

STELLA BULK SEWER AND INTERNAL RETICULATION

Draft Basic Assessment Report

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Table of Contents

SECTION A: ACTIVITY INFORMATION	4
1. PROJECT DESCRIPTION	4
2. FEASIBLE AND REASONABLE ALTERNATIVES	7
3. PHYSICAL SIZE OF THE ACTIVITY	9
7. SENSITIVITY MAP	11
8. SITE PHOTOGRAPHS	11
9. FACILITY ILLUSTRATION	11
10. ACTIVITY MOTIVATION	12
11. APPLICABLE LEGISLATION, POLICIES AND/GUIDELINES	18
12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT	20
SECTION B: SITE/AREA/PROPERTY DESCRIPTION	23
1. GRADIENT OF THE SITE	24
2. LOCATION IN THE LANDSCAPE	24
3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE	24
4. GROUNDCOVER	25
5. SURFACE WATER	25
6. LAND USE CHARACTER OF SURROUNDING AREA	26
7. CULTURAL/HISTORICAL FEATURES	27
8. SOCIO-ECONOMIC CHARACTER	27
9. BIODIVERSITY	30
Section C: public participation	33
1. ADVERTISEMENT AND NOTICE	33
2. DETERMINATION OF APPROPRIATE MEASURES	33
3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES	34
4. COMMENTS AND RESPONSE REPORT	34
5. AUTHORITY PARTICIPATION	34
6. CONSULTATION WITH OTHER STAKEHOLDERS	35
SECTION D: IMPACT ASSESSMENT	36
1. 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	36
2. Environmental Impact Assessment	44
SECTION E. Recommendation of practitioner	46

APPENDICES

APPENDIX		ATTACHED
Appendix A	Maps	X
Appendix B	Photographs	X
Appendix C	Facility illustration(s)	X
Appendix D	Specialist reports (including terms of reference)	X
	(i): Phase 1 Heritage Impact Assessment	X
	(ii): Ecological Assessment	X
	(iii): Geohydrological Assessment	X
Appendix E	Public Participation Report	X
Appendix F	Impact Assessment	X
Appendix G	Environmental Management Programme (EMPr)	X
Appendix H	Details of EAP(s) and expertise	X
Appendix I	Specialist's declaration of interest	X
Appendix J	Title Deeds	X

ACRONYMS USED IN THIS BASIC ASSESSMENT REPORT

WWTW	Waste Water Treatment Works
DWS	National Department of Water and Sanitation
EMPr	Environmental Management Programme
PPP	Public Participation Process
WULA	Water Use License Application
BAR	Basic Assessment Report
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
I&APs	Interested and Affected Parties
HDPE	High Density Poly Ethylene
WAS	Waste Activated Sludge
MLSS	Mixed Liquor Suspended Solids
FFBA	Floating Fine Bubble Aeration
SDF	Spatial Development Framework

SECTION A: ACTIVITY INFORMATION

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

YES	NO
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If YES, please complete the form entitled “Details of specialist and declaration of interest” for the specialist appointed and attach in Appendix I.

1. PROJECT DESCRIPTION

a) Describe the project associated with the listed activities applied for

Dr Ruth S Mompoti District Municipality is proposing to Develop a Bulk sewer system in Stella located in the North West Province. The site of work is located ± 50km North East of Vryburg which is within the jurisdiction of the Dr Ruth S Mompoti District Municipality.

The proposed entails a development of Stella bulk sewer system and upgrade of the old dams. The development will include a phase B for the entire internal sewer for Stella. This will improve the health and hygiene of the whole Stella community. The development of Stella Bulk Sewer system will be divided into the following 3 portions:

1. Outfall sewer pipelines and sewer pump pipelines
2. Wastewater Pump station
3. Wastewater treatment works

The pipeline lengths to be utilized entails:

- Rising Main - 200Ø mm – 3 170m
- Outfall sewer - 250Ø mm – 1 488m
- Outfall sewer - 315Ø mm – 552m
- Manholes – 36

The development of the waste water Pump station will entail:

- Pre-treatment – Mechanical Grinder
- Emergency by-pass hand screen
- Concrete Sump – Surface Area – 48m² – Volume – 181m³
- Emergency Concrete Sump - Surface Area – 65m² – Volume – 165m³
- 3 X Self priming pumps
- Standby Generator
- Brick Pump station.

The Unit Process at the WWTW will entail:

- Anaerobic Pond
 - Anaerobic Pond
 - Volume – +- 400m³
 - HDPE Lined earth dam

- **Aeration Basin**
 - Surface area – 1560 m²
 - Volume – +- 6240m³
 - HDPE Lined earth dam
- **Clarifier**
 - Surface area – 196 m²
 - Volume – +- 686m³
 - HDPE Lined earth dam
- **Maturation / Evaporation ponds**
 - 6 Ponds
 - Surface area – 5642 m²
 - Volume – +- 9590m³
 - HDPE Lined earth dam
- **Sludge Drying Beds**
 - 4 Drying beds
 - Surface area – 1971 m²
 - Volume – +- 887m³
 - Concrete Structure
- Final water to be irrigated

The proposed WWTW includes an activated sludge process which will be able to produce a final effluent to comply with General Effluent Standard requirements

The Activated Sludge process will allow for the screening and the de-gritting of the raw sewage, before it is discharged to be treated. The screening consists of one mechanical screen, in a duty configuration. The removed screenings will discharge into a screw press for watering/compaction. The de-gritting consists of one mechanical de-gritting channel, in a duty configuration. The settled grit will be conveyed to be discharged together with the dewatering/compaction screenings.

The Activated Sludge process will lead to the secondary treatment process which is a typical biological nutrient removal process. The Biological process:

- The WWTW will consist of an Aerobic pond. The pond provides for aerobic zones, with floating fine bubble aeration equipment.
- The pond will be earthen basins, with high quality HDPE sheet lining.
- The Waste activated sludge withdrawal will be executed and controlled from the return activated sludge delivery rising main.
- Process temperature simulation;= 12 to 22 °C
- General COD inflow concentration;= 864 mg/l
- General TKN inflow concentration;= 63 mg/l
- General Tot P inflow concentration;= 14 mg/l
- General suspended inflow concentration;= 440 mg/l
- General sludge age;= 18 – 20 days
- Mixed Liquor Suspended Solids (MLSS) operating concentration;= 4000 mg/l Secondary Settling;
- The construction will be combinedly HDPE lined, concrete and HDPE baffle walls to ensure, efficient side wall slopes for gravity settlement. The settled sludge will be

collected at the bottom with multiple collection hoppers, connected with the suction end of the return activated sludge pump set.

- Average design flow;= 1,5 MI/day
- Maximum design flow;= 2,7 MI/day
- Overflow loading at PDWF;= 200 kl/m.day
- Retention period at PDWF;= 1.5 h
- Up flow velocity at PDWF;= 1 m/h

The only sludge produced from the treatment process will be the daily waste activated sludge (WAS) from the secondary treatment process. The WAS will be wasted to the sludge drying beds, via the WAS control bypassing from the RAS pumps discharge pipe line. The sludge drying beds will provide adequate draining via the sand bed and sub-soil drain system, and also solar drying capacity through sufficient surface area exposure. The dried sludge will have to be removed manually and transported to adequate disposal facilities/landfill site. The filtrate (or supernatant) will join the final effluent for irrigation purposes.

b) Provide a detailed description of the listed activities associated with the project as applied for

Listed activity as described in GN 327,325 and 324	Description of project activity
<p>Example: GN 327 Item xx xx): The construction of a bridge where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p>	<p>A bridge measuring 5 m in height and 10m in length, no wider than 8 meters will be built over the Orange river</p>
<p>NEMA GN R327 07 April 2017 27</p> <p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation</p>	<p>The total development footprint of the proposed bulk sewer system is expected to be over 14 hectares so it will exceed the clearing of more than 1 hectare but less than 20 Hectares</p>
<p>NEMA GN R327 07 April 2017 25</p> <p>The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres</p>	<p>Construction of Stella’s Bulk sewer system with wastewater pump station, wastewater treatment works and sewer pipe line with a daily average throughput capacity of 1500 cubic metres. The WWTW will however be constructed on a maximum throughput of 2 700 cubic metres</p>

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;
 - l the design or layout of the activity;
- (d) the technology to be used in the activity;
 - l the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe alternatives that are considered in this application as required by Appendix 1 (3)(h) of GN 326, Regulation 2014 as amended. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) 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 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, competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

The identification of alternatives should be in line with the Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004. Should the alternatives include different locations and lay-outs, the co-ordinates of the different alternatives must be provided. 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.

E) Site alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
Portion 3 of Farm Zoutpans Fontein 546	26°33'30.09"	24°50'38.75"
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
N/A		
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)
N/A		

In the case of linear activities:

Alternative:

Latitude (S):

Longitude I:

Alternative S1 (preferred)

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

N/A	

Alternative S2 (if any)

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

N/A	

Alternative S3 (if any)

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

N/A	

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.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A of this form.

b) Lay-out alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
Corner A	26°33'32.23"S	24°50'23.39"E
Corner B	26°33'36.82"S	24°50'25.77"E
Corner C	26°33'32.98"S	24°50'41.54"E
Corner D	26°33'24.23"S	24°50'34.36"E
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

c) Technology alternatives

Alternative 1 (preferred alternative)
N/A
Alternative 2
Alternative 3

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)

Alternative 1 (preferred alternative)		
N/A		
Alternative 2		
Alternative 3		

e) No-go alternative

Should the proposed development not be constructed, significant socio-economic impacts are likely to occur as a result of significant job creation losses in the area of Stella. The existing Waste water treatment works will further deteriorate and the health of people in Stella will be impacted. If the current operation is left to continue as it is, this would serve to reduce the quality standards of the Works and risk contamination of groundwater and disturbance to the natural functioning of local ecosystems. In addition, the anticipated future developments in Stella will require adequate and competent sewer treatment infrastructure. Should the Municipality keep the current oxidation ponds and pump station, it is highly likely that any anticipated future developments will function without adequate sewage infrastructure.

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

3. PHYSICAL SIZE OF THE ACTIVITY

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

Alternative:

Alternative A1¹ (preferred activity alternative)
 Alternative A2 (if any)
 Alternative A3 (if any)

Size of the activity:

146800 m ²
m ²
m ²

or, for linear activities:

Alternative:

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

Length of the activity:

m
m
m

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

Alternative:

Size of the site/servitude:

¹ "Alternative A.." refer to activity, process, technology or other alternatives.

Alternative A1 (preferred activity alternative)	146800 m ²
Alternative A2 (if any)	m ²
Alternative A3 (if any)	m ²

4. 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:

No new access roads will be required. Existing tracks will be utilised. The project is located in the North West Province and falls under the municipal jurisdiction of Dr Ruth S Mompoti District Municipality. The actual site of work will take place in Stella which is located ± 50km North East of Vryburg. Access to the site is through an existing gravel road. See attached locality map (Appendix A)

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.

5. LOCALITY MAP

An A3 locality map is 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 accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s);
- 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 and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

6. LAYOUT/ROUTE PLAN

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

The site indicates the following:

- the property boundaries and numbers of all the properties within 50 metres of the site;
- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

7. SENSITIVITY MAP

The layout/route plan as indicated above is overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to:

- watercourses;
- the 1:100 year flood line (where available or where it is required by DWS);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map covers areas within 100m of the site and must be attached in Appendix A.

8. 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 report. It must be supplemented with additional photographs of relevant features on the site, if applicable.

9. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of at least 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.

10. ACTIVITY MOTIVATION

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

1. Is the activity permitted in terms of the property's existing land use rights?	YES	NO	Please explain																										
<p>The proposed development site is situated on a property zoned as agricultural. The site is associated with it forming part of the municipal grazing</p>																													
2. Will the activity be in line with the following?																													
(a) Provincial Spatial Development Framework (PSDF)	YES	NO	Please explain																										
<p>Basic service infrastructure in Naledi Local Municipality and Stella in particular is not up to standard. According to the community survey of 2016 by Statistics South Africa types of toilet facilities used in terms of the total number of households is represented as follows:</p>																													
<table border="1"> <thead> <tr> <th colspan="2">Type of Toilet facilities used in Naledi</th> </tr> <tr> <th>Facility Type</th> <th># of H/H</th> </tr> </thead> <tbody> <tr> <td>Flush toilet connected to a public sewerage system</td> <td>14358</td> </tr> <tr> <td>Flush toilet connected to a septic tank or conservancy tank</td> <td>588</td> </tr> <tr> <td>Chemical toilet</td> <td>615</td> </tr> <tr> <td>Pit latrine/toilet with ventilation pipe</td> <td>2017</td> </tr> <tr> <td>Pit latrine/toilet without ventilation pipe</td> <td>1085</td> </tr> <tr> <td>Ecological toilet</td> <td>-</td> </tr> <tr> <td>Bucket toilet (collected by municipality)</td> <td>282</td> </tr> <tr> <td>Bucket toilet (emptied by household)</td> <td>134</td> </tr> <tr> <td>Other</td> <td>495</td> </tr> <tr> <td>None</td> <td>1119</td> </tr> <tr> <td>Total</td> <td>20692</td> </tr> </tbody> </table>				Type of Toilet facilities used in Naledi		Facility Type	# of H/H	Flush toilet connected to a public sewerage system	14358	Flush toilet connected to a septic tank or conservancy tank	588	Chemical toilet	615	Pit latrine/toilet with ventilation pipe	2017	Pit latrine/toilet without ventilation pipe	1085	Ecological toilet	-	Bucket toilet (collected by municipality)	282	Bucket toilet (emptied by household)	134	Other	495	None	1119	Total	20692
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<p>Figure 9 represents the type of toilet facilities used in terms of the total number of households (Source: Community survey of 2016 by Statistics South Africa)</p>																													
<p>The construction and upgrade of Stella Waste Water Treatment Works is therefore a strategic move in providing improved quality of water and sanitation supply in the area.</p>																													
(b) Urban edge / Edge of Built environment for the area	YES	NO	Please explain																										
<p>The activity is located at the outer boundary within which urban expansion can be accommodated</p>																													

