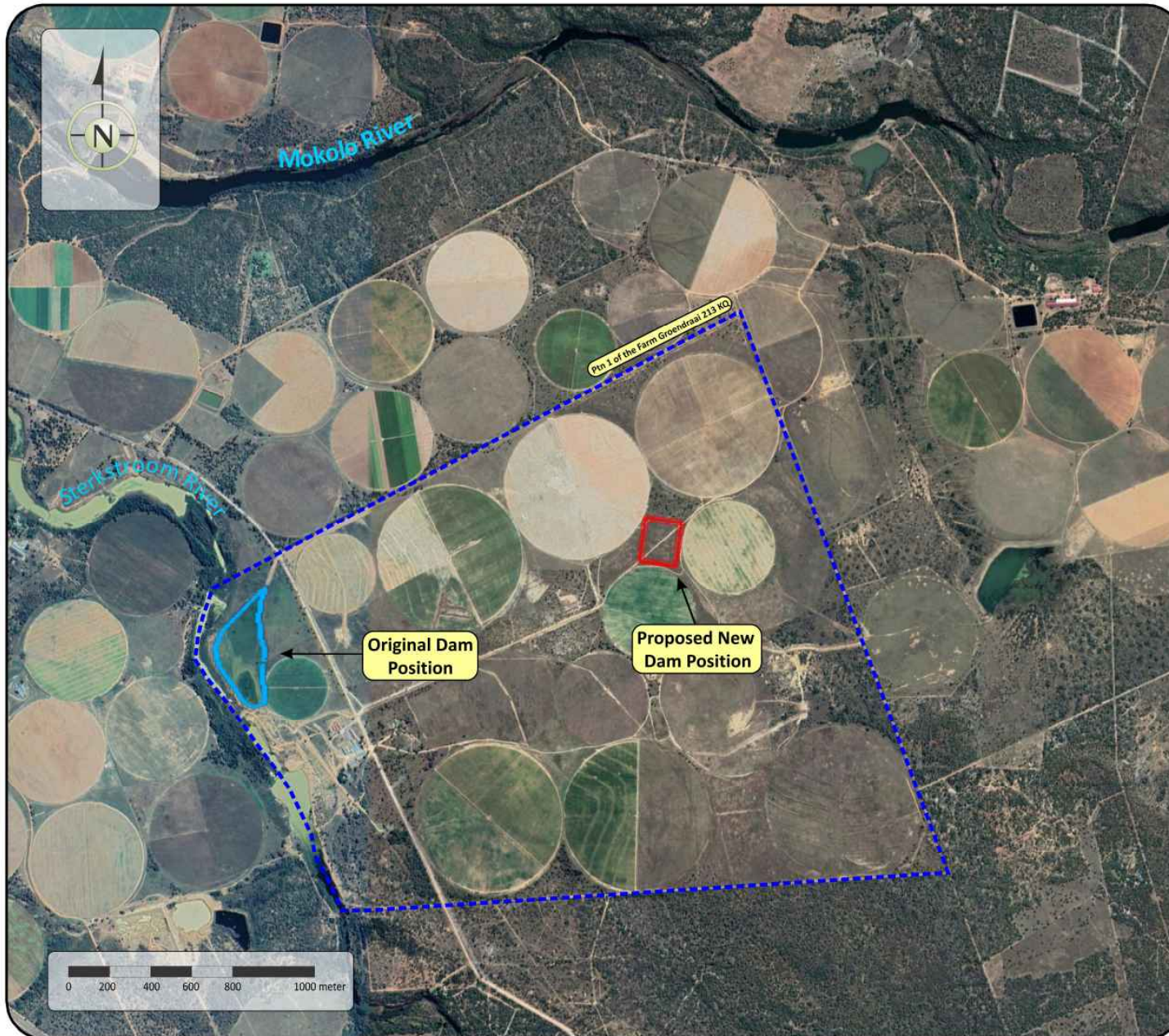
**Consultant:**



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 Lynnwoodridge 0040


**Figure 1:**  
 Locality Map

Figure 1: Locality




**Legend:**

**Project Site**

 Portion 1 of the Farm Groendraai 213 KQ

 Original Dam

 Proposed New Dam Position

242788 Topographical Map sheets

**Project:**

Storage of Water in Dams  
 Thinus Maritz Vaalwater (PTY) Ltd.

**Proponent:**

  
 Thinus Maritz  
 Boerdery  
 Vaalwater

**Consultant:**

  
 spoor  
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**Dam Positions**

Figure 2: Dam Locality



## **4. RECEIVING ENVIRONMENT**

### **4.1 Bio-Physical Environment**

The applicable farm portions falls within a summer rainfall region, with precipitation on average falling between 500-700 mm annually where the highest rainfall occurs during the December and January months. Winters, in contrast are found to be extremely cold and very dry- during which fairly infrequent frost incidences may occur (approximately 4 days p.a.). The mean monthly maximum and minimum temperatures for the area are 35.3°C (indicative of a warm temperate climatic regime) and 0.9°C for November and June, respectively (Mucina & Rutherford, 2006).

In terms of the local geology, the farm portion is located on the Bb92 land type. With reference to the RSA Geology map, the proposed dam site can be described as fine to medium-grained, feldspathic sandstone, siltstone and shale which is part of the Vaalwater Formation of the Kransberg Sub-group of the Waterberg Group (Code“Mv”).

The study area consists of a low undulating area, with no prominent topographic features located within its extent. A sequence of hills is, however, present on the more northern edge of the site- whose characteristics are further emphasized by small non-perennial streams flowing between them in wet-, summer (seasonal) months. The proposed dam site is located just south of the watershed between the Sterkstroom and the Mokolo rivers. Elevation (MAMSL) is found to be higher in the northern side (approximately, 1093 MAMSL) of the site area, when compared to the southern side (approximately 1086 mamsl). The site slopes predominantly south westwards towards the Sterkstroom River.

With regard to hydrological features the application area is located in the A42E quaternary drainage region (QDR). The relevant watercourses and spatial framework falls within the Sterkstroom River (A42D-346). The A42E QDR are located in the Limpopo Water Management Area (WMA). Regionally, the area exhibits a weak branched drainage pattern that can be contributed to its gently sloping topography.

The storage dam site is situated within the Mixed Bushveld and Sourish Mixed Bushveld veld type, as described by Acocks (1988) as well as by Low & Rebelo (1996). In the new vegetation map of South Africa, the area falls within the Central Sandy Bushveld vegetation type (SVcb 12, Mucina & Rutherford 2006). This vegetation unit is vulnerable with less than 3% statutorily conserved (Doorndraai Dam and Skuinsdraai Nature Reserves) and with about 24% transformed mainly by cultivation (19 %) and (4 %) urban and built-up areas (Mucina & Rutherford 2006).

Almost all the natural vegetation was replaced by crop farming such as mixed crop and cattle farming activities. The following crops are planted on a rotational basis, viz. Peanuts; Tobacco; Potatoes; Flowering bulbs (Amaryllis); Corn; Watermelon and grazing for the owner's cattle. In terms of the site specific area, the Kranskloof Dam are situated in an area listed as having no natural remaining areas in the terms of the Limpopo Conservation Plan V2. The proposed dam is not situated in an in-stream position of a sensitive watercourse.

With regards to mammal biodiversity, no Red Data or sensitive species are deemed present on the site since the site falls outside of their distributional ranges or does not offer suitable habitat(s). In terms of sensitive bird species, no species of international and/or national conservation concern (Red Data species, IUCN/Birdlife International 2011, Barnes 2000), ranging from Near Threatened to Vulnerable, were considered as possible to occur on site.

In terms of reptilian biota one red data specie are listed to habituate the area. The African Rock Python (*Python natalensis*). Proper environmental awareness training should be done for all staff on the farms to enlighten them to the possible occurrence and how to act when these species are encountered.

## **4.2 Socio Economic Environment**

### **4.2.1 Lephalale Local Municipality**

The Lephalale Municipality is located in the north western part of the Waterberg District of Limpopo and is the biggest municipality in the province- covering 14 000km<sup>2</sup>. Lephalale Local Municipality is rich in natural resources that give it a competitive advantage in Mining, Energy, Tourism and Agriculture (Lephalale Municipality, 2018). Agriculture as a sector, presents one of the greatest opportunities to significantly grow the South-African economy and create jobs. According to the IDP, agriculture is the sector that employs the largest part (38.85%) of the workforce within the municipality and is followed directly by community service (15.71%). The agricultural sector is therefore essential for food security and employment contribution within the municipality. This is vital as the unemployment in the area is a staggering 22% of the population. Further demographics state that the Lephalale Municipality has a population of 140 240 people (Statistics South Africa, 2016).

The youth represent 40.7% of the population. Approximately 43 002 households live within the municipality, with an average household size of 3.2 people. Given the size and the population, the population density within the area is calculated as 8 people per square kilometres. The community survey of 2016 projected a 21.8% in the male population compared to the 13.5% of the female population with an overall increase of 18% in 2016 against the 35.8% of 2011. This increase can be attributed to the skills development- and job opportunities within the municipality as a result of the Waterberg coalfield. The survey also suggested a population increase that is found to be higher than the provincial growth rate of 0.84% p.a. for the past five years. Almost 58.4% of the population is economically active in terms of age.

Lephalale offers a variety of scenic contrasts which includes mountain ranges, clear streams and rolling hills. Archeologically, the municipality is rich in geological sites encompassed by rock art- attributing to the tourist attractiveness of the area. Tourism in the area is also increased by the hunting and ecotourism industries. Industrial operations as well as related business tourism also contribute economically to the municipality. Agriculture, especially red meat is one the potential economic activity which is likely to grow in the municipal area. Both social infrastructure and economic infrastructure indicators show that much must still be done to improve the quality of life of the people of Lephalale (Lephalale Municipality, 2018).

## **5. LEGISLATIVE FRAMEWORK**

The following section includes the primary list of legislation which is deemed relevant to the proposed development on all levels of government, including the constitutional, national, provincial, and local level. Although the aim was to be as comprehensive as possible the list does not represent a complete legal compliance review and the responsibility remains with the Proponent to ensure compliance with the required legislation.

### **5.1 The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)**

The Constitution of the Republic of South Africa is the principal legal source of the Republics' legislative framework, including its environmental law. The Bill of Rights is fundamental to the Constitution of South Africa. Section 24 of the Act states that:

Everyone has the right (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that (i) prevent pollution and Ecological degradation; (ii) promote conservation; and (iii) secure Ecologically sustainable development and use of natural resources while promoting justifiable Economic and social development. (Government Gazette, 1996).

The Constitutional environmental right not only afforded every person with the entitlement to enjoy a right to an environment which is not harmful to their health and well-being, but also placed a constitutional mandate on government to protect the environment through reasonable legislative and other measures. (PULP, 2010)

### **5.2 Environment Conservation Act, 1989 (ECA) (Act 73 of 1989)**

The primary objective of the ECA is to provide for the effective protection and controlled utilization of the environment. This Act has been largely repealed by NEMA, but certain provisions remain, in particular provisions relating to environmental impact assessments (EIA). Section 2 of the act contains the policy framework of the to achieve the above. It states that:

- 2(1) Subject to the provisions of subsection (2) the Minister may by notice in the gazette determine the general policy to be applied with a view to –*
- (a) the protection of ecological processes, natural systems, and the natural beauty, as well as the preservation of biotic biodiversity in the natural environment;*
  - (b) the promotion of sustained utilization of species and ecosystems and the effective application and re-use of natural resources;*
  - (c) the protection of the environment against disturbance, deterioration, defacement, poisoning, or destruction as a result of man-made structures, installations, processes, products, or human activities; and*
  - (d) the establishment, maintenance and improvement of environments which contribute to a generally acceptable quality of life for the inhabitants of the Republic of South Africa. (ECA) (Act 73 of 1989).*

### **5.3 National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998)**

The NEMA Act provides the primary enabling vehicle Section 24 of the Constitution of the Republic of South Africa (Act 108 of 1996). The core environmental principle is the promotion of ecologically sustainable development. This Act introduces cooperative governance of environmental matters by establishing the necessary governmental institutions that will ensure proper implementation of environmental protection.