<p>(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>This project is in line with Water Services Development Plan in terms of the institutional arrangements for water services provision including sanitation services with Dr Ruth S Mompati District Municipality at the centre with a mandate of ensuring that everybody within the jurisdictions of the municipality has access to the basic water supply and sanitation services necessary for human health and well-being (section2, chapter 1), promoting and facilitating the construction of at least basic sanitation facilities, health and hygiene promotion, management of sewer systems, safe treatment and disposal of waste and monitoring and evaluation of service provision (section 19, chapter 4)</p> <p>In compliance with the Integrated Development Plan, the upgrading of Stella Bulk sewer system and oxidation ponds is the priority needs of the Dr Ruth S Mompati District Municipality and its residence with the increased capacity to service additional future units based on middle and lower income group.</p>			
<p>(d) Approved Structure Plan of the Municipality</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>The EMPr will form part of this application and will be implemented throughout the construction and operational phases of the project. This document will ensure that existing environmental management priorities for the area are not compromised</p>			
<p>(f) Any other Plans (e.g. Guide Plan)</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>

<p>3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>This proposed development falls in the timeframe intended by the existing approved SDF. The project is in line with the priorities identified by the IDP.</p>			
<p>4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>Currently the initial Waste Water Treatment Works (WWTW) for the whole of Stella consists of 6 oxidation ponds, and is currently not being utilized properly. It is polluted by the dumping site that is not retained. There is also no fencing between the current oxidation ponds and the current dumping/landfill site. A new WWTW will improve the health and hygiene of the whole Stella community.</p>			
<p>5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix E.)</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>The necessary services with adequate capacity are currently available (See design report, Appendix E)</p>			
<p>6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>This development is provided for in the infrastructure planning of the municipality. And thus, will not have any impact on the infrastructure planning of the municipality</p>			
<p>7. Is this project part of a national programme to address an issue of national concern or importance?</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>Acceleration of identified water and sanitation infrastructure has been highlighted as of importance in unlocking the socio economic opportunities in South Africa.</p>			

8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES	NO	Please explain
The proposed area is currently zoned as agricultural. There is currently an old oxidation dam on site.			
9. Is the development the best practicable environmental option for this land/site?	YES	NO	Please explain
The old oxidation dams are not up to standard and close to its maximum capacity. As Stella's community grows the only option is to expand or build a new Bulk Sewer System.			
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES	NO	Please explain
The negative impacts identified during the impact assessment as well as those raised by the I&AP's will be addressed by implementing the mitigation measures contained in this report, which will in turn eliminate the majority of negative impacts. The positive impacts associated with the proposed land use will not only be of great benefit for the local community in terms of employment opportunities, but will also aid in addressing issues of national concern in terms of health.			
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES	NO	Please explain
An old oxidation dam already exists in the proposed development area.			
12. Will any person's rights be negatively affected by the proposed activity/ies?	YES	NO	Please explain
After addressing all issues raised by the I&AP's, impacts identified during the impact assessment and implementing all the proposed mitigations, no rights of the surrounding landowners nor the surrounding environment will be negatively affected, provided that the applicant adheres to the proposed mitigations, recommendations and conditions of this report and the EMPr.			
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	YES	NO	Please explain
The activity is located at the outer boundary within which urban expansion can be accommodated or coincide with the urban edge line			

14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES	NO	Please explain
<p>Acceleration of identified water and sanitation infrastructure has been highlighted as of importance in unlocking the socio economic opportunities in South Africa. (SIP 18). A 10-year plan to address the estimated backlog of adequate water to supply 1.4 m households and 2.1 m households to basic sanitation is incorporated in SIP 18. The project will involve provision of sustainable supply of water and sanitation in order to meet social needs and support economic growth. Projects will provide for new infrastructure, upgrading of existing infrastructure, as well as improve management of sewerage infrastructure.</p>			
15. What will the benefits be to society in general and to the local communities?	Please explain		
<p>The proposed development will have a positive impact in the local community as it will improve the health and hygiene of the whole Stella community. Currently the initial Waste Water Treatment Works (WWTW) for the whole of Stella is not being utilized properly. It is polluted by the landfill site that is not retained. There is also no fencing between the current oxidation ponds and the current landfill site.</p>			
16. Any other need and desirability considerations related to the proposed activity?	Please explain		
<p>Good hygiene and health are one of the main concerns for each and every human being. The facility supplies job opportunities as well as the opportunity of skills development and transfer to local community and additional work for contractors in the area.</p>			
17. How does the project fit into the National Development Plan for 2030?	Please explain		
<p>CHAPTER 4 of the National Development Plan 2030 on Economic Infrastructure has outlined and has identified the supply of water and sanitation infrastructure as one of the Economic foundation of social and economic development. The proposed development serves to improve the quality/efficiency of the sanitation of areas within and around the Works.</p>			
<p>Before 2030, all South Africans will have affordable, reliable access to sufficient safe water and hygienic sanitation. This economic infrastructure is a precondition for providing basic services such as electricity, water, sanitation, telecommunications and public transport, and it needs to be robust and extensive enough to meet industrial, commercial and household needs</p>			

18. Please describe how the general objectives of Integrated Environmental Management as set out in Section 23 of NEMA as amended have been taken into account.

Section 23 requires the following general objectives:

(2) The general objective of integrated environmental management is to—

- a. Promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment;
- b. Identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;
- c. Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;
- d. Ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;
- e. Ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment; and
- f. Identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.

These are achieved as follows:

- a) Decision making based on the findings of the BAR process
- b) Impacts have been identified, predicted and evaluated in terms of environmental, socio-economic and cultural heritage environment. The risks, consequences and alternatives and options for mitigation have been evaluated.
- c) This BAR process and the EMP ensure that the effects of the activities on the environment receive adequate consideration before actions are taken in connection with them.
- d) There will have been adequate and appropriate opportunity for public participation that will lead to the decision being taken.
- e) Environmental attributes have been considered in management and decision making.
- f) The modes best suited to environmental management for this activity have been followed and recommended.

19. Please describe how the principles of environmental management as set out in Section 2 of NEMA as amended have been taken into account.

NEMA Section 2 requires:

(2) Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.

This has been achieved as follows:

The environmental management relating to the proposed project by the construction of the proposed layer houses has been set up in such a way as to place the needs of people at the forefront of its concern while addressing the environmental issues concerning the establishment of the facility. The facility has been designed to allow for addition of modules utilizing the same infrastructure which allows for true sustainable management

11. APPLICABLE LEGISLATION, POLICIES AND/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	Applicability to the project	Administering authority	Date
National Environmental Management Act (Act No. 107 of 1998)	To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.	Department of Environmental Affairs	April 2017
National Heritage Resources Act (Act No. 25 of 1999)	The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 hectares (ha) and where linear developments exceed 300 metres in length.	South African Heritage Resources Agency (SAHRA)	1999

	In this regard, the proposed development site will be subject to engagement with the South African Heritage Resources Agency (SAHRA). Potential impact on cultural heritage, paleontological or archaeological resources through excavation activities or disturbance will need to be monitored. Permits may be required per the National Heritage Resources Act (Act No. 25 of 1999).		
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993):	The purpose of this Act is to provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with, the activities of persons at work. The proposed development will therefore be subject to this Act during the construction and operational Application for Environmental Authorisation.	Department of Labour	1993
National Water Act (Act 36 of 1998)	promotes the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner	DWS – National and provincial	1998
Constitution of the Republic of South Africa (1996)	of special relevance in terms of environment is section 24	Constitution of the Republic of South Africa	1996
National Environmental Management: Air Quality Act 39 of 2004	To provide for the protection of and prevention of quality	Department of Environmental Affairs	2004
National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)	supports conservation of plant and animal biodiversity, including the soil and water upon which it	Department of Environmental Affairs	2004

	depends.		
National Environmental Management: Protected Areas Act 57 of 2003 (as amended Act 31 of 2004) (NEMPAA)	To provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes	Department of Environmental Affairs	2004
National Environmental Management: Waste Act 59 of 2008 (NEMWA)	To provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes	Department of Environmental Affairs	2003
National Veld and Forest Fire Act 101 of 1998 (NVFFA)	protects soil, water and plant life through the prevention and combating of veld, forest, and mountain fires	Department of Agriculture, Forestry and Fisheries	1998
National Heritage Resource Act (No. 25 of 1999)		South African (SAHRA)	1999

12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

a) Solid waste management

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

YES	NO
	25m ³

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

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

This solid construction waste will be separated into non-recyclables and recyclables and stored separately for collection. Non-recyclables will be collected and stored in fenced areas at a holding facility at the construction camps established. The construction waste will be removed from site by the appointed contractor to a registered waste disposal site.

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

Waste from the site will be collected by waste trucks on a weekly basis and disposed of at the nearest registered waste disposal site.

Will the activity produce solid waste during its operational phase?

YES	NO
	N/A m ³

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

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

Waste will be collected by waste trucks on a weekly basis and disposed of at a registered landfill site.

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

Regional landfill site in Vryburg

Where will the solid waste be disposed of 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 competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the NEM:WA?

YES	NO
-----	----

If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

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

YES	NO
-----	----

If YES, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

b) Liquid effluent

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

YES	NO
-----	----

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

m ³	
----------------	--

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

YES	NO
-----	----

If YES, describe the type of effluent and the disposal mechanism/method

N/A

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

YES	NO
-----	----

If YES, provide the particulars of the facility:

Facility name:	N/A		
Contact person:	N/A		
Postal address:	N/A		
Postal code:	N/A		
Telephone:	N/A	Cell:	N/A
E-mail:	N/A	Fax:	N/A

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

Treated effluent will comply with irrigation standards and will be used for irrigation for local farmers.

c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere other than exhaust emissions and dust associated with construction phase activities?

YES	NO
-----	----

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

YES	NO
-----	----

If YES, the applicant must 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:

There is a possibility that dust will be generated during construction phase, particularly during high wind conditions. Mitigation measures suggested to control dust generation in subsequent sections will ensure that the concentration is insignificant. The Environmental Management Plan is attached in Appendix J. Mitigation measures to ameliorate dust are detailed in this report.

d) Waste Licence/Registration

Will any aspect of the activity produce waste that will require a waste licence/registration in terms of the NEM:WA?

YES	NO
-----	----

If YES, please submit evidence that an application for a waste licence/registration has been submitted to the competent authority

e) Generation of noise

Will the activity generate noise?

YES	NO
-----	----

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:

Noise will be generated by the plant machinery and delivery trucks during the delivery construction material on site. It is however unlikely that this noise will be at a level higher than the existing ambient noise

1. WATER USE

NOTE: The bulk water system with WWTW will receive the sewage water from the surrounding area to treat and purify the sewage. No water will be used for water activities except purification.

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

Municipal	Water board	Groundwater	River, stream, dam or lake	Other	The activity will not use water
-----------	-------------	-------------	----------------------------	-------	---------------------------------

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:

N/A litres

Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water and Sanitation?

YES	NO
-----	----

If YES, please provide proof that the application has been submitted to the Department of Water and Sanitation.

2. ENERGY EFFICIENCY

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

1. **Electricity - The electricity requirements of the project is low. Eskom electricity will be provided at pump stations with a standby generator.**
2. **Fuel and Oil - Delivery Vehicles and other construction equipment will use petrol, diesel and oil during construction. Use and number of such vehicles and machinery will be restricted to that which is absolutely necessary for material delivery.**

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

Energy efficient lighting will be used where practical

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” for the specialist appointed and attach in Appendix F.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

- For linear activities (pipelines, etc) as well as activities that cover very 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 B and indicate the area, which is covered by each copy No. on the Site Plan.

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

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

- 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” for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	North west
District Municipality	Dr Ruth Segomotsi Mompoti District Municipality
Local Municipality	Naledi Local Municipality
Ward Number(s)	Ward 1
Farm name and number	Zoutpans Fontein 546
Portion number	Portion 3
SG Code	TOIN0000000054600003

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records:

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	NO
-----	----

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 THE LANDSCAPE

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

2.1 Ridgeline	<input type="checkbox"/>	2.4 Closed valley	<input type="checkbox"/>	2.7 Undulating plain / low hills	<input type="checkbox"/>
2.2 Plateau	<input type="checkbox"/>	2.5 Open valley	<input type="checkbox"/>	2.8 Dune	<input type="checkbox"/>
2.3 Side slope of hill/mountain	<input type="checkbox"/>	2.6 Plain	<input checked="" type="checkbox"/>	2.9 Seafront	<input type="checkbox"/>
2.10 At sea	<input type="checkbox"/>				

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

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

	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. 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^E	Natural veld with scattered aliens ^E	Natural veld with heavy alien infestation ^E	Veld dominated by alien species	Gardens
Sport field	Cultivated land	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 doesn’t have the necessary expertise.

5. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites?

Perennial River	YES	NO	UNSURE
Non-Perennial River	YES	NO	UNSURE
Permanent Wetland	YES	NO	UNSURE
Seasonal Wetland	YES	NO	UNSURE
Artificial Wetland	YES	NO	UNSURE
Estuarine / Lagoonal wetland	YES	NO	UNSURE

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

6. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that 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:

Natural area	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station ^H
Medium density residential	School	Landfill or waste treatment site
High density residential	Tertiary education facility	Plantation
Informal residential^A	Church	Agriculture
Retail commercial & warehousing	Old age home	River, stream or wetland
Light industrial	Sewage treatment plant ^A	Nature conservation area
Medium industrial ^{AN}	Train station or shunting yard ^N	Mountain, koppie or ridge
Heavy industrial ^{AN}	Railway line ^N	Museum
Power station	Major road (4 lanes or more) ^N	Historical building
Office/consulting room	Airport ^N	Protected Area
Military or police base/station/compound	Harbour	Graveyard
Spoil heap or slimes dam ^A	Sport facilities	Archaeological site
Quarry, sand or borrow pit	Golf course	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? Specify and explain:

N/A

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

N/A

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

N/A

Does the proposed site (including any alternative sites) fall within any of the following?

Critical Biodiversity Area (as per provincial conservation plan)	YES	NO
Core area of a protected area?	YES	NO
Buffer area of a protected area?	YES	NO
Planned expansion area of an existing protected area?	YES	NO
Existing offset area associated with a previous Environmental Authorisation?	YES	NO
Buffer area of the SKA?	YES	NO

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

7. CULTURAL/HISTORICAL FEATURES

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 Archaeological or paleontological sites, on or close (within 20m) to the site? If YES, explain:

YES	NO
Uncertain	

A heritage impact assessment is attached as Appendix G.

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

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

YES	NO
-----	----

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

YES	NO
-----	----

If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.

8. SOCIO-ECONOMIC CHARACTER

a) Local Municipality

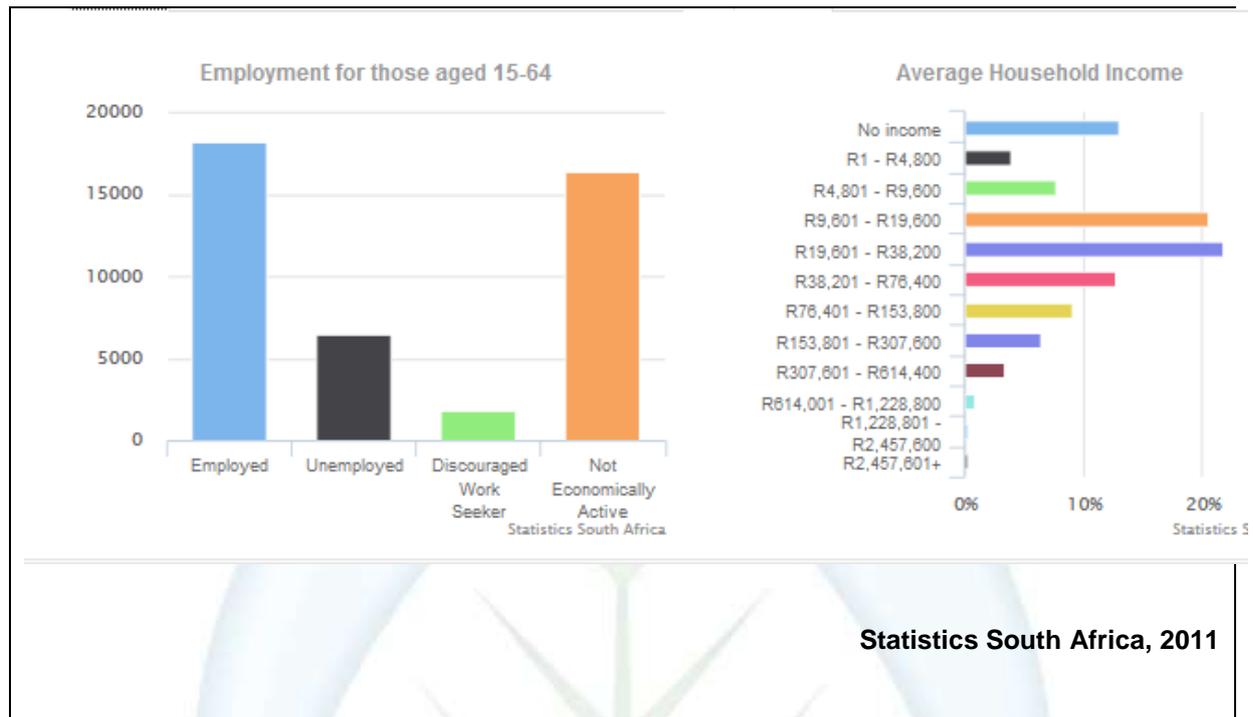
Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated.

Level of unemployment:

The proposed site is situated in the Naledi Local Municipality which has a population of 66 781. Of the 66 781 population, about 49.83% is female, while 50.17% is male. Naledi Local Municipality, with Vryburg town known as The Texas of South Africa, is an agriculture-based municipality, mainly live stock. Most of its income is derived from the agricultural sector. Formal employment, with government being the main employer, followed by private sector business (banks, retail-trade, hospitality) play a significant role as employer and source of income.

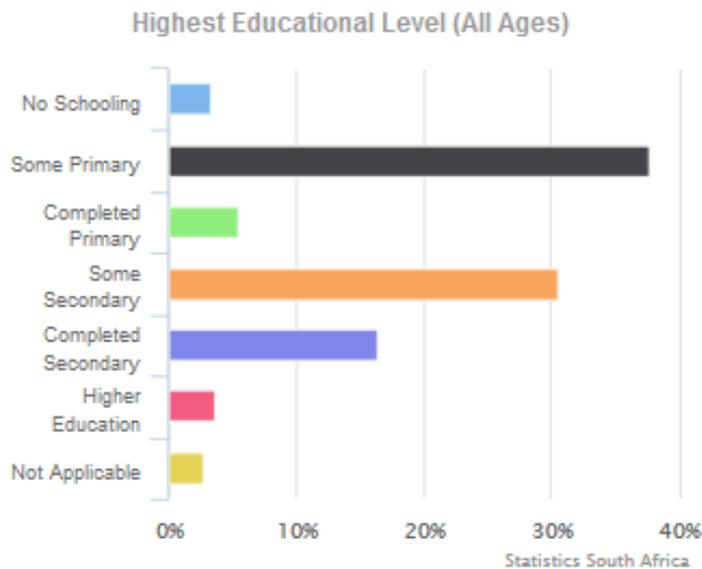
EMG

Economic profile of local municipality:



Level of education:

Of the a population of 747 431 the level of education is as follows:



Group	Percentage
No Schooling	3,3%
Some Primary	37,7%
Completed Primary	5,4%
Some Secondary	30,6%
Completed Secondary	16,5%
Higher Education	3,7%
Not Applicable	2,7%

Statistics South Africa ,2011

Employment Status	Number
Employed	18201
Unemployed	6415
Discouraged Work Seeker	1780
Not Economically Active	16344

Income	Percentage
None income	13%
R1 - R4,800	3,9%
R4,801 - R9,600	7,7%
R9,601 - R19,600	20,5%
R19,601 - R38,200	21,8%
R38,201 - R76,4000	12,7%
R76,401 - R153,800	9,1%
R153,801 - R307,600	6,4%
R307,601 - R614,400	3,4%
R614,001 - R1,228,800	0,9%
R1,228,801 - R2,457,600	0,3%
R2,457,601+	0,3%

Statistics South Africa ,2011

b) Socio-economic value of the activity

What is the expected capital value of the activity on completion?
 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 and construction phase of the activity/ies?
 What is the expected value of the employment opportunities during the development and construction phase?
 What percentage of this will accrue to previously disadvantaged individuals?
 How many permanent new employment opportunities will be created during the operational phase of the activity?
 What is the expected current value of the employment opportunities during the first 10 years?
 What percentage of this will accrue to previously disadvantaged individuals?

N/A	
Building contractors will have to be consulted in this regard	
YES	NO
YES	NO
Building contractors will have to be consulted in this regard	
Building contractors will have to be consulted in this regard.	
Building contractors will have to be consulted in this regard.	
The Developer of the WWTW will be consulted of how many opportunities will be available once it is operational.	
The Developer will be consulted in this regard.	
100%	

9. BIODIVERSITY

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult <http://bgis.sanbi.org> or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as Appendix D to this report.

a) Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)

Systematic Biodiversity Planning Category				If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan
Critical Biodiversity Area (CBA)	Ecological Support Area (ESA)	Other Natural Area (ONA)	No Natural Area Remaining (NNR)	N/A
				N/A
				N/A

b) Indicate and describe the habitat condition on site

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
Natural	80%	The site it is clear that a natural grass layer with a sparse tree and shrub layer is present. The species composition is still similar to the natural vegetation type.
Near Natural (includes areas with low to moderate level of alien invasive plants)	0%	N/A
Degraded (includes areas heavily invaded by alien plants)	10%	Trampling has occurred on site which does lead to significant disturbance of the vegetation layer.
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	10%	The site has transformed as there dirt tracks and footpaths abundant. These paths provide access to the area

c) Complete the table to indicate:

- (i) the type of vegetation, including its ecosystem status, present on the site; and
- (ii) whether an aquatic ecosystem is present on site.

Terrestrial Ecosystems		Aquatic Ecosystems								
Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Critical	Wetland (including rivers, depressions, channelled and unchannelled wetlands, flats, seeps pans, and artificial wetlands)			Estuary		Coastline			
	Endangered									
	Vulnerable									
	Least Threatened									
		YES	NO	UNSURE	YES	NO	YES	NO		

- d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats)

According to Mucina & Rutherford (2006) the area consists of Stella Bushveld (SVk 2). This vegetation type is listed as being of Least Concern (LC) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). The site in question is however not listed as either a Terrestrial or Aquatic Critical Biodiversity Area (CBA). As a result, overall, the loss of habitat and vegetation will not exceed a moderate impact. (See Appendix 2)

The main impact affecting the site is associated with it forming part of the municipal grazing area as well as its proximity to the adjacent urban area. Dirt tracks and especially footpaths are abundant. These paths also provide access to the area and consequently rubbish dumping and littering is evident. In addition, it was notable that the trees and shrubs were also heavily affected by cutting for firewood. Probably the most prominent impact on the site is associated with communal grazing by domestic livestock. Since this is not practised according to a structured grazing schedule and grazing capacity the amount of overgrazing and trampling is quite high which does lead to significant disturbance of the vegetation layer. In addition, to these impacts, the frequent burning of the area due to its proximity to the adjacent urban area is also considered a notable impact. From the description of the impacts on the site it would seem that vegetation would still be largely natural although modified to some extent by current land use.

The topography of the site consists of an almost completely flat area without any discernible slope. This is common in the region which is largely devoid of hills and similar positive landscape forms. As a result, vegetation may be quite uniform over large areas. However, as a result of the absence of a slope and consequently concentrated surface runoff patterns it also promotes the formation of pans or depression wetlands. The site has an elevation of 1312m and also confirms the absence of a discernible slope. Consequently, the site and surroundings are devoid of any watercourses, streams or drainage lines.

Section C: public participation

1. ADVERTISEMENT AND NOTICE

Publication name	Kalahari Bulletin	
Date published	23 July 2020	
Site notice position	Latitude	Longitude
	26.55787°	24.87153°
	26.55789°	24.87158°
	26.55344°	24.86684°
	26.55127°	24.86184°
	26.55126°	24.85457°
Date placed	23 July 2020	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

2. DETERMINATION OF APPROPRIATE MEASURES

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 326

Key stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 326

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)
Please refer to the Public Participation Report (Appendix E)		

Include proof that the key stakeholder received written notification of the proposed activities as Appendix E2. This proof may include any of the following:

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- signed acknowledgements of receipt; and/or
- or any other proof as agreed upon by the competent authority.

3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
Please refer to the Public Participation Report (Appendix E)	

4. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments received from I&APs and respond to each comment before the Draft BAR is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to the Final BAR as Appendix E3.

5. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)
Mr. Tshepo Bloom	Naledi Local Municipality	053 928 2200 strydomr@naledi.local.gov.za
Mrs M Maseka	Department of Government & Local Settlement	marcia@nwpg.gov.za 081 388 2890
Mrs G Maseng	Department of Heritage	masengg@nwpg.gov.za 018 388 2753
Mrs H Pretorius	Department of Public Works and Roads	hpretorius@nwpg.gov.za 018 388 1254
O. D Masike	Dr Ruth Segomotsi Mompoti District Municipality	masikeo@bophirima.co.za 0729013556
Mangie Rakale	Department of Water and Sanitation	rakalem@dws.gov.za 0832338534
Rachel Mpe	North West Department of Water and Sanitation	mper@dws.gov.za 0183879500
Deon Erusmus	Stella WUA	deonsr@lantic.net 0823167770
Enka de Villiers	Stella WUA	devillierse@lantic.net 0825428842
Pieter de Villiers	Stella WUA	devillierse@lantic.net 0829207309
Mr NW Skalk	Naledi Local Municipality	tapb@naledi.local.gov.za 053 928 2300
Mr Segapo Tyatya	Naledi Local Municipality- Municipal Manager	municipalmanager@naledi.local.gov.za 053 928 2200
Councilor Mrs G Gamma	Naledi Local Municipality Speakers Office	053 928 2300

Include proof that the Authorities and Organs of State received written notification of the proposed activities as appendix E4.

In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

6. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for any activities (linear or other) 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 competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as appendix E5.

Copies of any correspondence and minutes of any meetings held must be included in Appendix E6.

A large, faded watermark of the EMG logo is centered on the page. It consists of a stylized tree with a blue canopy and a green trunk, positioned above the letters 'EMG' in a large, light blue, sans-serif font.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 as amended 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. 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

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts 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. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A(2) of this report.

Activity	Impact summary	Significance	Proposed mitigation
Alternative 1 (preferred alternative)			
Flora and Fauna			
Clearance of Vegetation	Direct impacts:	Medium	<ul style="list-style-type: none"> Only vegetation within the registered road reserve and servitudes can be removed. Keep vegetation removal to a minimum and only what is required. Construction footprint to be demarcated as per the construction phase conditions outlined Construction vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development. Keep to designated gravel roads or already created pathways..
	Indirect impacts:	LOW	
	Cumulative impacts:	LOW	
Land transformation – Veldfire	Direct impacts:	LOW	<ul style="list-style-type: none"> The Developer will ensure that firefighting equipment is available onsite in the

Activity	Impact summary	Significance	Proposed mitigation
	Indirect impacts:	LOW	<ul style="list-style-type: none"> event that an accidental fire should break out. Construction workers will not be allowed to make fires on the site. Construction activities that generate heat or an open flame should be monitored and appropriate measure taken to prevent run away veld fires. A Fire Management Plan must be present on site The local fire station, landowner and neighbouring landowners must be alerted about potential of causing a fire.
	Cumulative impacts:	LOW	
Unauthorized vehicle movement	Direct impacts:	LOW-MODERATE	<ul style="list-style-type: none"> Vehicles must stay to existing gravel roads during any maintenance activities. Vehicle drives must be informed where it is safe to drive.
	Indirect impacts:	LOW	
	Cumulative impacts:	LOW	
Hunting and gathering of Fauna	Direct impacts:	LOW-MODERATE	<ul style="list-style-type: none"> No animal life should be killed and measure should be implemented to inform workers thereof. A specialist should be informed immediately if the animal does not willing move from site or has a nesting ground on the designated area. Any animals found onsite should be relocated During maintenance special care should be given to any animals that re-occupied the site after construction has been completed. Accidental killing of animals with vehicles should be kept to a minimum
	Indirect impacts:	LOW	
	Cumulative impacts:	LOW	