NEMA also makes provision for fair environmental decision-making and for conciliation and arbitration of conflicts. As part of the process of integrated environmental governance, NEMA introduces a new framework for environmental impact assessments. Finally, based on the doctrine of strict liability, NEMA also introduces a far-reaching general duty of care to prevent, control and rehabilitate the effect of significant pollution and environmental degradation, including historic pollution and environmental degradation. (PULP, 2010)

#### **5.4 National Environmental Management: Biodiversity Act, 2004 (NEM:BA) (Act 10 of 2004)**

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. It provides for the protection of species and ecosystems in need of protection, sustainable use of indigenous biological resources, equity in bio-prospecting, and the establishment of a regulatory body on biodiversity –South African Biodiversity Institute. (PULP, 2010) In terms of the Biodiversity Act, Proponents have the responsibility for:

- ❖ The conservation of endangered Ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations),
- ❖ Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with Ecological sustainable development and protection of biodiversity,
- ❖ Limit further loss of biodiversity and conserve endangered Ecosystems.

#### **5.5 National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004)**

In regulating air quality in South Africa, the NEM:AQA was introduced to protect the environment by introducing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development whilst promoting justifiable economic and social development. In addition, the act aims to provide national norms and standards for regulating air quality monitoring as well as air quality management and control. The list of activities included in General Notice 248 must be considered for any activities that produces emissions. The following passages of the act bare relevance;

*Section 22: No person may without a provisional atmospheric emissions licence conduct an activity;*  
*(a) listed on the national list anywhere in the Republic; or*  
*(b) listed on the list applicable in a province anywhere in the province.*

#### **5.6 National Environmental Management: Waste Act, 2008 (Act 59 of 2008)**

Act no 59 of 2008 provides for the control of waste management activities which have or is likely to have a detrimental effect on the environment. The act aims to;

- ❖ Reform the law regulating waste management in order to protect health and the environment by providing reasonable measures to prevent pollution and Ecological degradation and for securing Ecologically sustainable development,
- ❖ To provide for institutional arrangements and planning matters,
- ❖ To provide for national norms and standards for regulating the management of waste by all spheres of government,
- ❖ To provide for specific waste management measures,
- ❖ To provide for the licensing and control of waste management activities,
- ❖ To provide for the remediation of contaminated land,
- ❖ To provide for a national waste information system,

- ❖ To provide for compliance and enforcement, and
- ❖ To provide for all matters related to the above aspect.

Importantly the act furthermore includes requirements that stipulate that no person may commence, undertake, or conduct a waste management activity listed in the act unless a licence is issued in respect of that activity.

### **5.7 National Water Act, 1998 (NWA) (Act 36 of 1998)**

The National Water Act (NWA) identifies 11 consumptive and non-consumptive water uses in terms of section 21 of the act which must be authorized. The authorization system includes scheduled uses, general authorizations, and licences. It allows for the reserve of the specific water resource to be determined and also includes a public involvement process in the establishment of strategies and decision-making and guarantees the right to appeal against such decisions. The reserve is defined by the quality and quantity of the water resource in order to meet basic human needs as well the Ecological requirements.

Section 27 of the NWA specifies that the following factors regarding water use authorization be taken in consideration:

- ❖ The efficient and beneficial use of water in the public interest;
- ❖ the socio-Economic impact of the decision on whether or not water use is authorized;
- ❖ alignment with the catchment management strategy;
- ❖ the impact of the water use, and possible resource directed measures;
- ❖ investments made by the Proponent in relation with the water resource in question.

### **5.8 National Heritage Resources Act, 1999 (NHRA) (Act 25 of 1999)**

Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study be undertaken for:

- (a) *construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
- (b) *construction of a bridge or similar structure exceeding 50 m in length; and*
- (c) *any development, or other activity which will change the character of an area of land, or water –*
  - (1) *exceeding 10 000 m<sup>2</sup> in extent;*
  - (2) *involving three or more existing erven or subdivisions thereof; or*
  - (3) *involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or*
- (d) *the costs of which will exceed a sum set in terms of regulations; or*
- (e) *any other category of development provided for in regulations.*

### **5.9 Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)**

The main aim of this act is to provide a legal vehicle for the protection of productive agricultural resources. The act provides for the control and protection of wetlands, soil conservation matters, control and prevention of veld fires, control of weeds and invader plants, and the control of pollution via agricultural practices. The act therefore focusses on fighting of soil erosion, the protection of water resources, and combatting the degradation of indigenous vegetation conducive to agricultural practices through the control of invasive alien vegetation.

## **5.10 Municipal Systems Act, 2000 (Act 32 of 2000)**

The Municipal Systems Act form part of a string of other legislation which aims at empowering local government to fulfil its constitutional obligations. As part of this objective the SA government published the Local Government White Paper in 1998, which outline the policy framework for local government structures. In addition, government furthermore published the Municipal Demarcation Act, 1998 (Act 27 of 1998) which allowed for the demarcation of new municipal boundaries, the Municipal Structures Act, 2000 (Act 33 of 2000) which outlines the required structures of a local authority and the Municipal Financial Management Act, 2003 (Act 56 of 2003) which must secure sound and sustainable management of the fiscal and financial affairs of municipalities and municipal entities by establishing norms and standards and other requirements for the lawful financial management of these entities.

The Municipal Systems Act work in unison with these sets of legislation by regulating key municipal organizational, planning, participatory and service delivery systems. In combination, these sets of legislation provide a framework for the democratic, accountable, and developmental local government system as envisaged by the Constitution.

## **5.11 National Development Plan**

The National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society. It is a plan for South Africa, and it provides a broad strategic framework to guide key choices and actions. Given the complexity of national development, the plan sets out six interlinked priorities:

- ❖ Uniting all South Africans around a common programme to achieve prosperity and equity.
- ❖ Promoting active citizenry to strengthen development, democracy, and accountability.
- ❖ Bringing about faster economic growth,
- ❖ Higher investment and greater labour absorption. Focusing on key capabilities of people and the state.
- ❖ Building a capable and developmental state.
- ❖ Encouraging strong leadership throughout society to work together to solve

## **5.12 Integrated Environmental Management**

The term Integrated Environmental Management (IEM) has been used in South Africa since the 1980's. Documentation on how IEM would assist the EIA process was originally produced in 1992 by the then National Environmental Management Competent Authority. The need has since arisen for more comprehensive inputs in the EIA process, and this paved the way for the development of the Integrated Environmental Management Series in 2002 which consisted of a set of booklets providing more detailed insights in the approach and methodologies associated with EIA. In brief, the IEM seeks to achieve the following;

*“Integration of environmental considerations across the full lifecycle of the activity: for example, for a project this implies consideration of environmental issues through pre-feasibility, feasibility, planning and design, construction, operation and decommissioning” (DEAT 2002).*

## **5.13 Occupational Health and Safety Act, 1993 (Act 85 of 1993)**

The Occupational Health and Safety Act, 1993 (Act 85 of 1993) provides for the health and safety of persons at work as well as for the health and safety of persons working near or with plant and machinery. The Act also

protects persons, other than persons at work, against hazards to health and safety due to the activities of persons at work.

#### **5.14 Sustainable Project**

The principle of Sustainable Project has been established in the Constitution of the Republic of South Africa (108 of 1996) and given effect by NEMA and the ECA. Section 1(29) of NEMA states that sustainable project means the integration of social, economic, and environmental factors into the planning, implementation, and decision-making process so as to ensure that project serves present and future generations. Thus, Sustainable Project requires that:

- ❖ The disturbance of Ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- ❖ That the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- ❖ That waste is avoided, or where it cannot be altogether avoided, minimised, and re-used or recycled where possible and otherwise disposed of in a responsible manner
- ❖ That a risk-averse and cautious approach is applied, which considers the limits of current knowledge about the consequences of decisions and actions;
- ❖ Negative impacts on the environment and on people's environmental rights be anticipated; and, prevented and where they cannot altogether be prevented, are minimised and remedied.

#### **5.15 The Waterberg Bioregional Plan**

Bioregional plans are one of a range of tools provided for in the National Environmental Management: Biodiversity Act (No. 10 of 2004) (hereafter referred at as the Biodiversity Act) that can be used to facilitate the management and conservation of biodiversity priority areas outside the protected area network. The purpose of a bioregional plan is to inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land-use planning and decision-making guidelines. (WDBP, 2016)

In terms of this plan the site area has been identified as a no natural remaining area (NNR site). It does however border on a range of other CBA and ESA areas. In terms of the bioregional plan this translates into areas that have been selected as the best option for meeting biodiversity targets based on complementarity, efficiency and/or avoidance of conflict with other land uses. In terms of the ESA1 category the area is described as containing remaining areas of Waterberg escarpment, hills, and ridges, which is identified as sensitive habitats in the Environmental Management Framework and other ecological support features such as climate change adaptation and Important Bird Areas (IBA's).

## 6. ROLES AND RESPONSIBILITIES

In order to ensure that the prescribed mitigation, rehabilitation, and monitoring measures are effectively and efficiently implemented in all the relevant stages of the proposed development, it is important to assign certain responsibilities to the specific managers thereof. The success of the implementation of the aims of this EMPr will not only depend on whether appropriate mitigation and rehabilitation measures have been adequately identified, but also on the level of commitment of all the responsible individuals to implement the recommendations which are proposed in this document.

### 6.1 Government Departments

As the responsibility for the protection of our natural heritage lies with the relevant Government Departments, they have the power to conduct site inspections to ensure that the development complies with all legislation, regulations, and standards. They may enforce penalties where non-compliance occurs.

### 6.2 Applicant

The party or agent who is the contractual owner of the project during the construction and operational phases and who will be responsible for the long-term maintenance of the proposed infrastructure is the Applicant. In the case of the Storage Dam Development, the Applicant is;

**Mr Thinus Maritz Vaalwater (PTY) Ltd.**

PO Box 1034

Vaalwater

0530

Tel: (014) 755 4976

E Mail: vaalwater@thinusmaritz.co.za

The Applicant is responsible for:

- ❖ the implementation of the EMPr (from the initiation of the project up to and during the operational phase) and all the prescribed rehabilitation,
- ❖ the relevant environmental management measures (i.e. constant monitoring and maintenance in line with the conditions of environmental authorizations and licenses) in terms of the operational phase and associated infrastructure,
- ❖ appointing a project manager/s or Principal Contractor that will represent the Applicant and who will liaise competently with all the Services agencies, contractors, the local community, and the other entities involved.

### 6.3 Principal Construction Contractor or Principal Contractor (PC)

The Principal Contractor will be responsible for the implementation of this document during the construction phase of the project. With relevance to the EMPr the PC is responsible for:

- ❖ appointing a construction manager to act as representative for the PC and their staff,
- ❖ responding timeously to any complaints and commands issued by the Environmental Control Officer (ECO) or,
- ❖ recording any paper trails from the developer/implementing agent, ECO, Community, and the PC,
- ❖ rehabilitating the site to conditions acceptable to the directives of the EMPr and the reasonable approval of the ECO,
- ❖ compliance to any applicable laws and acts specifically those relevant to the project



- ❖ conducting site inspections along with the ECO.

**PLEASE NOTE:** It is imperative that the EMPr must be included in the principal construction contract documents and the PC must also include the items of the EMPr to be priced in the bill of quantities, in order for the required provisions to be made towards responsible environmental management.

#### **6.4 Environmental Control Officer (ECO)**

The Applicant is responsible for employing an Environmental Control Officer (ECO) at the start of the construction phase.

The ECO, on behalf of the implementing agent will be responsible for:

- ❖ liaising with the PC to ensure that the environmental management procedures of the EMPr are implemented and are effective,
- ❖ ensuring that the Contractors/Sub-contractors and Employees are aware of their environmental impact,
- ❖ conducting monthly compliance audits and developing detailed reports with concerns identified and proposed risk mitigation for the PC to consider and attend to,
- ❖ liaising between the developer/implementing agent and the PC (and the relevant appointed sub-contractors) with regard to all environmental concerns, and
- ❖ the ECO in association with the relevant parties will also be responsible for assisting in the resolution of conflicts arising due to the proposed infrastructure development.