Activity	Impact summary	Significance	Proposed mitigation
Permanent loss of animal life	Direct impacts:	MODERATE	<ul style="list-style-type: none"> Construction footprint to be demarcated as per the construction phase conditions outlined Construction vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development The development area is defined as remaining in its natural state, contain natural habitats for fauna and flora species, therefore: Ensure the Environmental Management Plan includes localities of these animals, and measures to rescue, protect/remove them Limit the amount of construction sites that are worked on simultaneously. Reduce the amount of noise generated by vehicles.
	Indirect impacts:	LOW	
	Cumulative impacts:	LOW-MODERATE	
Heritage			
Archaeological and/or historical features or artifacts	Direct impacts:	MODERATE	<ul style="list-style-type: none"> Upon finding any archaeological or historical material all work at the affected area must cease The area will be demarcated in order to prevent any further work there until an investigation has been completed An archaeologist will be contacted immediately to provide advice on the matter Should it be a minor issue,
	Indirect impacts:	LOW	
	Cumulative impacts:	LOW	
	Indirect impacts:	LOW	

Activity	Impact summary	Significance	Proposed mitigation
	Cumulative impacts:	LOW	the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit <ul style="list-style-type: none"> • SAHRA's APM Unit will be notified • If needed the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist • Work on site will only continue after removal of the archaeological/historical material was done • Operating controls and monitoring will be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.
Water Resources			
Surface and ground water Quality	Direct impacts:	MODERATE	<ul style="list-style-type: none"> • Surface contamination of the soil through hazardous materials should be cleaned up immediately and disposed of properly. • All vehicles must be fitted with a drip tray and leaking vehicles must be repaired off site at a designated construction area. • It is recommended to use alternative substances to those that are hazardous especially near sensitive areas such as the existing irrigation concrete canal
	Indirect impacts:	LOW	
	Cumulative impacts: A cumulative impact can be	LOW-MODERATE	

Activity	Impact summary	Significance	Proposed mitigation
	foreseen for the surrounding environment and its aquifer as farmers frequently use boreholes to abstract water for domestic and agricultural use		within close proximity of the area <ul style="list-style-type: none"> Any maintenance taking place in the WWTW should have a spillage treatment kit with them at all times. All spillages must be cleaned before leaving a site. HTP liner is to be used to ensure no seepage of waste water into groundwater resources.
	Indirect impacts:	NO IMPACT	
	Cumulative impacts:	LOW-MODERATE	
Aesthetics			
Course of Pipeline	Direct impacts: During the construction works and maintenance during the operational phase the aesthetic value of the surrounding environment will be lowered due to open trenches and construction works. This impact will be the highest at wetlands and watercourses	MODERTARE	<ul style="list-style-type: none"> It is recommended that the number of construction sites be kept to a minimum to lower the overall aesthetic impact. Once an area is completed it is recommended that the area be rehabilitated before moving on to the next section through levelling off the ground and re-vegetating the excavated areas. Trenches may not be kept open and unattended for longer than 30 days Maintenance of the pipeline should occur as quickly as possible to minimize the overall aesthetics value created by open trenches, soil heaps, construction signs and still standing vehicles
	Indirect impacts:	LOW	
	Cumulative impacts: A cumulative impact has already occurred through the main gravel road and private access roads on private land and excavating along the already disturbed areas will have a very small cumulative impact	LOW	
Location WWTW/Oxidation ponds and pump stations	Direct impacts: Construction and permanent fixture of the WWTW close to a watercourse and lowering	LOW-MODERATE	<ul style="list-style-type: none"> Avoid excessive clearance of vegetation and disturbance to the area. It is recommended that after

Activity	Impact summary	Significance	Proposed mitigation
	aesthetic value		the construction phase and before the operational phase, that indigenous trees be planted around the disturbed and cleared area to recover some aesthetic value for the area as well as blending the pump house into the environment
	Indirect impacts:	LOW	
	Cumulative impacts:	LOW	
Noise and Air Quality			
Generation of noise	Direct impacts:	LOW-MODERATE	<ul style="list-style-type: none"> • No loud music at any construction sites. • Vehicles must be maintained in such a manner as to not cause excessive noise when operating them. • Electric pumps must be installed at the pump stations. • The pump stations must not be built within 100m from residential infrastructure, unless the landowner provides consent. • Ensure that the pump house is sufficiently insulated to buffer noise coming from the pump house. • Also, maintain the pump and generator in such a manner that it does not cause excessive noise.
	Indirect impacts:	LOW	
	Cumulative impacts:	LOW	
Air quality	Direct impacts:	LOW-MODERATE	<ul style="list-style-type: none"> • Confine vehicle movements on unpaved roads to demarcated areas only • Ensure that site drainage carries spillage of clay or coal fines away from traffic movement zones • Spraying of clay or coal stockpiles if wind erosion is
	Indirect impacts:	LOW	

Activity	Impact summary	Significance	Proposed mitigation
	<p>Cumulative impacts:</p> <p>Cumulative impacts can be foreseen when construction of the WWTW coincidence with the harvesting and ploughing seasons, which will contribute to the amount of dust in the air</p>	LOW	<p>observed.</p> <ul style="list-style-type: none"> • Set up water sprayers along haul roads to dampen dust and minimise dust loading to surrounding vegetation. • Speed control for all roads to limit dust generation • The handling removal and disposal for sludge waste products must be in terms of legal requirements and as per guidance through an approved operational Environmental Management Plan
Job Creation	<p>Direct impacts:</p> <p>Local labour from the community will be employed by the developer. This will have a positive impact on the wellbeing of employees with a multiplier effect on households of the employed</p>		<ul style="list-style-type: none"> • No mitigation
	<p>Indirect impacts:</p>		
	<p>Cumulative impacts:</p>		
No-go option			
Activity will not proceed and the environment is left as it is. The	<p>Direct impacts:</p>	HIGH	If this project has been identified as a no-go option around 500 job opportunities will be lost to the local

Activity	Impact summary	Significance	Proposed mitigation
impact is assessed from the need of this project to continue as part of water supply for the towns of Lindley and Arlington	Indirect impacts:	MODERATE	communities. This project will also stimulate the local economy as the project is estimated to cost around R 2 Billion. Furthermore, if this project is rejected the towns of Arlington and Lindley will most certainly lack adequate water supply to support the towns and the project will have to be resumed further in the future.
	Cumulative impacts:	HIGH	

A complete impact assessment in terms of Regulation 19(3) of GN 326 must be included as Appendix F.



2. Environmental Impact Assessment

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 A (preferred alternative)

In terms of potential impacts resulting from the proposed preferred development during the operational phase, the most significant impacts are those related to land transformation, pollution and waste generation by the proposed WWTW.

Major positive impacts during the operational phase are socio-economic, educational, improved access and treatment of waste water. All of these will enhance the livelihoods of the local community.

Construction impacts, if effectively and sufficiently managed in accordance with the mitigation measures proposed in this report, the Specialist Reports and the Environmental Management Program (EMPr), will predominately be of low significance post mitigation.

Based on the summary of the environmental findings presented, this BAR states that the proposed project would have moderate to low impacts on the bio-physical environment, both of which can be completely mitigated and managed and, where necessary, avoided. Obtaining a Water Use License National as per the Water Act, No 36 of 1998 and maintenance of the site to avoid impact on the surrounding natural environment are some of the key mitigation measures that must be implemented during the construction and operation.

This report is intended to offer an objective assessment of the potential environmental impacts and issues/concerns raised during the Basic Assessment process. The impact assessment section of this report indicates that the most significant environmental impacts associated with the proposed development can be effectively mitigated to have a low significance impact rating.

The proposed development of Stella bulk sewer water system is strategically required to meet the demands of anticipated future increase in sewage wastewater quantities that would result from expected developments in Stella and improve the health and hygiene of the whole Stella community. Other significant benefits include the improved quality of treated effluent which is being discharged into the surrounding area as a result of poor construction and maintenance of the existing pump station and oxidation ponds. In summary the proposed development is associated with significant biophysical benefit associated with improving the quality of treated effluent discharged to the environment.

The main decision-making factors that the EAP considers need to be taken into consideration by the authorities when deciding on the sustainability of their decisions are as follows:

- The proposed development is strategically required for the health and hygiene of the

people and to meet the demands of the anticipated future increase in in sewage wastewater quantities that would result from expected developments in Stella.

- I&APs have shown interest in the proposed development which suggests that the rights and interests of the public are unlikely to be affected by the proposed development

Potential ground water impacts during construction and operational phases can be effectively mitigated through the implementation of environmental standards of best practice, management of all potential ground water contaminants, bottom lining of all sewage infrastructure that has a potential to leak into the ground. With the correct management, mitigation and adherence to best practice principles these potential pollution events can be avoided.

Alternative B

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Alternative C

--

No-go alternative (compulsory)

The No-go Alternative implies that the development of the proposed Waste Water Treatment Facility will not take place. In this scenario, the receiving environment will not be impacted upon negatively in any manner.

However, it should also be noted that no positive impacts will be realized such as avoidance/reduction in ground and surface water contamination due to leaking current oxidation ponds and pump station. Should Stella keep the current oxidation ponds

In light of the above, as well as the fact that all negative impacts can be adequately mitigated and managed, it is not recommended that the No-go Alternative be supported.



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)?

YES

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).

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

This BAR has provided a comprehensive assessment of the potential environmental impacts associated with the proposed development of the Stella WWTW. These impacts have been identified by the EIA team (including specialists) and I&APs. The key findings of the Basic Assessment are discussed in this Report. In general, the proposed development will have an impact of low significance provided that there is effective application of the mitigation measures proposed in this BAR and the EMPr. The majority of these impacts are easily mitigated and can be reduced to lower significance through appropriate design and mitigation measures. No unacceptably impacts of unacceptably high significance are foreseen once proper mitigation measures have been implemented. The findings of the specialists that were involved are briefly presented as follows:

- All the specialists that were involved (Ecology, heritage, and geohydrological), concluded that the proposed development of Stella is unlikely to have significant negative impacts on the receiving environment provided mitigation measure are adhered to. However, potential impacts should still be managed to prevent cumulative impacts as set out in the mitigation measures in this report.
- The Geohydrological specialist concluded that a fault was located within the Ventersdorp Lavas on Traverse 2 and it is recommended that no activities occur there as these faults act as preferential pathways for water and potentially any contaminants (See Geohydrological Report, Appendix 2)
- Although the specialists involved in the project concluded that the site is suitable for the expansion, mitigation measures in the EMPr (Appendix G) should be strictly adhered to.

Therefore based on the specialist findings undertaken for the Stella development site, it is a recommendation of this Basic Assessment Report that the Proposed development be authorised. It is therefore recommended that the environmental authorities authorise the development subject to the following conditions:

- Compliance with the mitigation measures outlined in this BA report and EMPr
- Ground and surface water monitoring
- Identifying and implementing measures that reduce the possibility of increase in odour, levels, potential ground water contamination and malfunctions or operational problems occurring within the Works.
- Special attention should be directed at storm water diversion structures to restrict

pollutants such as hydrocarbons, cleaning chemicals and other waste water chemicals from seeping into the subsurface and underlying groundwater table.

- Appropriate lining is recommended to be installed at all water work bodies to restrict contamination to groundwater
- Avoiding building new facility on Transverse 2 fault as per the recommendation of the Geohydrological specialist
- Public safety must be considered during planning and construction site layout
- The appointed Contractor must adhere to OHSA with regards to noise levels and protective equipment
- Maintenance workers to be appointed during operation of the Works
- Neighbouring property owners must be informed when the construction commences; and
- Specifications detailed in the EMPr must be adhered to and monitoring during constructing and operational phases be undertaken

In addition, the following specific recommendations apply:

- Regulate and control movement over the site. Personnel, vehicles and equipment to move along designated routes.
- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.
- Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.
- The operator must develop a management and monitoring programme for alien and invasive species methods of removal of site during construction.
- Rehabilitate the old oxidation ponds which are adjacent to the proposed area.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint

Is an EMPr attached?

YES

NO

The EMPr must be attached as Appendix G.



The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as Appendix H.

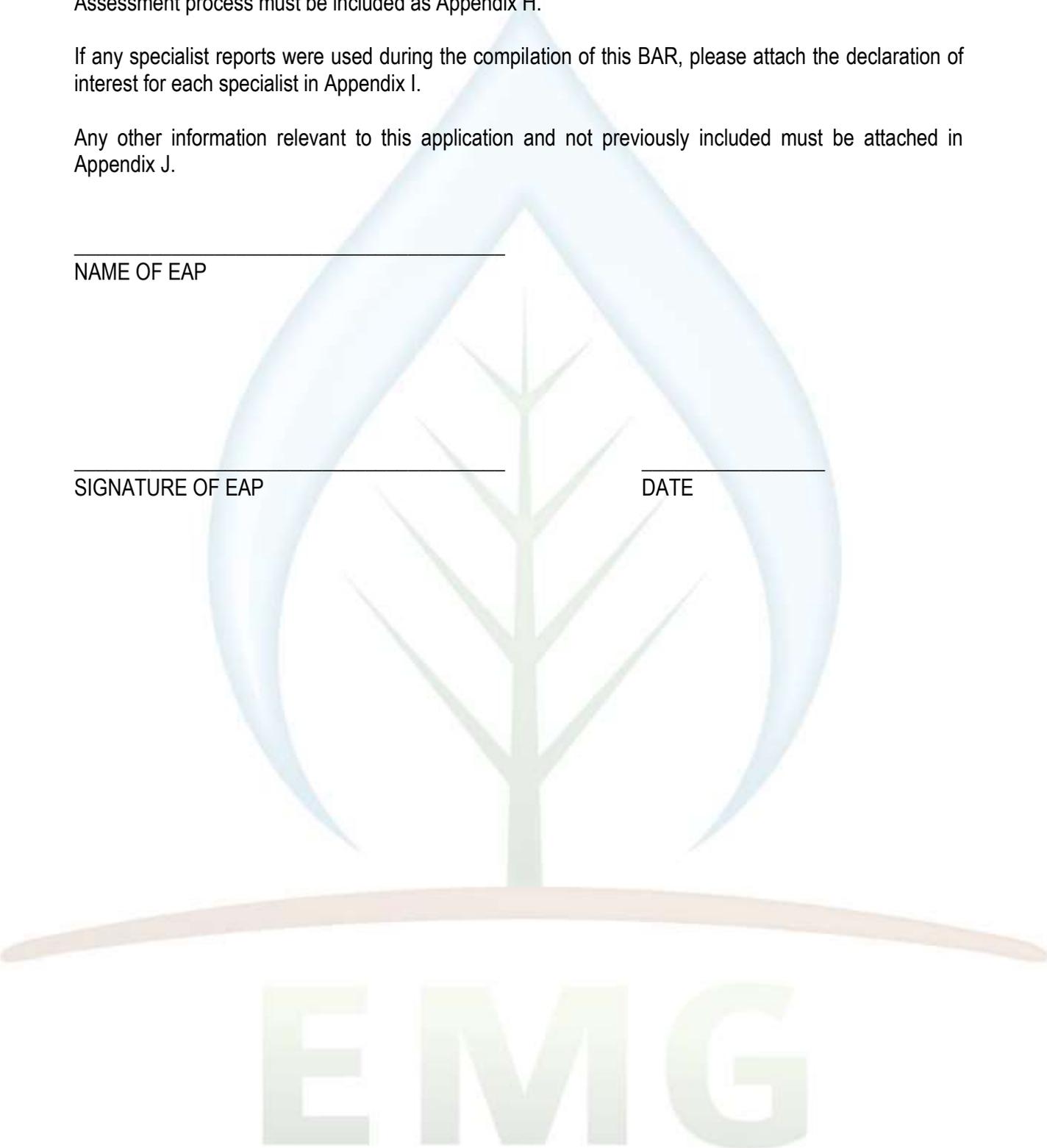
If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I.

Any other information relevant to this application and not previously included must be attached in Appendix J.

NAME OF EAP

SIGNATURE OF EAP

DATE



EMG

SECTION F: APPENDIXES

The following appendixes must be attached:

Appendix A: Maps

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix D (i): Phase 1 Heritage Impact Assessment

Appendix D (ii): Ecological Assessment

Appendix D (iii): Geohydrological Assessment

Appendix E: Public Participation Report

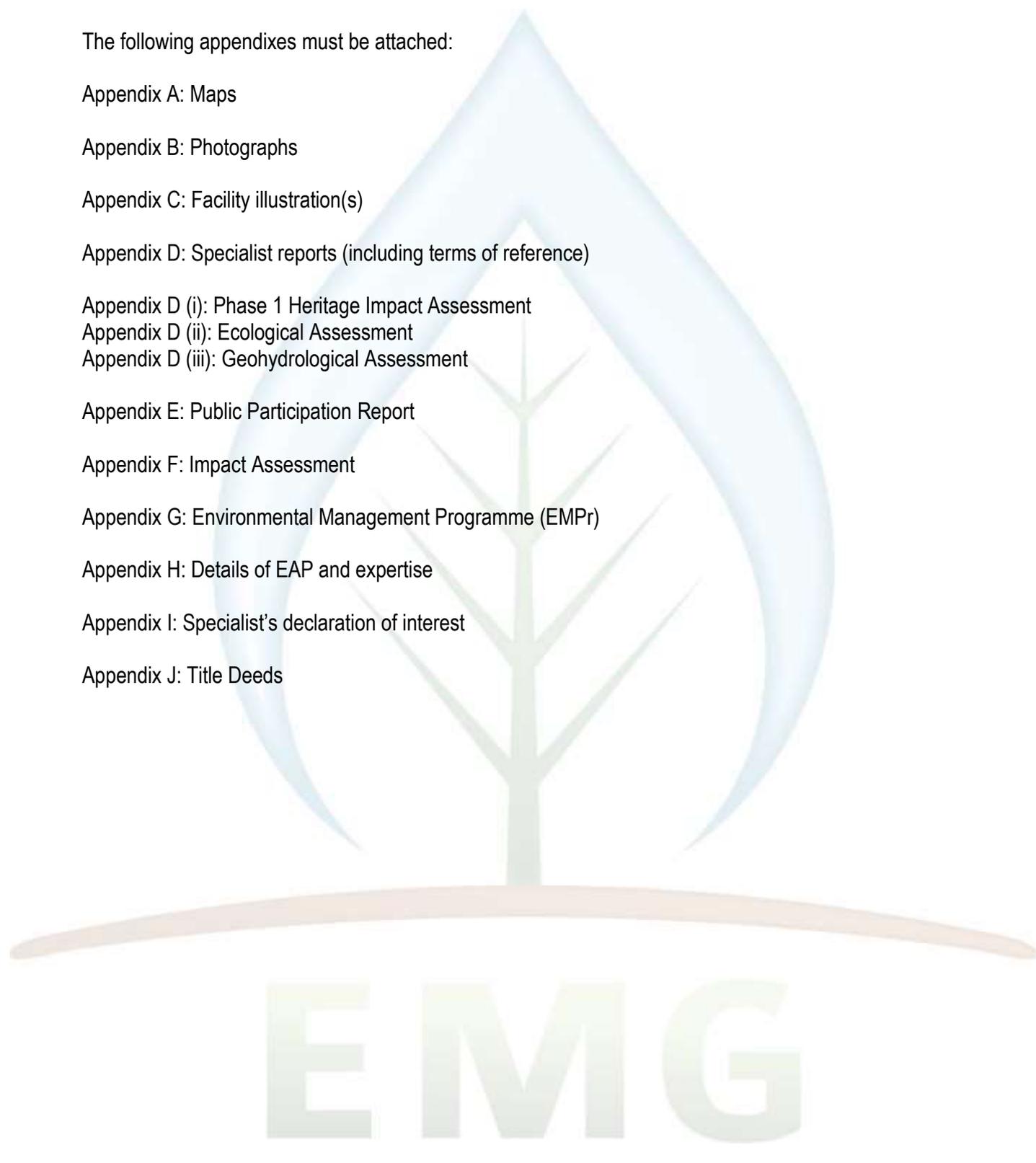
Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Specialist's declaration of interest

Appendix J: Title Deeds



EMG

APPENDIX A: MAPS





Stella Bulk Sewer Plan

Write a description for your map.

Legend

- Feature 1
- HDA Development
- New
- New Stella WWTW
- Old Stella
- Saps - Stella
- Stella
- Stella
- Stella New Pump Station
- Stella Rising Main
- Stella WWTW Centre Pivot



Google Earth

©2020 AFRIGIS (Pty) Ltd.
Image © 2020 Maxar Technologies
©2020 Google

1 km

APPENDIX B: PHOTOGRAPHS









Appendix C: Facility illustration(s)







AMENDMENTS

No.	DATE	BY	DESCRIPTION

NOTES

ELECTRICAL SYMBOLS

	CEILING LIGHT		METER BOX
	WALL MOUNTED LIGHT		DISTRIBUTION BOX
	WALL PLUG		GEYSER
	1.2m DOUBLE FLUORESCENT LIGHT		
	9 kg DRY CHEMICAL FIRE EXTINGUISHER		

DESCRIPTION OF MATERIAL

- A - 6.4mm "RHINO" CEILING ON 38x38mm BATTENS @ 450mm c/c WITH CORNICE EXCEPT WHERE OTHERWISE SHOWN BY OWNER. USE SISOLATION ABOVE ALL CEILINGS.
- B - WALLPLATE 38x114mm.
- C - THE CHROMADEK ROOF SHEET IN SINGLE LENGTHS FIXED AS PER SUPPLIER'S SPECIFICATIONS ON 76x50mm SAP BATTENS @ 1.2m C/C ON ENGINEERED APPROVED GANGNAIL ROOF TRUSSES AT 900mm c/c FIXED WITH 4mm DOUBLE TIED ROOF WIRES BUILT IN FOR FOUR LAYERS OR HOOPS FIXED TO CONCRETE BEAMS WITH RANBOLTS. ROOF GUTTER - 230x10mm ASBESTOS CEMENT FASCIA'S PAINTED AS PER ENGINEER
- H - APPROVED SABS SEMI-FACE BRICKS IN STRETCHER BOND WITH 10x10mm HORIZONTAL AND VERTICAL JOINTS.
- E - APPROVED SABS PLASTER BRICKS IN STRETCHER BOND WITH 10x10mm HORIZONTAL AND VERTICAL JOINTS WITH 12mm PLASTER FOLLOWED BY PRIMER COAT & 2 COATS OF APPROVED ACRYLIC PVA PAINT OUTSIDE & 2 COATS ENAMEL PAINT OUTSIDE.

[FOR TENDER]

REFERENCE DRAWINGS

PLAN No.	DESCRIPTION

NEP CONSULTING ENGINEERS
 PR. ENG: P.F.ERNST
 PR.NR: 740593

SIGNATURE: _____
 PRINT ISSUED ON: _____

South Africa P.O. Box 2082, Klerksdorp, 2570
 Fax: +27 (0) 53 451015 Tel: +27 (0) 53 451005
 email: nep@nepconsulting.co.za
 Head office situated between Klerksdorp and Wonomarasat at Bond Blyde
 Running with development

CLIENT
STELLA

IMPLEMENTING AGENT:

PROJECT
CONSTRUCTION PUMP STATION

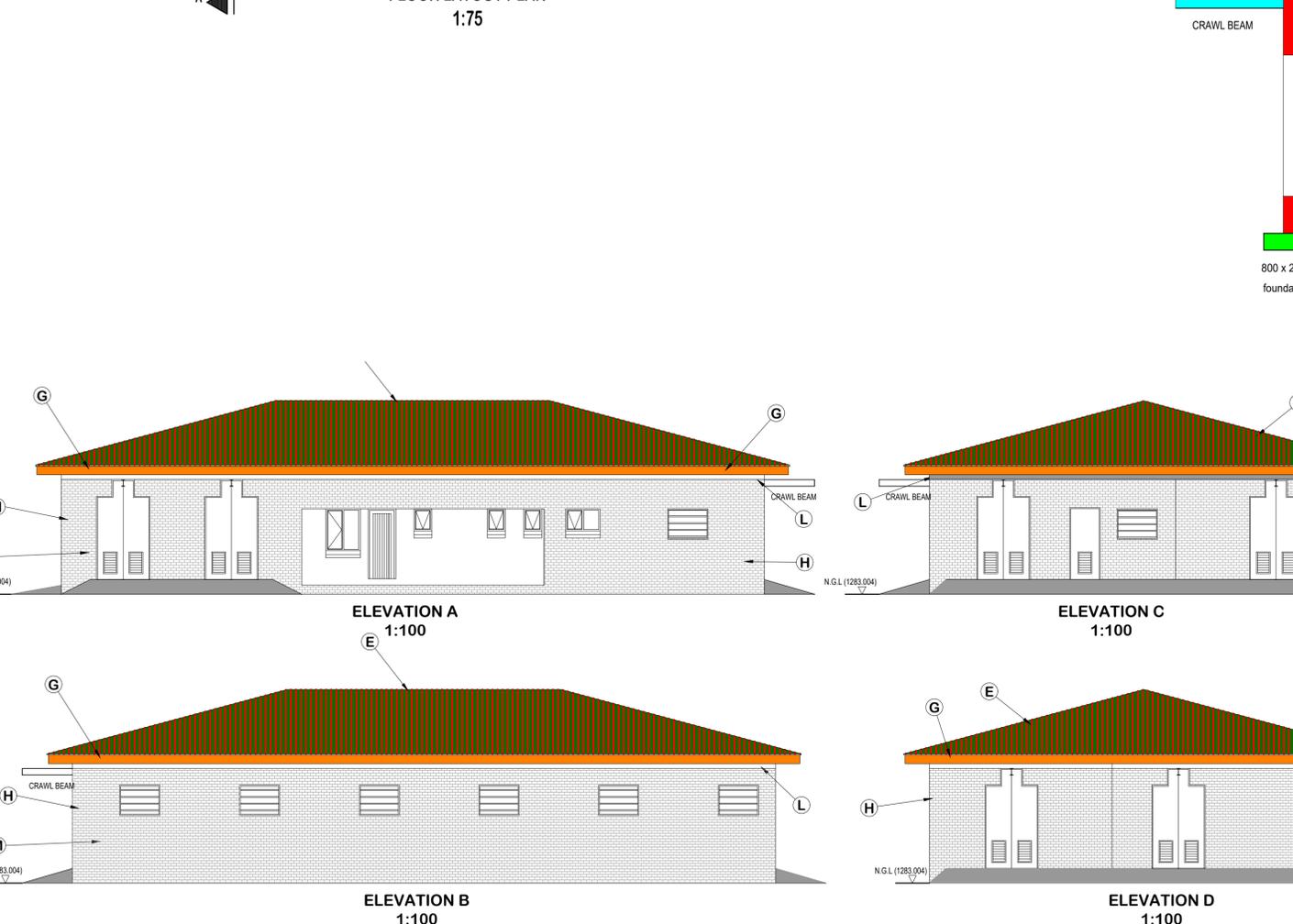
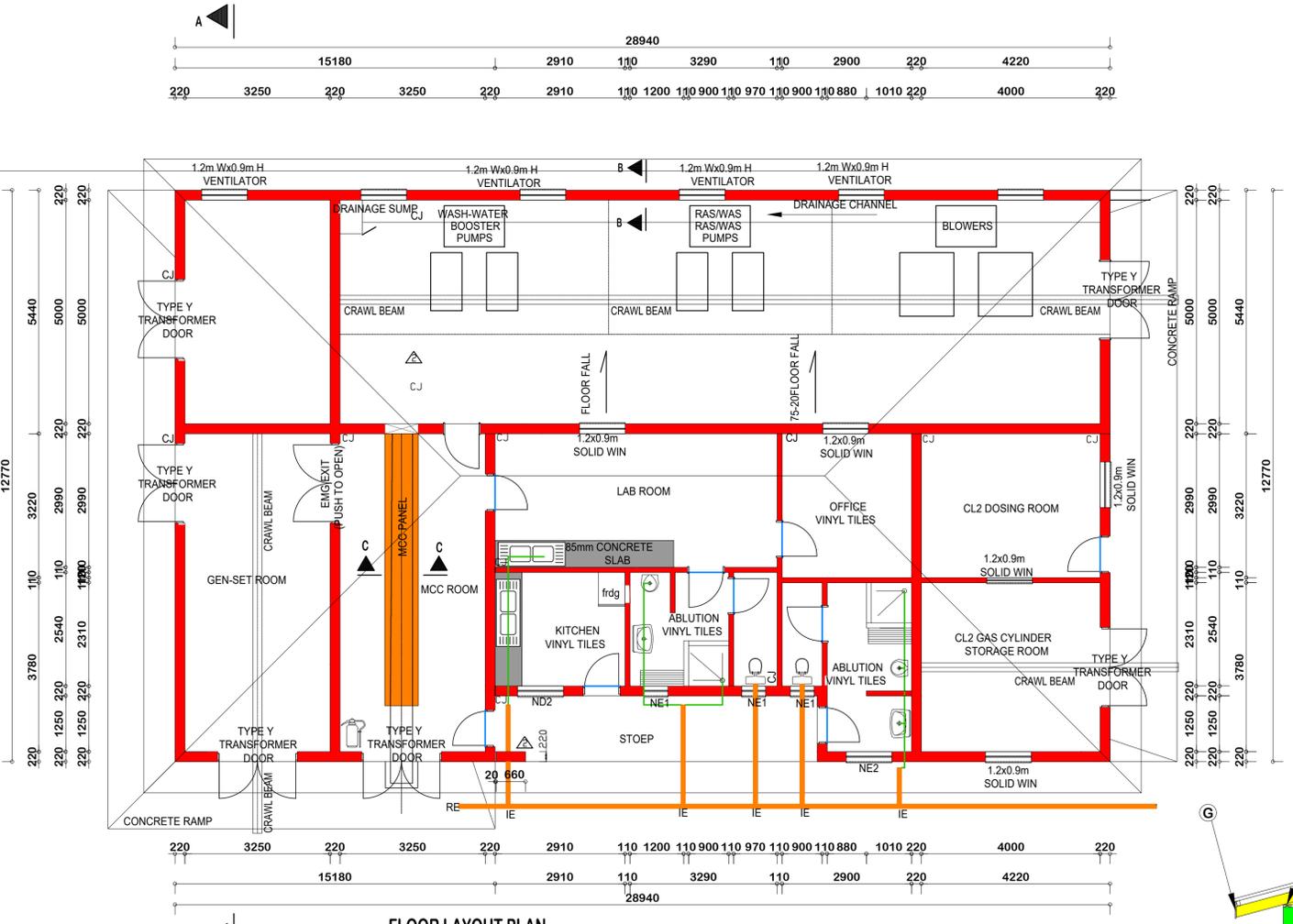
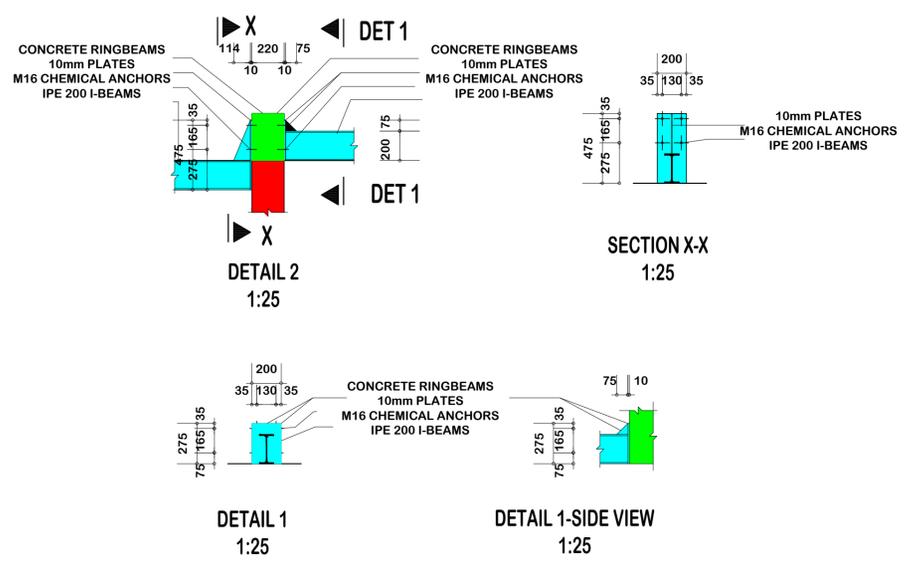
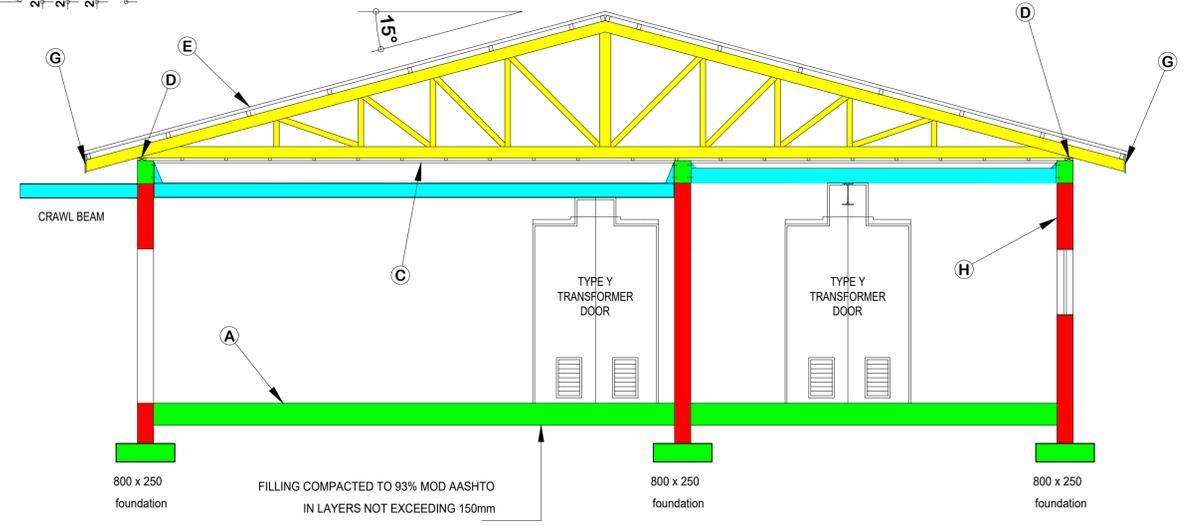
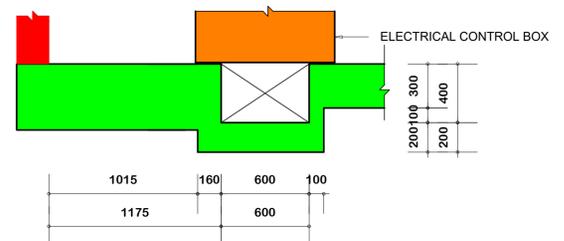
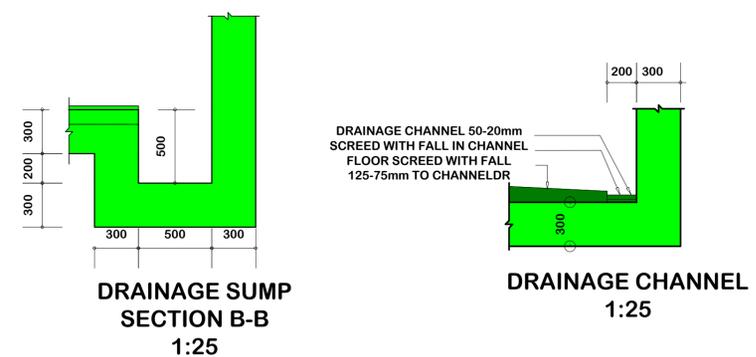
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STELLA PUMP STATIONS

DESIGN	DATE	DRAWN	DATE
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SCALE as shown

DRAWING No.
NW392/9/35/XXX

AMENDMENT No.





AMENDMENTS

No.	DATE	BY	DESCRIPTION

NOTES

[FOR TENDER]

REFERENCE DRAWINGS

PLAN No.	DESCRIPTION

NEP CONSULTING ENGINEERS
 PR. ENG: P.F.ERNST
 PR.NR: 740593

SIGNATURE:

PRINT ISSUED ON



CLIENT

STELLA

IMPLEMENTING AGENT:

.....

PROJECT

CONSTRUCTION OF CLARIFIER

DRAWING TITLE

STELLA CLARIFIER

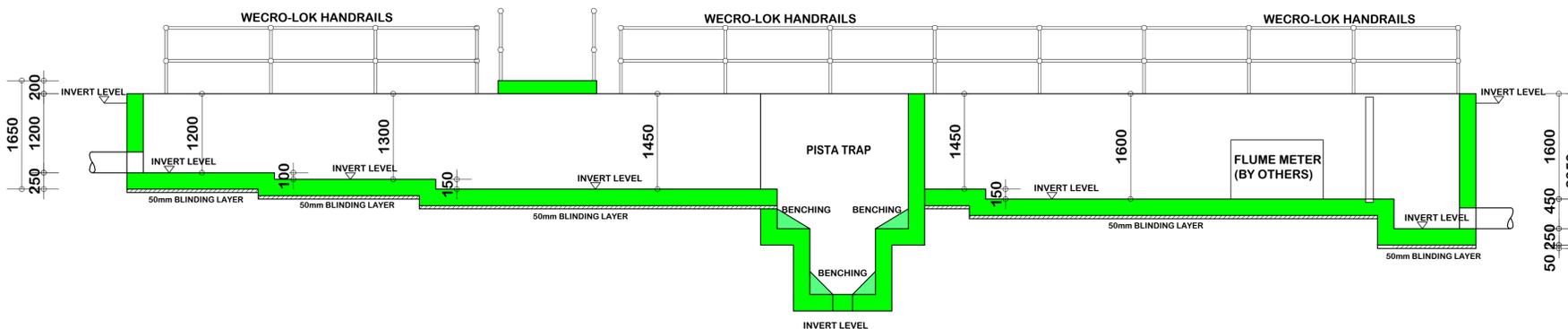
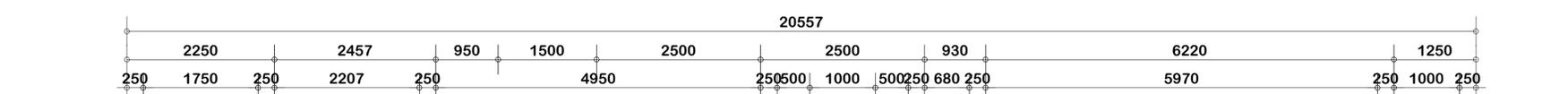
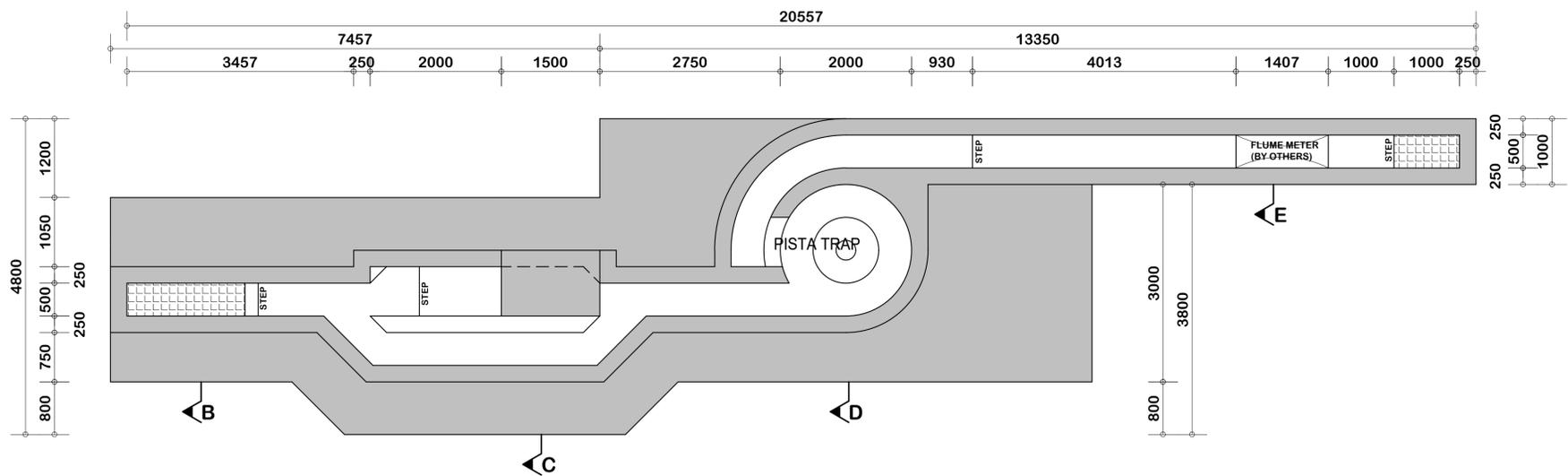
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SURVEYED	DATE	CHECKED	DATE
		D. BLAKE	10/2020

SCALE as shown

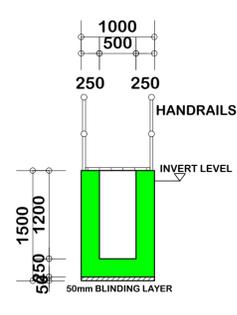
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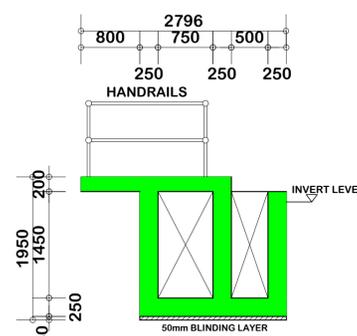
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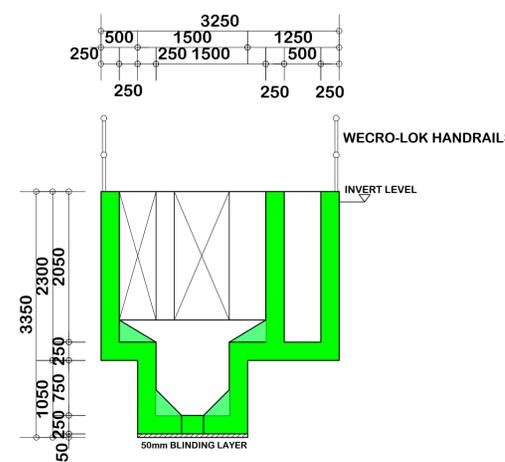
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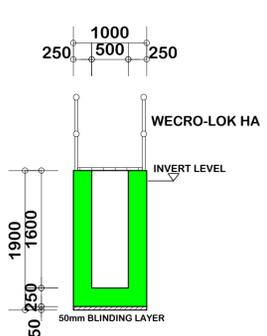
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**SECTION C-C
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**SECTION D-D
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**SECTION E-E
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AMENDMENTS

No.	DATE	BY	DESCRIPTION

NOTES

[FOR TENDER]

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PRINT ISSUED ON

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Running with development

CLIENT

STELLA

IMPLEMENTING AGENT:

.....