#### **6.5 The Local Community**

It is important to involve the local communities where this is relevant in terms of impacts that the development may have on their activities or facilities. If possible, a local community member or group should be identified to which pertinent information can be communicated. These parties will also have an open channel through the ECO to communicate any issues to the Applicant.

#### **6.6 In General**

All of the abovementioned parties are responsible for appointing representatives that are suitably qualified to perform the necessary tasks appointed to them. These representatives must also be able to interact within a professional team in order to facilitate all the relevant activities needed for the successful implementation of the EMPr and the completion of the proposed Dam Infrastructure development.

#### **6.7 Monitoring**

Monitoring forms an integral part of the success of an EMPr and must take place on a continual basis. This will ensure that the EMPr is implemented appropriately. Monitoring will also assist in establishing the appropriateness of the mitigating measures and in identifying any other aspects that might need to be included in the EMPr. Where non-compliance did occur, monitoring will assist in determining the effectiveness of the remediation measures implemented and it will assist in identifying any other measures that might be needed. The monitoring programme will be addressed in Chapter 8.

## 7. BIOPHYSICAL, SOCIO-ECONOMIC, AND CULTURAL IMPACTS AND THE ASSOCIATED MITIGATION AND REHABILITATION MEASURES

Table 2: Mitigation &amp; Rehabilitation Measures

<b>BIOPHYSICAL ENVIRONMENT</b>			
<b>ASPECT &amp; RELATED ENVIRONMENTAL RISKS</b>	<b>RISK CATEGORY (With Mitigation)</b>  <b>LOW</b> <b>MEDIUM</b> <b>HIGH</b>	<b>PROJECT PHASE</b>  <b>RESPONSIBLE PARTY</b>  <b>PERFORMANCE INDICATOR</b>	<b>MITIGATION AND REHABILITATION MEASURES</b>
<p><b>Aspect:</b></p> <p><b>Environmental Awareness</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Fires.</li> <li>❖ Sensitive habitat.</li> <li>❖ Sensitive species. (See Vegetation and Animal Life)</li> <li>❖ Proper personal conduct.</li> <li>❖ Community safety.</li> <li>❖ Spread of HIV Aids.</li> <li>❖ Pollution.</li> <li>❖ EMPr.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Medium</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Construction &amp; Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Environmentally sensitive and responsible conduct.</li> <li>❖ Community safety.</li> </ul>	<ul style="list-style-type: none"> <li>❖ If any, cooking in the construction camps must be performed by electrical or gas stoves in well ventilated areas which are declared safe for this purpose. Designated fireplaces must be provided for, in the construction camps in safe areas away from flammable materials. No fires may be built outside these areas.</li> <li>❖ Sufficient temporary ablution facilities (1 for every 15 people) in the form of chemical toilets must be provided for all employees during the construction phase of the development. These ablution facilities must be serviced on a regular basis as per the contractor's schedule that provides them.</li> <li>❖ Conduct Environmental Awareness talks to sensitize any and all visitors and employees on the site to the relevant site-specific sensitivities.</li> <li>❖ AIDS awareness talks must be also form part of the Environmental Awareness Talks.</li> <li>❖ This EMPr must be made available to all employees, construction employees, visitors, and maintenance personnel on the site to ensure that they are informed of the appropriate environmentally responsible conduct. A copy must therefore be held at the site offices at all times.</li> <li>❖ All employees, construction employees, maintenance personnel and the PC must be made aware of the location of the EMPr document (at the site and farm office) and of their responsibility to adhere to the content thereof.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<p>This action can be performed at an Environmental Awareness talks at the first appropriate time when the bulk of the contractors and sub-contractors have been appointed.</p> <ul style="list-style-type: none"> <li>❖ Activities such as littering, informal settlement, loud music and other ill-mannered behaviour will be regarded as unacceptable, and it will be the responsibility of the various contractors and other employers to ensure that employees under their supervision conduct themselves appropriately. These actions must be reported to the ECO who will see to the issuing of the relevant fines. See APPENDIX 1.</li> <li>❖ No damage and/or removal of indigenous plant or animal material for cooking or other purposes will be allowed. See APPENDIX 1.</li> </ul>
<p><b>Aspect:</b></p> <p><b>Start of Construction &amp; Related Activities</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Site clearance for dam.</li> <li>❖ Compaction of resident soils by construction vehicles.</li> <li>❖ Possible contamination by fuels and other construction materials.</li> <li>❖ Security.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Medium</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction &amp; Construction</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Public awareness of start of construction on site.</li> <li>❖ Safety around the construction site.</li> <li>❖ Design and construction of the construction camps.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The PC must, at a relevant staff meeting communicate the dangers of the construction site and stress that the site is specifically out of bounds for staff and farm children.</li> <li>❖ Special arrangements must be made for traffic management specifically during the construction phase and the of the Applicant and the PC must ensure that the relevant warnings are communicated to the surrounding landowners before the commencement of major construction.</li> <li>❖ A complaints register must be maintained on site. (See APPENDIX 5)</li> <li>❖ The whole of the construction site should preferably be fenced off during construction. The PC must in addition provide suitably visible signage (visible for farm staff) informing people that the site is under construction and that no access is allowed for any unauthorised persons. No casual access may be allowed here.</li> <li>❖ Full documentation (ID, contact details and of next of kin) of all construction personnel must be kept on file at the site office and no unauthorized persons may be allowed on site.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<ul style="list-style-type: none"> <li>❖ Traffic.</li> <li>❖ Access.</li> <li>❖ Occupational Health and Safety.</li> </ul> <p><i>See Appendix 2_Typical Composition of Construction Camp</i></p>	<ul style="list-style-type: none"> <li>❖ Medium</li> <li>❖ Low</li> <li>❖ Medium</li> </ul>	<ul style="list-style-type: none"> <li>❖ Responsible environmental management in and around construction camps.</li> <li>❖ Concurrent management of Occupational Health and Safety aspects.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The construction phase must be managed by strict management guidelines (EMPr as well as the internal guidelines of the individual contractors), and it will be the responsibility of the relevant contractors to ensure that they themselves and their employees conduct themselves according to the management guidelines laid down.</li> <li>❖ Vegetation clearance for the erection of construction camps must be avoided and the existing farm facilities must be used.</li> <li>❖ The main site office must be situated at or near the closes farm store area. Temporary water and fuel tanks must also be contained in the camp as well as a workshop area.</li> <li>❖ Adequate water, sanitation and solid waste disposal services must be provided or arranged for prior to human habitation on the site. Solid waste should be sorted into categories and those not suited to be dumped in an appropriate waste skip at the temporary facility (E.g. cement and chemicals) must be dumped at a licenced waste disposal facility designed for this purpose. A suitable site must be selected for the waste skip site and this site should only contain materials that do not pose any risk in terms of surface or sub surface environmental contamination (e.g. building rubble). This site must also be suitably rehabilitated after completion of the construction activities.</li> <li>❖ Any batching plants must be positioned away from any drainage feature (i.e. Further than 100m away, horizontally from any drainage feature). All runoff from batching areas must be strictly controlled.</li> <li>❖ Cement contaminated water must be collected, stored, and disposed of at a site approved by the ECO. Appropriate measures for overflow from batching plants, e.g. during heavy rains, must be put in place. The batching plant shall be bunded with earth berms, sandbags, or straw bales to prevent runoff escaping from the site.</li> <li>❖ Waste concrete and cement sludge must be scraped off the site of the batching plant daily and removed to an approved landfill site. Concrete shall not be mixed directly on the ground. Plastic liners or mixing trays are to be used.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<ul style="list-style-type: none"> <li>❖ Special attention must be given to any temporary fuel tank and its surrounding area. This area should be appropriately designed, in a watertight bunker which is able to hold 110% of the volume of the tank itself. The area should be monitored on a weekly basis to ensure that no fuel is leaking into the local environment.</li> <li>❖ The drainage valve of the bunded area may not be allowed to drain into the surrounding environment but must be pumped or emptied into containers to be removed by an oil recycling company or other suitable hazardous waste Contractor.</li> <li>❖ Should an accidental puncture of a fuel tank occur and the bunded area be breached, an appropriate Spills Specialist should be contacted immediately for clean-up operations. The topsoils and sub soils of the site of the spillage must be completely removed and be disposed of at a fittingly licensed facility by the Specialist. The excavation must be filled up to the top with healthy topsoils. This must be performed directly after a spillage and not only at the final rehabilitation of the construction camp to ensure no leaching of oils and fuels into the sub soils. See APPENDIX 3 for options.</li> <li>❖ Containment bunkers must be kept empty at all times to be prepared for any emergency spills.</li> <li>❖ All construction materials must be stored in designated areas that are suitable for the containment of that specific material. (Cement, paints, acidic cleaning agents and bitumen, must be stored in watertight containers within the construction camp). In the event of a spillage the appropriate environmental Spills Specialist must be contacted. The contaminated soils must be removed to a depth at which no sign of the contaminant is visible and replaced with healthy topsoils. See APPENDIX 3 for options.</li> <li>❖ Construction vehicles and equipment must be monitored and maintained on a regular basis (weekly) to ensure that no environmental contamination is brought about by oil, fuel, or hydraulic fluid leakages.</li> <li>❖ All fuel and lubricant oriented areas (for storage and waste) at the construction camp (e.g. diesel tanks, workshop shed, and compressor shed) must be constructed with impervious concrete floors and oil and fuel resistant walls, with</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<p>watertight sumps at the end of the catchment drains of these areas. Sumps must be pumped into suitable containers and removed by an appropriate Specialist, to a suitably licensed waste disposal facility.</p> <ul style="list-style-type: none"> <li>❖ On completion of construction the total extent of the construction camp must be dismantled, and full rehabilitation of the site be done.</li> <li>❖ Compacted soils must be loosened to a depth of 300mm and reseeded with seed of locally occurring indigenous grass species. This must occur in all the areas not to be taken up by buildings or paved infrastructure. All soils in areas contaminated with cement dust, small oil and fuel leakages and other contaminants must be removed to an appropriate depth as per the specific contaminant as prescribed by the ECO. These soils must be replaced with suitably healthy soils (able of harbouring plant and animal life) and be stabilized by contouring the soils according to the local site contours, be reseeded or re planted with soil stabilising grass species.</li> <li>❖ Drivers of construction vehicles must be informed to make use of accepted access roads only and not enter into any sensitive areas. (E.g. 32m buffer areas of rivers)</li> <li>❖ A suitably qualified and duly registered Occupational Health and Safety Officer must be appointed to manage the relevant health and safety aspects during the proposed Infrastructure development.</li> <li>❖ Construction employees and staff must be supplied with sufficient protective clothing and other gear (e.g. ear plugs) and must furthermore be trained how to use this gear properly by the Occupational Health and Safety Officer.</li> <li>❖ Also see Recommendations under Geology and Soils.</li> </ul>
<p><b>Aspect:</b></p> <p><b>Cutting and Filling</b></p> <p><b>Impacts:</b></p>		<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction</li> <li>❖ Construction</li> </ul> <p><b>Responsible Parties:</b></p>	<ul style="list-style-type: none"> <li>❖ Specific sites were cut and fill activities are needed must be inspected by qualified engineers and signed off as stable and safe before construction activities can commence here.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<ul style="list-style-type: none"> <li>❖ Stability of specific cut and fill sites.</li> <li>❖ Public Safety.</li> <li>❖ Occupational Health and Safety.</li> <li>❖ Rubble removal.</li> <li>❖ Waste Soils.</li> <li>❖ Blasting</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p>Applicant, PC, &amp; ECO</p> <p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>❖ Environmentally responsible conduct during cutting and/or blasting operations.</li> <li>❖ Occupational health and safety.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Topsoil (top 300mm layer minimum) must be removed, prior to any earthmoving activities and stockpiled separately from subsoil material.</li> <li>❖ Where these procedures are used during the construction process, rubble associated with the cut operations (natural and not building rubble) must be used during rehabilitation in the fill areas where no structural stability is needed. E.g. in front of the structures. Rubble may not be left anywhere on the construction site or be pushed down valleys or drainage ways. Materials and rubble left over must otherwise be reshaped and re-vegetated to resemble the surrounding landscape.</li> <li>❖ Material (only natural) from cutting should be used for the shaping of earth berms or for rehabilitation.</li> <li>❖ Near vertical slopes (1:1 or 1:2) where erosion control measures (e.g. gabions) are not to be placed must be stabilized using hard structures following specifications, preferably with a natural look and facilities for plants to grow in. <ul style="list-style-type: none"> <li>- Areas with a 1:3 – 1:6 slopes must be logged or covered with a biodegradable membrane material (e.g. Kaytech Soil Saver).</li> <li>- Secured logs must be placed in continuous lines following the contours and spaced appropriately depending on the steepness (aspect) of the slope.</li> <li>- These slopes must be seeded with an indigenous grass mix to reduce soil erosion.</li> <li>- A maintenance programme must be developed to ensure sufficient coverage of the grassed areas and to detect and rehabilitate eroded areas timeously.</li> </ul> </li> <li>❖ Where the excavation work involves the use of explosives, a method statement must be developed in accordance with the applicable explosives legislation, The Explosives Act 2003 (Act 15 of 2003) by an appointed person who is competent in the use of explosives for excavation work and the contractor shall ensure that the procedures therein are followed.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<ul style="list-style-type: none"> <li>❖ Where there is a reasonable possibility of damage to power and telephone lines or any other property, the contractor shall suitably adapt his method of blasting and the size of charges and shall use adequate protective measures, such as cover blasting, to limit the risk of damage as far as possible. Specific requirements relating to certain services may be included in the Project Specifications.</li> <li>❖ Vibrations caused by blasting operations must be recorded by one or more blasting seismographs of a type as approved by the Engineer and in positions as described by the specialist blasting Consultant.</li> <li>❖ A photographic record shall be kept by the blasting Consultant of all properties that may be affected by the blasting operations.</li> <li>❖ The Engineer shall be given 24 hours' notice by the Contractor before each blasting operation is carried out.</li> </ul>
<p><b>Aspect:</b></p> <p><b>Climate</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ High rainfall in 24 hours could cause potential storm water related impacts e.g. scouring and erosion.</li> <li>❖ Potential water saturated soil conditions.</li> <li>❖ Flooding.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction</li> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Storm water management.</li> <li>❖ Responsible personal conduct of construction staff.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Implement a construction/management plan to specify the most appropriate time (preferably May – early September) for any construction activities to commence and to phase the construction phase so as to clear only those areas influenced by the next phase of construction.</li> <li>❖ Special attention must be given to the overall storm water design so as to increase the volume of local storm water absorption, thereby decreasing the volumes and velocities of storm water at the discharge ends of the storm water system.</li> <li>❖ Construction and occupational phase storm water management must ensure community safety. Concentrated discharge must be avoided as far as possible and discharged safely.</li> <li>❖ Special attention must also be given to the design of the stormwater structures at the discharge ends of the overflow system so as not to cause erosion damage here.</li> </ul>



ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<ul style="list-style-type: none"> <li>❖ Electrical storms.</li> <li>❖ Veld fires.</li> <li>❖ Precautionary measures.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<ul style="list-style-type: none"> <li>❖ Responsible environmental management practice.</li> <li>❖ Personal safety</li> </ul>	<ul style="list-style-type: none"> <li>❖ Employees and staff must be educated on the incidence of lightning and how to work safely under these conditions. This aspect must furthermore be overseen by the site health and safety representative.</li> <li>❖ Ensure that the founding structures of all the dam wall structures and infrastructure are constructed during a time of stable sub soil conditions and as per engineer's detail.</li> <li>❖ Special attention must be given to the recommendations of the dam safety reports. It is further recommended that the applicant compile a list of emergency contacts (SAPS, Vaalwater and Lephalale EMS Services) Downstream neighbours) who must be contacted during the event of a dam failure.</li> <li>❖ Strict safety management rules must accompany the manifest of the Infrastructure development in terms of fire safety. No fires may be allowed outside of designated fireplaces and braai areas. All activities and facilities which has fire related activities must be provided with the appropriate fire distinguishing equipment which must be monitored and serviced by a qualified service operator on a regular basis, according to NHBRC specification.</li> <li>❖ Heavy downpours can create flash floods and the site area is specifically prone to these incidences during the summer months. The PC during construction and the Farm management during the operational phase must create clearly visible on-site awareness to the risk of flash flooding.</li> </ul>
<p><b>Aspect:</b></p> <p><b>Geology and Soils</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Loss of topsoil – (essential vegetative substrate).</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction</li> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p>	<ul style="list-style-type: none"> <li>❖ Topsoil (top 300mm layer minimum) must be removed prior to any earthmoving activities and stockpiled separately from subsoil material and only at the sites of the construction camps and the footprints of the specific structures to be built. The stockpiled topsoil mounds should not exceed 1,5m in height.</li> <li>❖ Topsoil stripping should occur in a phased manner and only where construction will follow rapidly to avoid long periods of exposure and only during periods of low precipitation to avoid erosion and subsequent siltation of nearby water bodies.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<ul style="list-style-type: none"> <li>❖ Scouring and erosion</li> <li>❖ Compressibility and collapse potential of transported and residual soils between founding depth and bedrock.</li> <li>❖ Site drainage – to reduce risk of subsurface material saturation and consequent differential movement.</li> <li>❖ Perched water conditions on shallow soils.</li> <li>❖ Contaminations</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Medium</li> </ul>	<p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>❖ Topsoil conservation.</li> <li>❖ Storm water management.</li> <li>❖ Management of accidental contamination and spills.</li> <li>❖ Responsible environmental management practice.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Areas where construction must take place must be clearly demarcated to ensure that only these areas are stripped.</li> <li>❖ Stockpiled topsoil must not be compacted by any vehicle and should be protected against erosion. (E.g. construct a bunded area of sand around the topsoil stockpiles to ensure the containment of the topsoil).</li> <li>❖ Stockpiled topsoil must not be contaminated with oil, diesel, petrol, construction material or rubble or any other foreign matter, which may inhibit its potential to harbour faunal and floral communities after rehabilitation.</li> <li>❖ Stockpiled topsoil must not be used as fill material and should be replaced wherever rehabilitation is needed, after construction.</li> <li>❖ Compressibility and collapse potential of the soils and subsurface material of areas where the infrastructure is to be constructed should be investigated by a qualified engineer and construction should then commence according to the engineering Specialist's recommendations)</li> <li>❖ It is recommended that an engineering geologist or geotechnical engineer inspect all foundation areas and trenches prior to construction in order to identify and evaluate any surface or subsurface geological characteristics in variance with that found during the original geotechnical investigations. Any trench or cutting must also be declared safe to work in by the relevant Engineer and OHS Officer.</li> <li>❖ Special attention should be given to site drainage details. Qualified engineers should inspect the overflow areas and adequate drainage structures should be designed and constructed to avoid subsurface water saturation and possible structural failure.</li> <li>❖ Erosion control measures should be implemented to prevent siltation and loss of existing and remaining topsoil on site.</li> <li>❖ In the event of spills from vehicles, the area should be cleaned immediately using a bioremediation product, such as Petro-Clean TM or similar. The absorbent and soil must be placed in a bin and removed from the site by a certified company and disposed of as a hazardous waste at a licensed</li> </ul>

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			<p>commercial facility. No Hydrocarbons may escape into the environment. A spill recovery kit must be on site, along with trained personnel. See APPENDIX 3.</p> <ul style="list-style-type: none"> <li>❖ Vehicle tanks must not be over-filled. Overfill protection devices and shear-off valves must be installed in fuel dispensers and fuel dispensing hoses to prevent fuel spillages in the event of a drive-away during refuelling operations.</li> <li>❖ Staff must be trained to fill vehicles without spilling fuel.</li> <li>❖ A sufficient no. of Spill Kits must supply by a suitably accredited Supplier for the construction phase.</li> <li>❖ Any spill should be cleaned up immediately. Surface contaminations as a result of spillages outside of the dispensing apron area should also be cleared up immediately. Contaminated topsoils and surface water should be disposed of at designated hazardous waste handling facility or be managed by an appropriately qualified Contractor.</li> </ul>
<p><b>Aspect:</b></p> <p><b>Hydrology</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Lawful water use volumes.</li> <li>❖ EWR.</li> <li>❖ Unstable soil conditions as a result of water saturation.</li> <li>❖ Site drainage.</li> <li>❖ Scouring and erosion.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Medium</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction</li> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Storm water management.</li> <li>❖ Management of accidental</li> </ul>	<ul style="list-style-type: none"> <li>❖ Water use volumes must stay within the existing lawful water use volumes allocated to the Thinus Maritz Vaalwater (PTY) Ltd. farming operations. Reporting on the water use volumes must be conducted in terms of the DWS guidelines on a monthly basis.</li> <li>❖ The DWS must conduct the relevant ecological water reserve assessments for the Sterkstroom river to determine the correct EWR values for the river.</li> <li>❖ No long-term vegetation clearing of may occur. A construction management plan should be implemented to specify appropriate time for the bulk of the construction activities to commence (preferably May to early September).</li> <li>❖ The whole of the construction site may also not be cleared of vegetation at once. Site clearance may only proceed for the next phase of construction as per the construction management plan.</li> <li>❖ Construction work must be performed between the months of April/May to September/October as far as this is reasonably possible. Where this is not possible the PC must prepare a report stating the reasons and additional</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<ul style="list-style-type: none"> <li>❖ Siltation of downstream water bodies.</li> <li>❖ Surface water pollution as a result of spillages</li> <li>❖ Possible groundwater pollution.</li> <li>❖ Spillages that may occur during refuelling.</li> <li>❖ Ponding.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Medium</li> <li>❖ Medium</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p>contamination and spills.</p> <ul style="list-style-type: none"> <li>❖ Responsible environmental management practice.</li> </ul>	<p>measures that will be taken to curb storm water related impacts as well as the degradation of water quality.</p> <ul style="list-style-type: none"> <li>❖ The PC and the Applicant must create awareness of the dangers of the rivers and the dam infrastructure and especially during periods of high precipitation.</li> <li>❖ All such materials, fuels and chemicals must be stored in a specific and secured area to prevent pollution from spillages and leakages. Sufficient bunding of fuel storage tanks and chemical storage areas must be provided.</li> <li>❖ Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum.</li> <li>❖ Spill trays must be provided if refuelling of construction vehicles is done on site. See APPENDIX 3.</li> <li>❖ On site waste disposal and pit latrines must strictly be prohibited during the construction phase and disposal must be carried out with standard sealed chemical toilets and waste disposal containers. The Principal Contractor must make arrangements with the Vaalwater Municipality's waste section for proper disposal at licenced waste disposal sites of all construction waste.</li> <li>❖ No uncontrolled discharges may be permitted from the construction camp.</li> <li>❖ All spillages from any potential contaminants such as lubricants and hydro-carbon based fuels must be safely and immediately removed and disposed of at an appropriate site.</li> <li>❖ Surface water draining of contaminated areas containing oil and petrol should be channelled towards a sump which will separate these chemicals and oils.</li> <li>❖ Storm water shall not be allowed to flow through the batching area. Cement sediment shall be removed from time to time and disposed of in a manner as instructed by the RE.</li> <li>❖ Spoil sites may not be used for the disposal of hazardous or toxic waste.</li> <li>❖ Special attention must be given to site drainage details and adequate drainage structures must be designed and constructed to avoid subsurface water saturation and possible structural failure of infrastructure.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<ul style="list-style-type: none"> <li>❖ The use of all materials, fuels and chemicals which could potentially leach into underground water must be controlled and managed according to the relevant legislation.</li> <li>❖ Storm water drainage structures must be designed by qualified engineers and in a way, that disposes of the site storm water in a safe matter, which is not harmful to the surrounding environment in any way.</li> <li>❖ Sufficient numbers of temporary chemical toilets (1 per 15 people) must be installed by the PC for the time of the construction activity.</li> <li>❖ Storm water runoff must be channelled from open areas with retention structures around the construction areas. This must be done without compromising the conditions of the sub soil stability. Storm water outlets discharging stormwater from the surrounding areas during construction must contain energy dissipating structures that will curb erosion at specific dams into the stormwater canal as well as the at the Mokolo and Sterkstroom rivers.</li> <li>❖ Straw bales should be placed and adequately secured on all downhill locations where erosion may occur to prevent washouts and to retain siltation and topsoil from the site. A supply of straw bales must be kept on site for this purpose.</li> <li>❖ Vehicle tanks must not be over-filled. Overfill protection devices and shear-off valves must be installed in fuel dispensers and fuel dispensing hoses to prevent product free flow or fuel spillages in the event of a drive-away during refuelling operations.</li> <li>❖ Any spill should be cleaned up immediately. Surface contaminations as a result of spillages should be cleared up immediately.</li> <li>❖ The Applicant must develop a routine maintenance and rehabilitation plan or the Dam infrastructure. The plan must include routine inspections at all of the dam sites itself as well as along the entire length of the associated infrastructure according to the industry standard in order to detect any damage or erosion that might occur. Any damage or erosion damage must be reported and repaired immediately.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<p><b>Aspect:</b></p> <p><b>Vegetation and Animal Life</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Removal of vegetation and habitat as a result of construction activity.</li> <li>❖ Alien invasive plant species management.</li> <li>❖ Sensitive aquatic species.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Medium</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction</li> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicator:</b></p> <ul style="list-style-type: none"> <li>❖ Protection of indigenous vegetation.</li> <li>❖ Relocation of sensitive species on site.</li> <li>❖ Management of alien invasive species.</li> <li>❖ Environmental Awareness Training.</li> </ul>	<ul style="list-style-type: none"> <li>❖ All of the significant indigenous trees and other indigenous vegetation which fall within the areas to be developed if any must be retained or transplanted under the supervision of a specialist. Special attention must be given to ensure that the vegetation in these areas are not disturbed for any purposes i.e. firewood.</li> <li>❖ Any significant indigenous plant specimens (e.g. trees of 1,5m high with a trunk thicker than 150mm and vegetation clusters) that will come into harm's way must be transplanted, (if feasible from a transplantable point of view and to a similar suitable natural area of the site or in a temporary nursery (this can happen at a safe site near the construction camp) and be replanted in the natural areas of the site or be used in the rehabilitation or landscaping of the site during the post construction period.</li> <li>❖ Only indigenous vegetation must be planted during the operational phase to increase the biodiversity of the site and effort should be given to retain the natural character of the site as far as possible.</li> <li>❖ Any small game or other bird, reptile or amphibian specie that becomes trapped in the trenches or in any construction related activity may not be harmed and must be placed in a suitable container. The relevant LDEDET or closest SPCA must then be contacted to come and remove the animal. This Conservation Department or SPCA will then bear the responsibility to relocate the specie to a suitable habitat.</li> <li>❖ Proliferation of alien and invasive species is expected within disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the proposed Infrastructure project. Alien plant seed dispersal within the top layers of the soil within footprint areas, that will have an impact on future rehabilitation, has to be controlled.</li> <li>❖ Removal of the alien and weed species encountered on site must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998).</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<ul style="list-style-type: none"> <li>❖ Removal of species should take place throughout the construction and rehabilitation/ maintenance phases.</li> <li>❖ Removal of alien vegetation within the riverine areas must be undertaken manually, to prevent further disturbances to the soils which may exacerbate the problem.</li> <li>❖ Removal of alien vegetation within the riparian zone must preferably be undertaken manually.</li> <li>❖ Avoid the use of herbicides as far as possible. Should herbicides be deemed necessary, only herbicides approved by the Department of Water and Sanitation (DWS) may be used and care should be taken with the choice of herbicide to ensure no additional impacts on the riverine areas or indigenous floral species occur due to the herbicide used.</li> <li>❖ All removed plant material must be covered with a sail, that is tied down during transportation by road to prevent any blow-off from the vehicle.</li> <li>❖ Alien vegetation must be disposed of at a designated waste disposal site.</li> <li>❖ Alien invasive species management over the longer term must include the following measures: <ul style="list-style-type: none"> <li>- Liaison with surrounding stakeholders by the relevant department of the Vaalwater, to control upstream and surrounding nodes of seed production;</li> <li>- Identify priority species to control in consultation with relevant stakeholders;</li> <li>- Develop protocols for the removal of all alien species that show recruitment;</li> <li>- Rehabilitate disturbed areas to pre-disturbance conditions, invasive grass species must not be utilised during rehabilitation activities;</li> <li>- Keep grass height (of indigenous grass species) as tall as possible as this enables it to effectively out-compete weeds and tolerate greater disease/ pest pressure so reducing the number of herbicides needed.</li> </ul> </li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<p>Taller grass also uses water more efficiently than shorter grass and protects the soil from moisture loss and erosion (USEPA. 2006);</p> <ul style="list-style-type: none"> <li>- Re-assessment and monitoring of the area to determine success of the action and any follow-up measures required; and</li> <li>- Alien vegetation needs to be cleared on an ongoing basis along the length of both freshwater systems (where the Municipality has jurisdiction) in order to ensure these species do not outcompete re-established indigenous vegetation.</li> </ul> <p>❖ Aquatic specialist assessments has identified sensitive fish species that is specifically sensitive to gill smothering via excessive silt transported to the local rivers via silt laden stormwater. It is therefore critical that stormwater management and disturbances along local watercourses be limited. This must be done via rock lined and vegetated stormwater swales with regular erosion berms which drains stormwater into well vegetated areas where it can filter into the local soils. Any barren soil areas must be vegetated via the suitable grass mix. Areas alongside watercourses must be vegetated via the appropriate vegetation palette prepared by a Specialist.</p>
<p><b><u>Aspect</u></b></p> <p><b>Site Sensitivities:</b> <b>Sterkstroom River</b></p> <p><b><u>Impacts:</u></b></p> <ul style="list-style-type: none"> <li>❖ Infrastructure repair.</li> <li>❖ Construction activities.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b><u>Project Phase:</u></b></p> <ul style="list-style-type: none"> <li>❖ Pre-Construction</li> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b><u>Responsible Parties:</u></b></p> <p>Applicant, PC, &amp; ECO</p> <p><b><u>Performance Indicators:</u></b></p>	<ul style="list-style-type: none"> <li>❖ Any construction or rehabilitation must preferably be undertaken in the dry seasons between April/May to September/October.</li> <li>❖ Rehabilitation of any areas cleared for any farming activity must be performed as soon as possible and as the construction process proceeds.</li> <li>❖ Rehabilitation in areas other than that mentioned in the first bullet of this section should include the following: <ul style="list-style-type: none"> <li>- Construction within the 32m buffer area of the Sterkstroom River must be conducted according to watercourse specific method statements.</li> </ul> </li> </ul>



ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<ul style="list-style-type: none"> <li>❖ Maintenance operations.</li> <li>❖ Watercourse rehabilitation</li> <li>❖ Sensitive aquatic species</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Medium</li> </ul>	<ul style="list-style-type: none"> <li>❖ Site sensitive design</li> <li>❖ Sensitive construction procedures</li> <li>❖ Watercourse specific construction method statements</li> <li>❖ Environmentally sensitive maintenance operations</li> </ul>	<ul style="list-style-type: none"> <li>- Where feasible, the bank of the watercourse where construction will occur should be sloped no steeper than 1:4 gradient to ensure stability and prevent further erosion.</li> <li>- When excavating for the repairs, care must be taken to store excavated soils as close as possible to the excavation itself but outside of any area susceptible to scouring and erosion.</li> <li>- It is of CRITICAL importance that excavated soils must be replaced in the same order than in which it was excavated. For this reason, soils must be stored in a manner that will allow for this.</li> <li>- Excavated soils must be protected against contaminations, rain downpours and associated stormwater impacts.</li> <li>- When construction has been completed, excavated soils in the 32m buffer areas of the riverine areas must be replaced in the same sequence as was excavated to ensure speedy restoration of these areas.</li> <li>- Where required, erosion berms should be designed below un-surfaced access roads (maintenance), to prevent siltation and erosion of the freshwater resources. The following points should serve to guide the placement of erosion berms: <ul style="list-style-type: none"> <li>• Where the track has slope of less than 2%, berms every 50m should be installed;</li> <li>• Where the track slopes between 2% and 10%, berms every 25m should be installed;</li> <li>• Where the track slopes between 10%-15%, berms every 20m should be installed; and</li> <li>• Where the track has slope greater than 15%, berms every 10m should be installed.</li> </ul> </li> </ul> <p>❖ Aquatic specialist assessments have identified sensitive fish species that is specifically sensitive to gill smothering via excessive silt transported to the local</p>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<p>rivers via silt laden stormwater. It is therefore critical that stormwater management and disturbances along local watercourses be limited. This must be done via rock lined and vegetated stormwater swales with regular erosion berms which drains stormwater into well vegetated areas where it can filter into the local soils. Any barren soil areas must be vegetated via the suitable grass mix. Areas alongside watercourses must be vegetated via the appropriate vegetation palette prepared by a Specialist.</p> <ul style="list-style-type: none"> <li>❖ Stormwater infrastructure must be monitored on a regular basis and maintenance must be done in areas where the infrastructure does not function optimally.</li> </ul>
<p><b>Aspect</b></p> <p><b>Waste Management</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Waste Management Plan.</li> <li>❖ Recycling.</li> <li>❖ Storage.</li> <li>❖ Cleaning.</li> <li>❖ Disposal.</li> <li>❖ Waste Removal.</li> <li>❖ Record Keeping.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Construction Waste Management Plan.</li> <li>❖ Closure and Rehabilitation of construction site and construction site camps on completion of construction phase.</li> </ul>	<ul style="list-style-type: none"> <li>❖ All construction related areas and roads should be cleared of any construction waste and should be swept clean as to avoid the waste from entering the storm water systems.</li> <li>❖ All solid waste must be removed and transported to an approved registered landfill site on a weekly basis.</li> <li>❖ On completion of works, the contractor shall clear away and remove from the site all construction paint, surplus material, foundations, plumbing and other fixtures of every kind. Areas thus cleared shall be graded and scarified to restore the ground as near as possible to its original profile.</li> <li>❖ Waste must be recycled.</li> <li>❖ All hazardous waste including used oils and fuels and wash water containing hydrocarbons must be managed in accordance with its hazardous substance category. Hazardous wastes must be taken away to the nearest hazardous waste handling facility on managed by an appropriate hazardous wastes Contractor.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
		<ul style="list-style-type: none"> <li>❖ Waste re-use, recycling and disposal record keeping.</li> <li>❖ Hazardous waste</li> </ul>	
<p><b>Aspect</b></p> <p><b>Fuel Management</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Storage.</li> <li>❖ Re-Fuelling.</li> <li>❖ Drip trays and Spill Kits.</li> <li>❖ Notification.</li> <li>❖ Rehabilitation.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Medium</li> <li>❖ Medium</li> <li>❖ Low</li> <li>❖ Medium</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Management of fuel related areas.</li> <li>❖ Spill management.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Re-fuelling must take place in the designated area with sufficient surface sealing such as a concrete liner to prevent spillage and soil contamination. See APPENDIX 1 &amp; APPENDIX 3.</li> <li>❖ Drip trays (min 100mm deep) must be placed under all vehicles awaiting maintenance, suspected of having a mechanical problem that can lead to a significant leakage, that is decommissioned and awaiting removal or that will remain in the parking area for more than one week.</li> <li>❖ Spill kits must be available in all vehicles that transport hydrocarbons for dispensing to other vehicles on the site. The dispensing devices (pump heads) must be compatible with the vehicles to which they are dispensing. In addition, the dispensing devices must be fitted with the necessary valves/ apparatus that will ensure that the nozzles do not drip fuel after pumping has stopped. See APPENDIX 3.</li> <li>❖ The whole of the site where vehicles are operated must undergo routine weekly inspections for any spillages, and these areas must be rehabilitated accordingly.</li> <li>❖ Applicable provincial and local government departments, local municipalities and adjacent landowners must be notified within 24 hours of a major spillage.</li> <li>❖ In the event of spills from vehicles, the area should be cleaned immediately using a bioremediation product, such as Petro-Clean TM. The absorbent and soil must be placed in a bin and removed from the site by a certified company and disposed of as a hazardous waste at a licensed commercial facility. No Hydrocarbons may escape into the environment. A spill recovery kit must be on site, along with trained personnel. See APPENDIX 3.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<p><b>Aspect:</b></p> <p><b>Vehicle Maintenance</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Design</li> <li>❖ Maintenance area</li> <li>❖ Equipment</li> <li>❖ Machinery</li> </ul>	<ul style="list-style-type: none"> <li>❖ Medium</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Sustainable vehicle management for optimal use.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Vehicle maintenance may only be performed if in a sealed off area with an oil impenetrable floor. In the case that the PC cannot supply such a facility on site, all vehicles and machinery must be serviced and maintained off site. Vehicle maintenance yards and secured storage areas will be established as far as is practicable, further than 100m horizontally from and water course and buffer areas as determined by the storm water management plan. The maintenance yard should be indicated on the layout plan of the site.</li> <li>❖ The maintenance of vehicles and equipment used for any purpose during any phase must take place only in the maintenance yard.</li> <li>❖ Any breakdown other than that in the maintenance area of the site requires the presence of a spill treatment team and equipment. This team must prevent and mitigate any spills that occur in this situation.</li> <li>❖ Equipment used in the construction phase must be adequately maintained in order not to spill oil, diesel, fuel, or hydraulic fluid during operations.</li> <li>❖ Machinery or equipment used on the site must not constitute a pollution hazard in respect of the above substances. The main contractor, site manager or ECO shall order such equipment to be repaired or withdrawn from use if he or she considers the equipment or machinery to be polluting and irreparable.</li> </ul>
<p><b>Aspect:</b></p> <p><b>General Rehabilitation Measures</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Relevant phases of the activity</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p>	<ul style="list-style-type: none"> <li>❖ Rehabilitation should be implemented concurrently during construction and should aim to prevent erosion and aid the return of natural, endemic, and indigenous vegetation cover.</li> <li>❖ After any construction activities are complete, the services camp must be taken down and full rehabilitation of the temporary construction site be done. Compacted soils must be loosened to a depth of 300mm re-compacted lightly (via turf roller) and reseeded with seed of locally occurring indigenous ground covering species.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<ul style="list-style-type: none"> <li>❖ Contamination</li> <li>❖ Rehabilitation measures</li> </ul>	<ul style="list-style-type: none"> <li>❖ Medium</li> <li>❖ Low</li> </ul>	<p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>❖ Removal and rehabilitation of construction camps.</li> <li>❖ Rehabilitation of contaminated areas.</li> <li>❖ Establishment of sufficient vegetation layer on all barren soil areas.</li> </ul>	<ul style="list-style-type: none"> <li>❖ All soils contaminated with cement dust, small oil and fuel leakages and other contaminants must be removed to an appropriate depth as per the specific contaminant and as prescribed by the ECO and be taken to an approved landfill site. These soils must be replaced with healthy soils (able of harbouring plant and animal life) and be stabilized by contouring the soils according to the local site landform.</li> <li>❖ Site roads used during construction must also be reshaped according to the prevailing landform, scarified, fertilized and re-seeded and re-vegetated with indigenous grasses and vegetation.</li> <li>❖ After construction, the PC must ensure that the site is clean, and void of any soils, construction rubble or any other construction related materials.</li> <li>❖ All barren sections of the finished construction area around the development must be wetted and stabilized to form a good medium for planting. These areas must then be reseeded with indigenous species.</li> <li>❖ Construction areas must be cleared of any loose laying mounds of soil or other construction materials and litter. The ECO and the PC must organize a final site inspection to see if this measure is in place before the site is signed off as finished.</li> <li>❖ Cognisance must be taken of all of the mitigation and rehabilitation measures in the site specific EMPr and must be read in conjunction with this rehabilitation plan.</li> </ul>
<p><b><u>Aspect:</u></b></p> <p><b>Visual Environment</b></p> <p><b><u>Impacts:</u></b></p> <ul style="list-style-type: none"> <li>❖ Construction related activities.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> </ul>	<p><b><u>Project Phase:</u></b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction</li> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b><u>Responsible Parties:</u></b></p> <p>Applicant, PC, &amp; ECO</p>	<ul style="list-style-type: none"> <li>❖ Negative impacts related to the construction phase of the development will only last for the duration of the construction phase of the development and will thus not be permanent. The PC and subcontractors must see to the overall tidiness of the construction area and that construction vehicles, materials and personnel stay within the construction camps after hours, over weekends and on public holidays. For the relevant proposed fines see APPENDIX 1.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
❖ Final visual outlook of the development.	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>❖ Maintenance of construction camps and site during construction phase.</li> <li>❖ Screening of negative visual aspects of the proposed Infrastructure Development with vegetation.</li> <li>❖ Downlighting.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Indigenous vegetation must be used to screen negative visual aspects of structures. Screening must however not be obtrusive to the natural character of the site.</li> <li>❖ Screening vegetation and landscaping must be planted to ensure that it is applied in a way that compliments the vegetation of the region.</li> <li>❖ Existing vegetation should be retained as far as possible at the construction site and the temporary construction camp structures to act as visual screens/absorbers and dust collectors.</li> <li>❖ Construction camp to be positioned so as to reduce its visual intrusion. The construction camp and laydown areas must furthermore be screened with netting to reduce its visual impact during the construction phase</li> <li>❖ No painting or marking of natural features shall be allowed. Marking for surveying and other purposes shall only be with pegs and beacons.</li> <li>❖ Additional locally indigenous landscaping should also be implemented in key areas to screen negative visual aspects.</li> <li>❖ Topographic shaping should be implemented - final profile of rehabilitated areas is formed to emulate natural contours of the area. Cuttings and fill areas to be rehabilitated to emulate occurrence of natural rocky outcrops in the area both in colour and shape.</li> <li>❖ Rehabilitate/restore exposed areas as soon as possible after construction activities are complete.</li> <li>❖ Dust suppression techniques should be in place at all times during the construction phase.</li> <li>❖ No construction rubble, construction material, refuse, litter, or any other material not found naturally in the surroundings should be allowed at any time to be lying around on the construction site.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
<p><b>Aspect:</b></p> <p><b>Noise:</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Possible noise pollution occurring as a result of construction and operation activities.</li> <li>❖ Occupational Health and Safety</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Construction</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>Applicant, PC, &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Notification of surrounding landowner's pre-construction commencement.</li> <li>❖ Maintenance of construction and maintenance equipment.</li> <li>❖ Proper personal conduct by all construction staff.</li> <li>❖ Compliance with occupational health and safety regulations.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The surrounding landowners must be notified of the commencement of construction activities well in advance of the actual start of the activities (At least 4 weeks).</li> <li>❖ Noisy activities related to the construction phase of the development (e.g. vehicles, compressors, employees) must be kept to the necessary minimum. Construction activities must also be restricted to between 08:00 in the mornings and 05:30 in the evening and not on any weekend or public holidays. This must be monitored by the ECO and fines must be levied for non-compliance. (See APPENDIX 1).</li> <li>❖ All employees, construction employees and maintenance personnel must be instructed to be sensitive towards the surrounding landowners. This action can be performed via an Environmental Awareness Workshop at the first appropriate time when the bulk of the contractors and sub-contractors have been appointed. (See APPENDIX 1)</li> <li>❖ Activities such as loud music and other ill-mannered behaviour must not be allowed. This behaviour will be regarded as unacceptable, and it will be the responsibility of the various contractors and other employers to ensure that employees under their supervision conduct themselves appropriately. These actions must be reported to the ECO who will see to the issuing of the relevant fines. (See APPENDIX 1).</li> <li>❖ Construction vehicles and equipment must be regularly serviced to avoid the noise that these machines may make if in disrepair.</li> <li>❖ Construction employees and staff must be supplied with sufficient protective clothing and other gear (e.g. ear plugs) and must furthermore be trained how to use this gear properly by the Occupational Health and Safety Officer.</li> <li>❖ The contractor shall give the Engineer 24 hours' notice before any blasting operation is carried out.</li> </ul>

ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
			<ul style="list-style-type: none"> <li>❖ The Applicant via the contractor must inform surrounding landowners, the local community, and any other registered I&amp;AP at least 24 hours prior to blasting operations in order for them to make the necessary arrangement.</li> </ul>
<p><b>Aspect:</b></p> <p><b>Air Quality:</b></p> <p><b>Impacts:</b></p> <ul style="list-style-type: none"> <li>❖ Increased dust pollution could occur during construction activities.</li> <li>❖ Generation of dust on site dirt roads.</li> <li>❖ Occupational Health and Safety</li> </ul>	<ul style="list-style-type: none"> <li>❖ Low</li> <li>❖ Low</li> <li>❖ Low</li> <li>❖</li> </ul>	<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction;</li> <li>❖ Construction and</li> <li>❖ Operation</li> </ul> <p><b>Responsible Parties:</b></p> <p>PC &amp; ECO</p> <p><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>❖ Sufficient dust suppression regimes during construction and operation.</li> <li>❖ Speed control on gravel roads during construction and operation.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Dust suppression must be performed according to the seasonal changes and according to the prevailing site-specific circumstances via a dust suppression truck on the site roads, other construction areas and the parking areas.</li> <li>❖ Vegetation and landscaping of the larger development environment will help improve air quality over the long term and must therefore be planted wherever disturbed as far as possible.</li> <li>❖ Site roads and parking areas must furthermore be maintained to remain in a good condition (e.g. roads must be kept from widening so as to keep the exposed area (area influenced by winds) as small as possible.</li> <li>❖ Construction vehicles must maintain low speeds on all site roads (10 – 30 km\h)</li> <li>❖ to reduce dust dispersal during construction.</li> <li>❖ The health and safety manager must ensure that employees are supplied with the correct safety wear and equipment (e.g. dust masks) and that they are informed as to their appropriate use.</li> </ul>
<p><b>Aspect:</b></p> <p><b>Archaeological Findings:</b></p> <p><b>Impacts:</b></p>		<p><b>Project Phase:</b></p> <ul style="list-style-type: none"> <li>❖ Pre-construction</li> <li>❖ Construction</li> <li>❖ Operation</li> </ul>	<ul style="list-style-type: none"> <li>❖ Employees, contractors, and construction employees should be informed to report any unusual finds during the construction phase, to the ECO in order to implement the correct procedures according to the South African Heritage Resources Act to conserve these finds appropriately.</li> </ul>



ASPECT & RELATED ENVIRONMENTAL RISKS	RISK CATEGORY (With Mitigation)  LOW MEDIUM HIGH	PROJECT PHASE  RESPONSIBLE PARTY  PERFORMANCE INDICATOR	MITIGATION AND REHABILITATION MEASURES
❖ Possible archaeological findings.	❖ Low	<p><b><u>Responsible Parties:</u></b></p> <p>Applicant, PC, &amp; ECO</p> <p><b><u>Performance Indicators:</u></b></p> <p>❖ Environmental Awareness</p>	❖ This impact must be brought forward during the environmental awareness workshops.

## **8. MONITORING & AUDITING**

### **8.1 Purpose**

The key to the successful implementation of the EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. In the event where discrepancies are identified, the problem must be investigated and attended to. All the results obtained during environmental monitoring must be documented for audit purposes.