PROJECT

CONSTRUCTION OF CLARIFIER

DRAWING TITLE

STELLA CLARIFIER

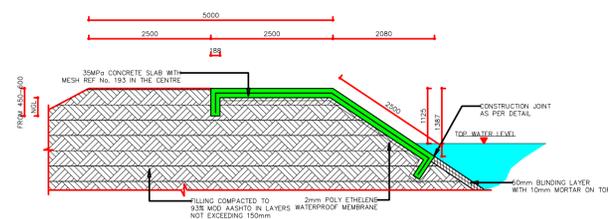
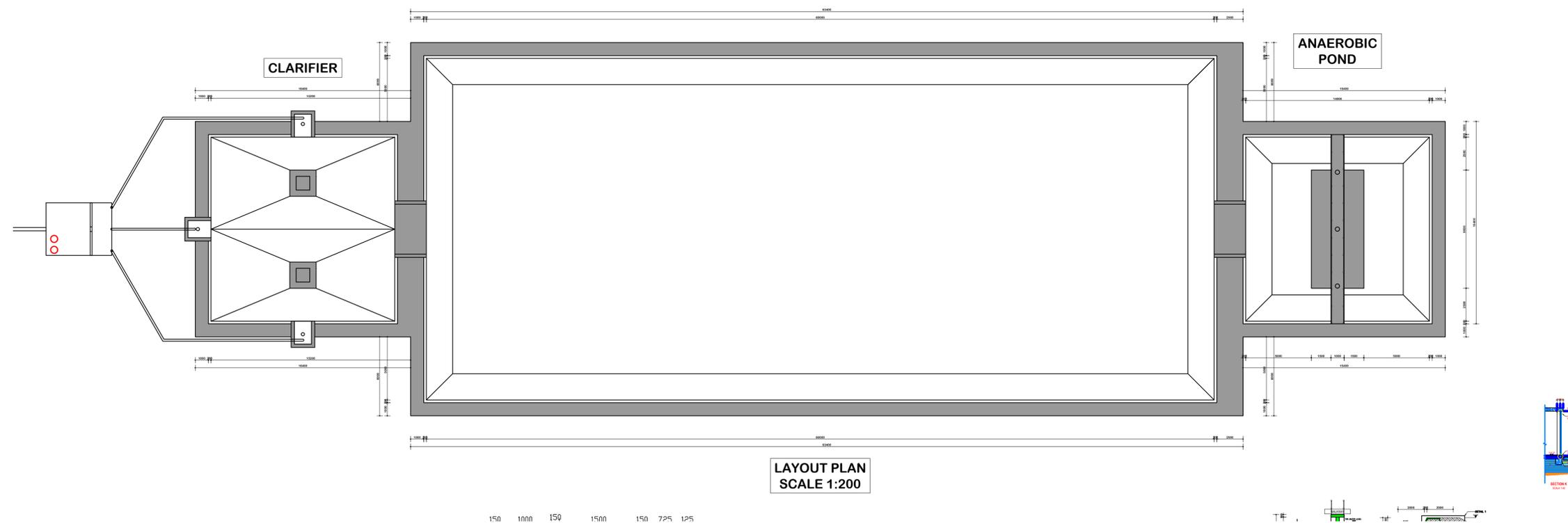
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SURVEYED	DATE	CHECKED	DATE
		D. BLAKE	10/2020

SCALE as shown

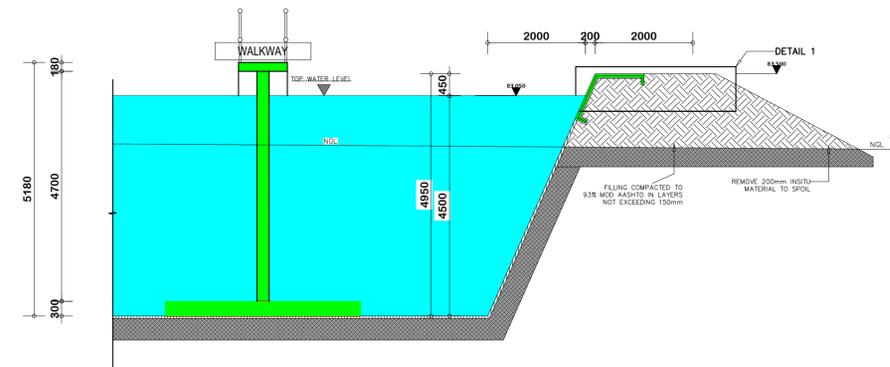
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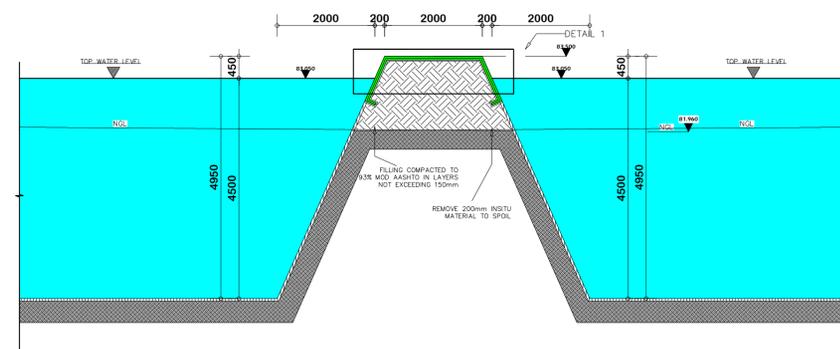
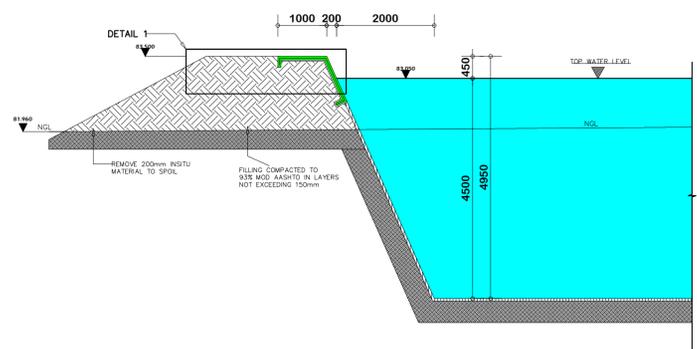
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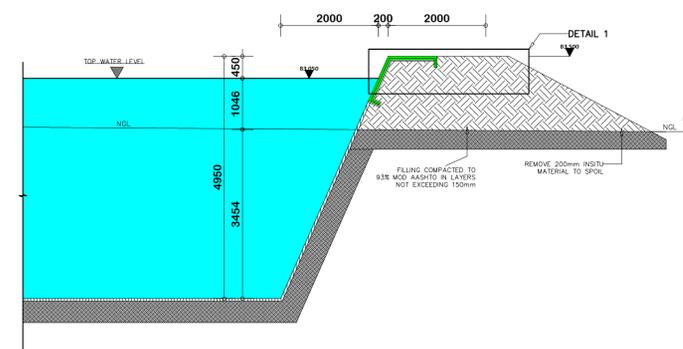
**DETAIL 1
1 : 50**



**SECTION B-B
SCALE 1 : 75**



**SECTION A-A
SCALE 1 : 75**



Appendix D: Specialist reports





Appendix D (i): Phase 1 Heritage Impact Assessment





**Phase 1 Heritage Impact Assessment of a new
WWTW facility and associated center pivot in Stella,
Northwest Province.**

Report prepared by
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09 / 09 / 2020

Summary

A Phase 1 Heritage Impact Assessment was carried out for the installation of a new WWTW and associated centre pivot in Stella, Northwest Province. The terrain is capped by a thick mantle of culturally sterile, red-brown Quaternary wind-blown sand and underlain by palaeontological insignificant basalts. A foot survey of the study area show no aboveground evidence of historically significant structures, Iron Age sites, graves or *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. Signs of land use and prior disturbance are evident. The proposed development footprints are considered to be of low archaeological significance and is assigned a site rating of Generally Protected C.

Introduction

A Phase 1 Heritage Impact Assessment was carried out for the installation of a new WWTW and associated centre pivot in Stella, Northwest Province (**Fig. 1**). The assessment is required as a prerequisite for new development in terms of the National Environmental Management Act and is also called for in terms of the National Heritage Resources Act (NHRA) 25 of 1999. The region's unique and non-renewable archaeological 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. As many such heritage sites are threatened daily by development, both the environmental and heritage legislation require impact assessment reports that identify all heritage resources in the area to be developed, and that make recommendations for protection or mitigation of the impact of such sites.

The NHRA identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories relevant to the proposed development are listed in Section 34 (1), Section 35 (4), Section 36 (3) and Section 38 (1) of the NHR Act and are as follows:

34. (1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

35 (4) No person may, without a permit issued by the responsible heritage resources authority—

- 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;

36 (3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

- (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; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

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

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site
 - a) exceeding 5000 m² in extent; or
 - b) involving three or more existing erven or subdivisions thereof; or
 - c) involving three or more subdivisions thereof which have been consolidated within the past five years;
- The rezoning of a site exceeding 10 000 m²; or
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

Terms of Reference

The task involved the following:

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Methodology

The heritage significance of the affected area was evaluated based on existing field data, database information and published literature. This was followed by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant publications, aerial photographs (incl. Google Earth) and site records were consulted and integrated with data acquired during the on-site inspection.

Field Rating

Site significance classification standards prescribed by SAHRA (2005) were used to indicate overall significance and mitigation procedures where relevant (**Table 1**).

Locality data

1 : 50 000 scale topographic map: 2624 DB_Stella

1 : 250 000 geological map 2624 Vryburg

The proposed development footprint covers about 18 ha of flat-lying grassland terrain on the Farm Zoutpansfontein 546 IN, situated on the western outskirts of Stella (**Fig 2**). The site is currently informally used for cattle grazing (**Fig. 4**).

Site coordinates (**Fig. 1**)

A) 26°33'23.98"S 24°50'19.78"E

B) 26°33'18.50"S 24°50'29.82"E

C) 26°33'30.85"S 24°50'42.10"E

D) 26°33'38.41"S 24°50'29.74"E

Background

The geology of the study area is shown on the 1: 250 000 geology map 2624 Vryburg (Council for Geoscience, Pretoria) and has been described by Keyser & Du Plessis 1993). According to the map sheet the site is underlain by Venterdorp Supergroup volcanic rocks (Allanridge Formation), that are capped in places by more recent Kalahari Group deposits (**Fig. 5**).

The Kathu-Kuruman-Taung region situated to the south and southwest of Stella is

generally rich in Early, Middle and Later Stone Age open sites / surface scatters (Helgren 1978; Humphreys 1978; Kuman 2001; Beaumont & Vogel 2006). Intact palaeontological and Stone Age archaeological sites are frequent and widespread in the region and include important localities like Taung, Kathu Pan, and Wonderwerk Cave (Beaumont & Morris 1990) (**Fig. 6**). Archaeological investigations at Wonderwerk Cave show evidence of *in situ*, ESA, Fauresmith and Middle Stone Age, as well as Later Stone Age deposits, including rock art (Thackeray *et al.* 1981; Chazan *et al.* 2012). It is unique since few sites have yielded such a long sequence of *in situ* ESA horizons, which also cover the ESA/MSA transition, while none of the other ESA sites in Southern Africa have yielded such abundant and well preserved *in situ* micro and macro-faunal and botanical remains. Specularite mining sites at Doornfontein and Beeshok near Postmasburg, provide evidence of LSA mining practices and the introduction in the region by 1200 BP, of domesticated ovicaprids and possibly cattle as well as pottery. Dolomite terraces and exposed valley floors along the Kuruman River valley are at places decorated with rock engravings that reflect colonial and LSA/Iron Age frontier interactions (Fock & Fock 1984).

The archaeological footprint around Dithakong is primarily represented by stonewall remnants of the early 19th century BaTlaping capital Dithakong, located near the modern village of Dithakong. At the time of the 1801-1803 Borchers and Somerville expedition, Dithakong was an important BaTlhaping (BaTswana) capital. It was calculated that the number of huts there were at least not less than 1 500 and the number of occupants at somewhere between 8 000 and 25 000 (Maingard, 1933; Beaumont 1983; Morris 1990). Extensive stonewall enclosures are found on the adjacent hills and archaeological investigations during the 1980's have revealed that the ruins were built during the 15th century A.D. and possibly by sedentary Khoi groups. The area consists of primary and secondary enclosures and cover a total area of about 1 km² comprising hundreds of circles of varying size (**Fig. 7**). Iron Age sites found northwest of Kuruman, and west of Stella include Gamohaam, Maropeng, Batlharos and Mahakane as well as Kinderdam, situated halfway between Vryburg and Madibogo (**Fig. 8**). Vryburg was established as the capital of the independent Boer Republic of Stellaland in 1882, hence the name of the town (**Fig. 9**). The Stellaland area, which includes the town of Stella, was incorporated as a British protectorate into British Bechuanaland in 1884, which in turn became part of the Cape Colony in 1895.

Field Assessment

A thick mantle of red-brown Quaternary wind-blown sand caps the terrain. A foot survey of the study area show no aboveground evidence of historically significant structures, Iron Age sites, graves or *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. Signs of land use and prior disturbance are evident (**Fig 10 & 11**).

Impact Statement and Recommendations

The proposed development footprints are located on palaeontological insignificant basalts, capped by unconsolidated, Quaternary wind-blown sand. The study area is considered to be of low archaeological significance and is assigned a site rating of Generally Protected C (**Table 1**).

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DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project.



07 / 09 / 2020

Tables and Figures

Table 1. Field rating categories for heritage sites as prescribed by SAHRA.