An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards. Audits should be conducted during the construction phase of the facility to ensure compliance with the management measures contained in the EMPr. The construction and operational phase audit schedule is as follows:

- ❖ Monthly external audits by the ECO during construction;
- ❖ One post-construction audit by an independent external auditor;
- ❖ External audits by an independent auditor pertaining to compliance with the water use licence conditions;
- ❖ Annual audits for the first five years of the operational phase.

The audits will incorporate the monthly reports submitted by the ECO. The frequency of the operational phase audits may be increased should the findings of the audits find that the conditions of the EMPr and EA are not being complied with.



## **9. CONCLUSION**

South Africa is situated in a semi-arid region and as such, is classified as a water-scarce country. Due to the high variability in river water storage needs to be implemented in order to assure the water availability for crop irrigation during dry-spells. In addition, the Limpopo Employment, Growth and Development Plan (LEGDP), which culminates from the revision of the Provincial Growth and Development Strategy (PGDS), includes the policy framework that contains the strategic vision of the province with the aim of growing the economy and enhancing sustained economic growth and job creation.

The Thinus Maritz Vaalwater (PTY) Ltd. farming operations is one of a number of other irrigation farms in the area where pivot irrigation is used for crop farming. To ensure that water use stays within the ecological water requirement and existing lawful use volume limits on a farm by farm basis is critical. Firstly, for the purposes of safeguarding the required water volumes in the Sterkstroom, to allow this river system to function on optimal ecological levels, and secondly to permit water users to use their lawful use volumes. Should there not be enough water to allow for the EWR requirements in the Sterkstroom river, it will have almost immediate negative implications. These include socio ecological impacts such as reduced water availability and reduced water quality.

The reverse of the above scenario is a situation where all the stakeholders, from the Farmer to the WUA to the local and district Municipalities, the provincial Authorities and the DWS WMA Managers, perform their duties responsibly to ensure sustainable water availability for the river system itself and all the lawful water users, in the long term.

It is believed that the identified impacts can be effectively minimised provided that the mitigation and rehabilitation measures included in section 7 of this EMPr are strictly adhered to. It is therefore very important that the relevant Managers (the Applicant, LDEDET, the project Engineers and construction phase & operational phase Managers) of each development stage of this development take cognisance thereof and implement it accordingly.

## 10. EMPr UPDATES

The EMPr will be updated as new aspects are identified and mitigating measures for these aspects are proposed.

**Table 4: EMPr Updates**

ASPECT / IMPACT	MITIGATING MEASURES	DATE	RESPONSIBLE PERSON

After an update, the site and project team are to be updated to ensure continual implementation of the EMPr occurs. Low risk updates can be conducted as part of ongoing environmental awareness on the site. High risk updates are to be communicated as soon as possible.

## **11. REFERENCES**

### **11.1 Published Sources**

- ❖ Acocks, J. P. H., 1975. Veld Types of South Africa. Memoirs of the Botanical Survey of South Africa, No 40. Pretoria: Botanical Research Institute.
- ❖ DEAT. 2004. Environmental Management Plans, Integrated Environmental Management, Information Series 12. Pretoria: Department of Environmental Affairs and Tourism (DEAT).
- ❖ ENPAT, 1998. Van Riet, Claasen, van Rensburg, Du Plessis, Environmental Potential Atlas of South Africa.
- ❖ Kruger, A. C., 2002. Climate of South Africa: Surface Winds (WS43), Pretoria: South African Weather Service.
- ❖ Kruger, A. C., 2002. Climate of South Africa: Climate Regions (WS45), Pretoria: South African Weather Service
- ❖ Mucina, L. & Rutherford, M. C. (eds.) 2006. The Vegetation of South Africa, Lesotho, and Swaziland. Strelizia 19. Pretoria: South African National Biodiversity Institute.
- ❖ Shultze, R. E., 1997. South African Atlas of AgroHydrology and Climatology, Pietermaritzburg: Department of Agricultural Engineering, University of Natal.

### **11.2 Unpublished Resources**

- ❖ Pirie, A., 2019. Quantification of the Irrigation Water Requirements and Assessment of the Ecological Water Requirements for the Thinus Maritz Vaalwater (PTY) Ltd. Farming, Limpopo Province Hydrospatial.
- ❖ Joubert, F., 2021. Dam Design Report Kranskloof Dam, Thinus Maritz Vaalwater (PTY) Ltd.. Johannesburg: PG Consulting Engineers.
- ❖ Tate R., & Fry C., 2019. Riverine Ecological Assessment for the Existing and Proposed Water Storage Facilities in the Mokolo River Catchment. The Biodiversity Company.

**APPENDIX 1**

**Proposed Penalties and Fines Associated with Various Acts of  
Non-compliance and Miss-Conduct**

## **PROPOSED PENALTIES AND FINES FOR NON-COMPLIANCE OR MISCONDUCT**

This EMPr forms part of the contract agreement between the Client and the PC and the Construction Manager. As such, non-compliance with conditions of the EMPr will amount to a breach of contract. Penalties will be issued directly to the PC/Construction Manager by the EO in the event of non-compliance to the EMPr specifications. The issuing of a penalty will be preceded by a verbal warning by the EO, as well as strict instruction in at least one monthly EO report to rectify the situation. The EO and PC/Construction Manager will communicate with regards to realistic time-frames for possible rectification of the contravention, and possible consequences of continued non-compliance to the EMPr.

Penalties incurred do not preclude prosecution under any other law. Cost of rehabilitation and/or repair of environmental resources that were harmed by the actions of the PC/ Construction Manager if such actions were in contravention of the specifications of the EMPr will be borne by the PC/ Construction Manager himself. Penalties may be issued over and above such costs. The repair or rehabilitation of any environmental damage caused by non-compliance with the EMPr cannot be claimed in the Contract Bill, nor can any extension of time be claimed for such works. Penalty amounts shall be deducted from Certificate payments made to the Contractor.

The following categories of non-compliance are an indication of the severity of the contravention, and the fine or penalty amounts listed in table 1 may be adjusted depending on the seriousness of the infringement.

- Category One:** Acts of non-compliance that are unsightly, a nuisance or disruptive to adjacent landowners, existing communities or persons passing through the area.
- Category Two:** Acts of non-compliance that cause minor environmental impact or localised disturbance.
- Category Three:** Acts of non-compliance that affect significant environmental impact extending beyond point source.
- Category Four:** Acts of non-compliance that result in major environmental impact affecting large areas, site character, protected species, or conservation areas.

All of the contraventions mentioned in table 1 as well as any other contravention to the EMPr specifications should be measured in terms of one of these 4 categories of non-compliance and penalties or fines should be adjusted accordingly.



**TABLE 1: List of Proposed Fines and Penalties as Applicable to Various Acts of Non-Compliance or Misconduct**

<b>DESCRIPTION OF NON-COMPLIANCE TO EMPr SPECIFICATION</b>	<b>SPOT FINES AND PENALTIES THAT COULD BE INCURRED</b>
Any person, vehicle, plant, or other activity related to the contractor's operations that spill over into a "no-go" or sensitive area	R 4 000
Any vehicle driving in excess of specified speed limits	R 1 000
Vehicles being driven, plant or construction materials being stored outside of demarcated areas within the construction site. Unauthorised persons on site.	R 2 000
Persistent, un-repaired oil/fuel leaks from machinery/vehicles. Spillages of oil/fuel at the refuelling site. Spillage of hazardous (e.g. Cement, Asphalt, Chemicals) materials on site. Burying of soils containing these spillages.	R 5 000
Litter on site or dumping/ burying of rubble or waste outside designated location/s. Inadequate provision of waste disposal facilities on site	R 2 000
Illegal Fires on site	R 5 000
Eating / cooking food outside of designated areas. Inadequate site ablution facilities or failure to make use of the site ablution facilities.	R 1 000
Excessive noise and / or dust as a result of site activities	R 2 000
Contractor's operations causing a public nuisance as a result of contravention of EMPr specifications.	R 2 000
Activities in contravention of EMPr that cause water waste or pollution	R 5 000
Poaching/ setting of snares or traps.	R 5 000
Damage to cultural Sites	Up to R 100 000
Erosion as a result of non-compliance – penalty shall be equivalent to the cost of rehabilitation plus 20%	

<b>DESCRIPTION OF NON-COMPLIANCE TO EMPr SPECIFICATION</b>		<b>SPOT FINES AND PENALTIES THAT COULD BE INCURRED</b>
Severe oil spills - penalty shall be equivalent to the cost of clean-up operations plus 20%		
Damage to indigenous vegetation or sensitive environments - penalty shall be equivalent to the cost of rehabilitation plus 20%		
Penalties for removing or damaging trees that are to be retained		
Girth of Trunk am above ground level	Replacement value per tree	
0 – 15 mm	R 100	
16 – 30 mm	R 200	
31 – 50 mm	R 500	
51 – 75 mm	R 1 000	
76 – 100 mm	R 2 500	
101 – 150 mm	R 5 000	
151 – 300 mm	R 10 000	
Larger than 300 mm	R 15 000 – R 100 000	

**PLEASE NOTE:** For any repeat offenders the fine will be **DOUBLED**, and a third offence could result in **permanent suspension**.

The following acts and legislation, amongst others, apply and will be enforced and monitored by the ECO;

- ❖ Environmental Conservation Act, (Act 73 of 1989)
- ❖ National Environmental Management Act, (Act 107 of 1998)
- ❖ National Environmental Management: Biodiversity Act, (Act 10 of 2004)
- ❖ Water Act, 1998, (Act 36 of 1998)
- ❖ National Parks Act, (Act 57 of 1976)
- ❖ Lake Areas Development Act, (Act 139 of 1975)
- ❖ Mountain Catchment Areas Act, (Act 63 of 1970)
- ❖ Forest Act, (Act 122 of 1984)
- ❖ Conservation of Agricultural Resources Act, (Act 43 of 1983)
- ❖ All Provincial ordinances and regulations as applicable

## **APPENDIX 2**

### **Typical Composition of a Construction Camp**

**Location of Site Camp**

- Located practically and on already disturbed area.
- ECO should screen the site and approve.
- Camp minimum 100m horizontally from drainage courses.
- Camp must be rehabilitated after construction.
- Soils loosened, re-planted with appropriate vegetation.
- Remove contaminated soils. Contact specialist to replace with healthy soils and shape to resemble original land form.
- Final payments may be withheld until relevant mitigation and rehabilitation have been completed.
- Erosion may not occur in the construction camp.

**Materials stored in designated areas.**

- Design Storage containers to prevent spillages.
- If spillage occurs, contact specialist.
- Remove contaminated soils, replace compacted gravel (to be completely removed).

**The Main Site Office must contain:**

- The EMP, notices that all parties are to adhere to it.
- A space to conduct environmental awareness workshops and relay pertinent information.
- Safety information and emergency response plan.
- Emergency Contact numbers
- Fire Extinguisher.
- Site must be Rehabilitated.
- Use Existing structures on site, build a simple structure or the office can be housed in a rented shed or container.

**The camp must contain a service yard**

- Maintain vehicles and equipment regularly, to prevent spillages and to minimise noise levels. No oil, fuel hydraulic fluid etc may leak onto the soil. Service areas must have impervious concrete floors & oil and fuel resistant walls. Watertight sumps at the end of these catchment drains. Pump into containers: specialist to remove.
- Contractor to provide proof to the ECO.

**SUMP**  
(to be emptied by specialist when required)

**Temporary fuel tank and its surrounding area** in a watertight bunker able to hold the volume of the tank.

- Monitor area weekly - no fuel onto surrounding soils.
- If puncture occurs, contact ECO and specialist. Remove contaminated soils completely. Dump at licensed facility. Fill excavation to top with healthy soils.
- Always keep containment banks empty.

Procon Environmental Technologies tel: (013) 697 4817/24

**Prevent runoff entering or leaving camp (Earth berms, drainage ditch or sandbags @ 500mm high)**

- 1 chemical toilet for every 15 people on the site.
- Workers use these toilets, not the site.
- Toilets will be clean and within walking distance from activities.

**Preferably No new access roads**

- New roads must be parallel to the existing contours.
- Rehabilitate Roads after construction.

**Fence off the construction camp and provide limited, appropriate access with signs; for Safety information and access control.**

- Appoint a Security Guard: to Prevent damages to equipment and to keep unauthorized persons out.

**Parking areas:** prevent spills or contain contaminants.

- Workers will not disturb local community
- Workers will not litter, play loud music or build shacks
- On-site accommodation: be neat, clean and safe.
- Cooking only in designated cooking area(s). Only with Electrical or gas stoves. Area must be ventilated and safe for cooking in. No fires, especially in winter.
- Waste skip at appropriate place. Sort solid waste into categories and send Hazardous waste to registered facility.
- Minimum Vegetation clearance: retain significant trees
- Footprint: not be larger than the camps them selves.

An area must be prepared for the storage of waste oil, impervious concrete floors, oil and fuel resistant walls, drain towards sump, cleaned by specialist as required. Contractor must provide proof to the ECO. No used oil may be allowed to spill onto adjacent soils.

**ENVIRONMENTAL MANAGEMENT PLAN**

**PROPOSED CONFIGURATION OF A TYPICAL CONSTRUCTION SITE CAMP AS PER ENVIRONMENTAL MANAGEMENT PLANS**

# SPOOR

**APPENDIX 3**

**Spill Management Contractors List**

EMPr for the Construction of a Dam for the Storage of Water: Thinus Maritz Vaalwater (PTY) Ltd.  
Ptn 1 of the Farm Groendraai 213 KQ, Vaalwater, Lephalale Local Municipality

SPILL AND POLLUTION RESPONSE COMPANIES						
Company	Product Description	Operating District	Website	Email address	Contact details	
Services Providers	24 Hour Spill Response Association	Oil and hazardous materials spills, Truck roll-overs/transfers, derailments, acid spills, biohazard containment and cleanup, ship leaks, fuel spills, industrial plant emergencies, air quality monitoring, clean up and remediation including facility and equipment decontamination, soil excavation and disposal, sludge processing, cleaning services, waste management ensuring safe disposal and safe disposal certificates, contingency planning, asbestos removal, offshore vessel services and support, pollution control, maintenance and service, consumable sales	National	www.24hourspillresponse.co.za www.facebook.com/pages/24-Hour-Spill-Response/203191236393968	info@24hourspillresponse.co.za	t: 0800 00 5817
	Oil Spill Control	Range of absorbent materials for oil and other hydrocarbon based products, chemicals and other liquids, spill kits, oily water separators, oil skimmers, pumps, oil containment booms, training service, spill response service, site inspection service, providing guidance on safety, environment and ISO regulations	Western Cape	http://oilspillcontrol.co.za/		t (sales): 021 531 5335 t: 082 774 8964 t: 082 455 7832
	Oil-Gone Agency cc Enretech	Bioremediation, spill clean-ups, spill kits, environmental remediation technology	Eastern Cape	http://www.oilgone.co.za/ http://www.enretech.co.za		t: 084 580 0327
	Procon Environmental Technologies	Environmental Products and Technologies, specializing in systems that minimize the impact of contamination on the environment and surrounding areas, prevention and treatment of oil pollution in soil and water	Centurion Witbank	http://www.pro-enviro.co.za/	procon@pro-enviro.co.za	t: 013 697 4617/4634 f: 013 697 4618 t: 012 667 5389 f: 012 667 5389
	ROSE Foundation (Recycling Oil Saves the Environment)	None-profit organisation - collect used oil	Burgersfort, Cape Town, Durban, Johannesburg, Middelburg, Nelspruit, Pietermaritzburg, Port Elizabeth, Pretoria, Richards Bay, Rustenberg, Weenen	http://www.rosefoundation.org.za/	usedoil@iafrica.com	t: 021 448 7492 c: 082 378 8556 f: 086 652 7384
	Spill Tech	Spill response 24/7, absorbent products, spill kits, asbestos disposal service, hazmat, high pressure cleaning, waste management, marine response, bioremediation, clean up after fires and floods.	National	http://www.spilltech.co.za/	info@spilltech.co.za	t: 0861 000 366
	HazClean	24h spillage response, spill kits, equipment, absorbent products	National	http://www.hazclean.co.za/	ian@hazclean.co.za	t: 0800 00 5817
	IFRT Spill Response	24h spillage response, industrial cleaning, spill kits, equipment, absorbent products, training	Vereeniging	http://www.ifrt.co.za/		t: 016 428 2207 t: 083 284 1879 t: 083 284 1880
Products	Absorbetech Environmental (former name SupaZorb Sales)	Absorbetech, a hydrocarbon absorbent, which is used to clean up spillages in factories, on water and capped or uncapped outdoor surfaces. The main benefit of using this product however, is the bio-remedial capacity it possesses. This means, the cleaning of such spillages utilizing a natural process through which a blend of bacteria and fungi break down, or degrade, a wide variety of hydrocarbons. In addition we offer a number of related products.	Durban Cape Town Johannesburg	http://absorbetech.yellowpages.co.za/	info@absorbetech.com	t: 031 914 3939 t: 031 700 8617 t: 021 531 9999 t: 011 708 1494
	Bio-systems SA	Products for the bioremediation of oil-contaminated soils, the bioaugmentation of urban, agricultural and rural effluent streams and the re-use of grey water.		www.biosystemssa.co.za	info@biosystemssa.co.za	t: 021 786 2972 f: 086 726 5445
	Earthwise Environmental SA (PTY) Ltd.	Oil and chemical absorbent products	National	http://www.spillsorb.co.za/	gus@enviroshore.co.za	t: 012 568 1043

**APPENDIX 4**

**Environmental Incident Register Template**

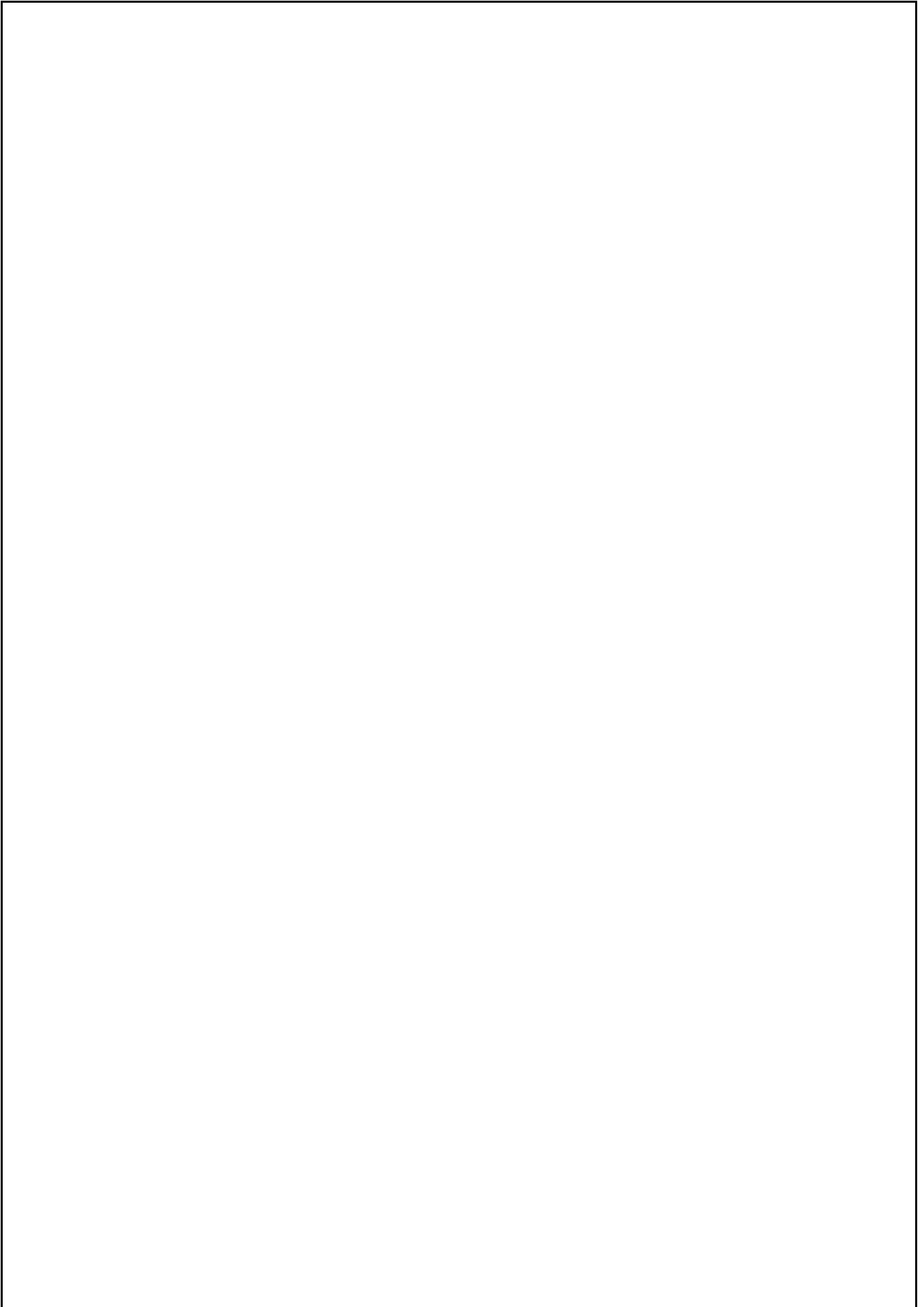




## **APPENDIX 5**

### **Environmental Complaints Register Template**





**APPENDIX G**  
OTHER INFORMATION

LIST OF STATE DEPARTMENTS ADMINISTERING A LAW RELATING  
TO A MATTER LIKELY TO BE AFFECTED BECAUSE OF THIS ACTIVITY

**LIST OF STATE DEPARTMENTS ADMINISTERING A LAW RELATING  
TO A MATTER LIKELY TO BE AFFECTED AS A RESULT OF THIS ACTIVITY**

<b>Authority</b>	<b>Lephale Local Municipality Department of Environmental Management</b>		
<b>Contact person:</b>	Mr. J Hlapa		
<b>Postal address:</b>	Private Bag X136, Lephale		
<b>Postal code:</b>	0555	<b>Cell:</b>	
<b>Telephone:</b>	014 762 1640	<b>Fax:</b>	
<b>E-mail:</b>	Joshua.hlapa@lephale.gov.za		

<b>Authority</b>	<b>Department of Water Affairs Limpopo Water Management Area</b>		
<b>Contact person:</b>	Pulane Matswi Love Hlekane		
<b>Postal address:</b>	49 Azmo Place, Joubert Street, Polokwane		
<b>Postal code:</b>	0700	<b>Cell:</b>	
<b>Telephone:</b>	(015) 290 1210	<b>Fax:</b>	
<b>E-mail:</b>	MatswiP@dws.gov.za HlekaneL@dws.gov.za		

<b>Authority</b>	<b>South African Heritage Resources Agency</b>		
<b>Contact person:</b>	Ms N Khumalo		
<b>Postal address:</b>	111 Harrington Street, CAPE TOWN		
<b>Postal code:</b>	8001	<b>Cell:</b>	
<b>Telephone:</b>	021 462 4502	<b>Fax:</b>	
<b>E-mail:</b>	NKhumalo@sahra.org.za		

PROPERTY DESCRIPTIONS

**Proposed Kranskloof Dam List of Affected Properties**

Property	Owner	SG Codes
<b>Properties and Owners from South to North</b>		
Portion 1 of the Farm Groendraai 213 KQ	Vaalwater Kranskloof Boerdery (PTY) Ltd. Mr Thinus Maritz - Director	TOKQ0000000021300001



WATER USE LICENSE(S) AUTHORISATION, ETC.

**Please Note:**

The Department of Water Affairs and Sanitation (DWS) Limpopo WMA  
has been contacted in this regard and the Water Use Licence Application is in process.