Field Rating	Grade	Significance	Mitigation
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

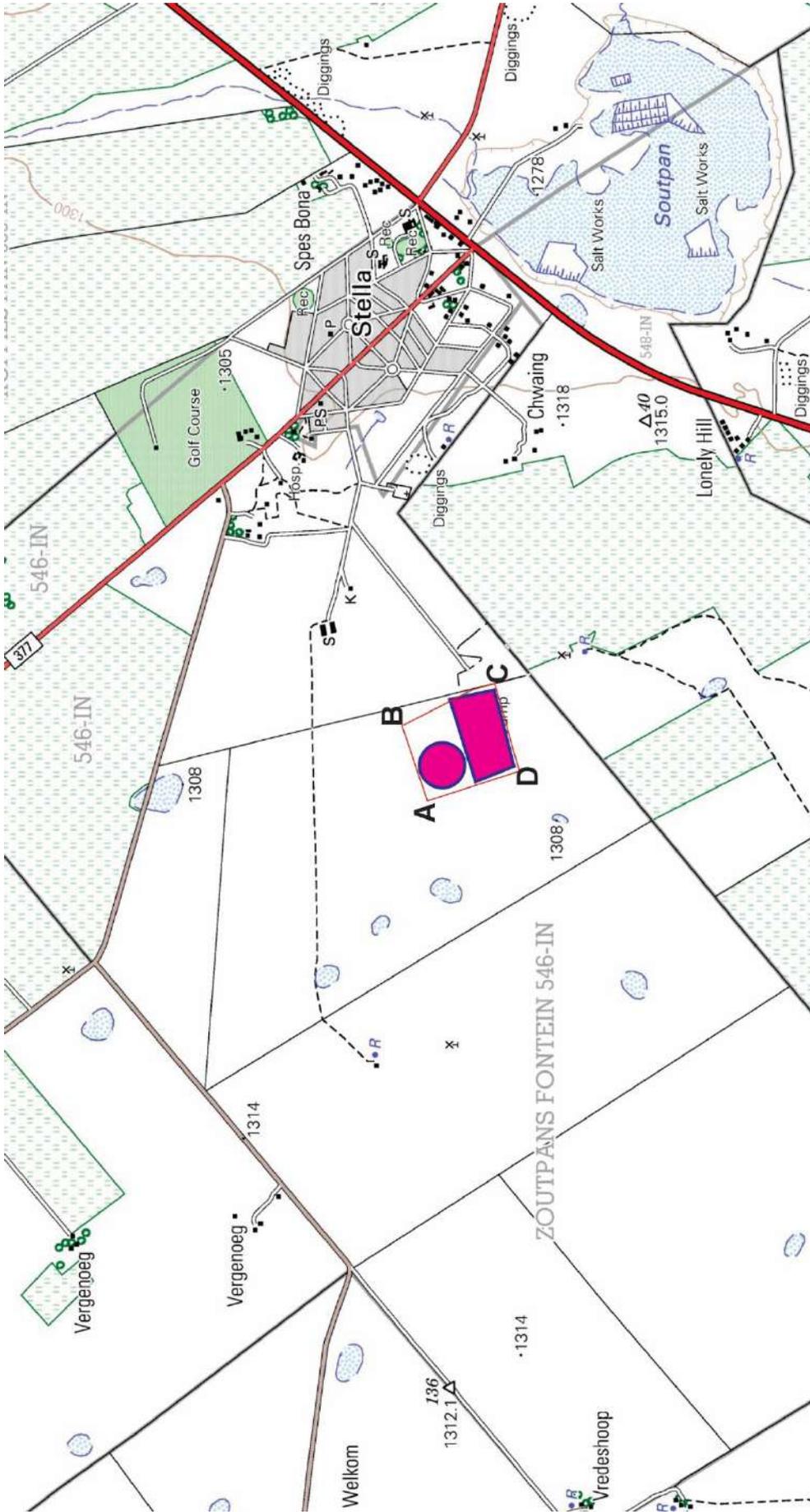


Figure 1. Map of the proposed development (portion of 1:50 000 scale topographic map 2624DB Stella).

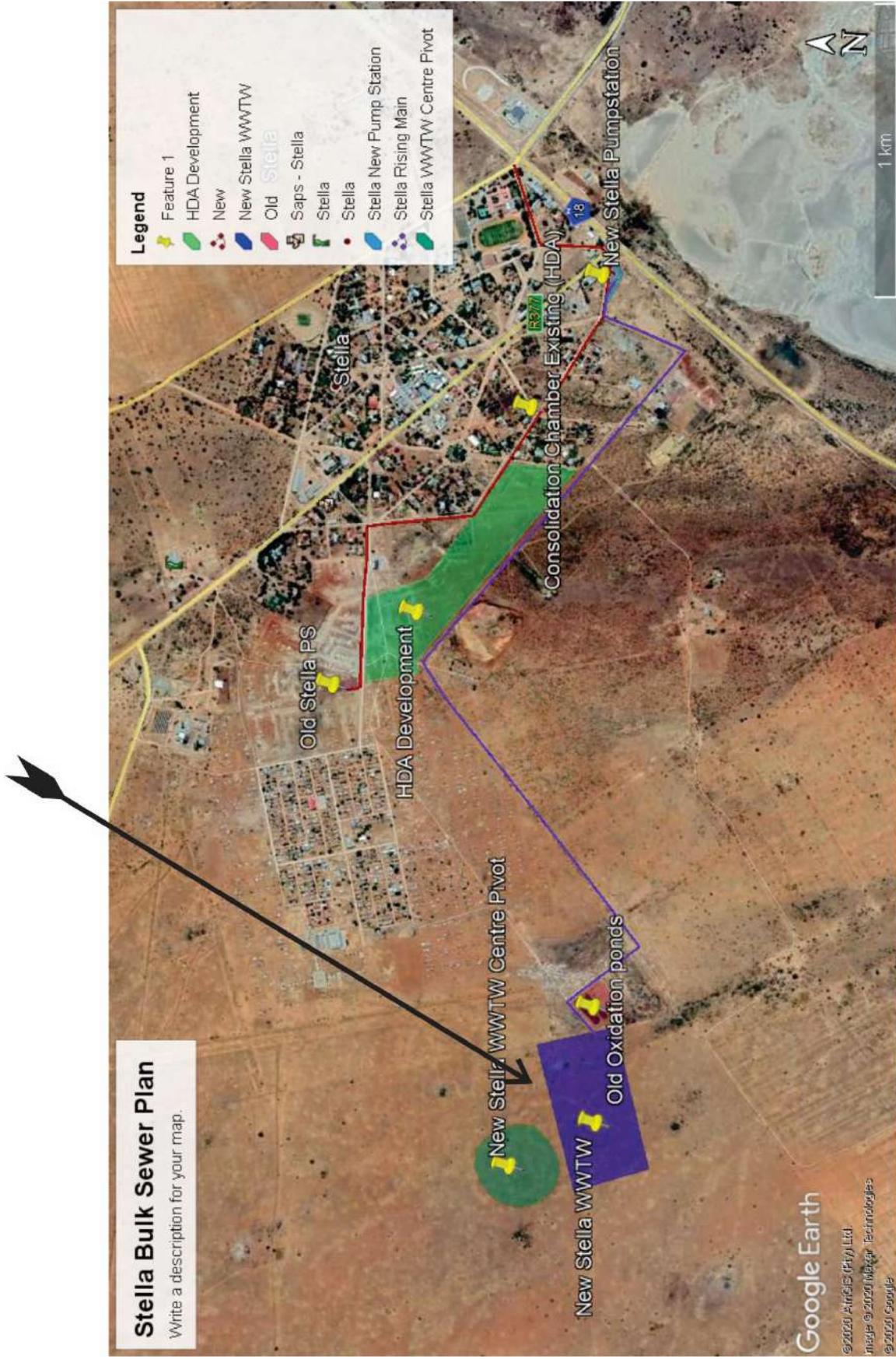


Figure 2. Layout of the proposed new centre pivot and WWTW footprints.



Figure 3. Aerial view of the study area covering the proposed center pivot and WWTW footprints.

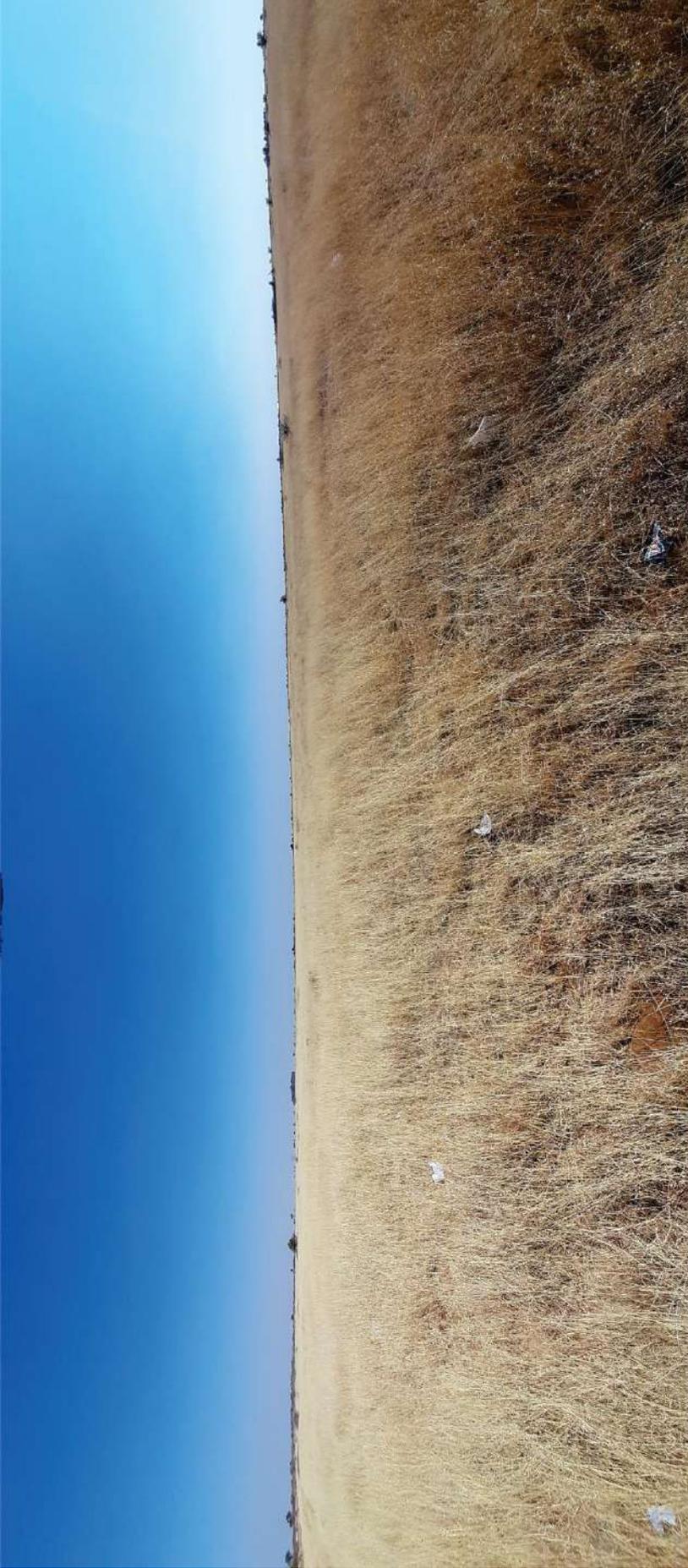


Figure 4. General view of the site, near southern boundary, looking west-northwest.

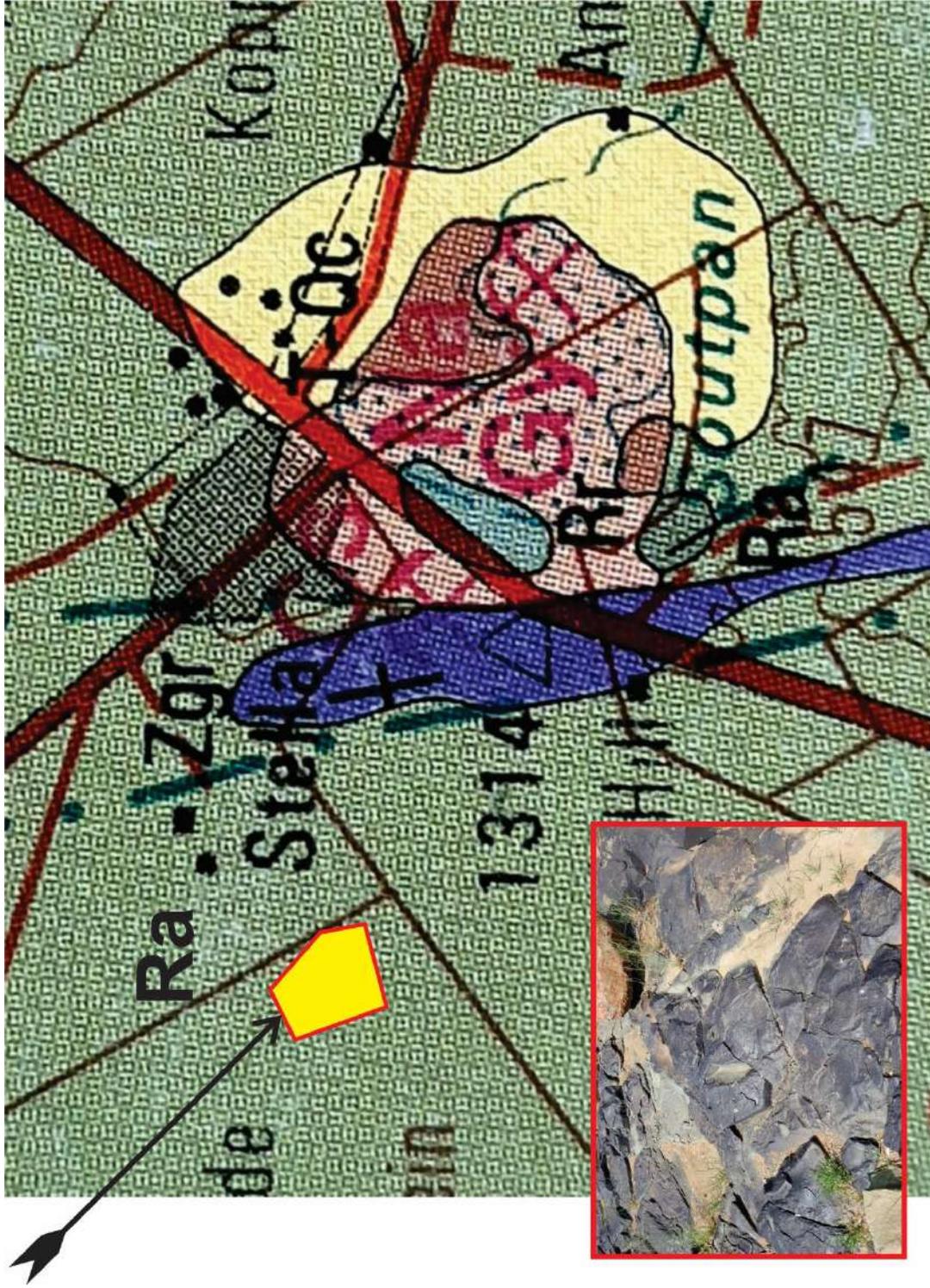


Figure 5. According to the 1:250 000 geological map 2624 Vryburg, the proposed footprint is underlain by Ventersdorp Supergroup basalts of the Allanridge Formation (*Ra*, insert).

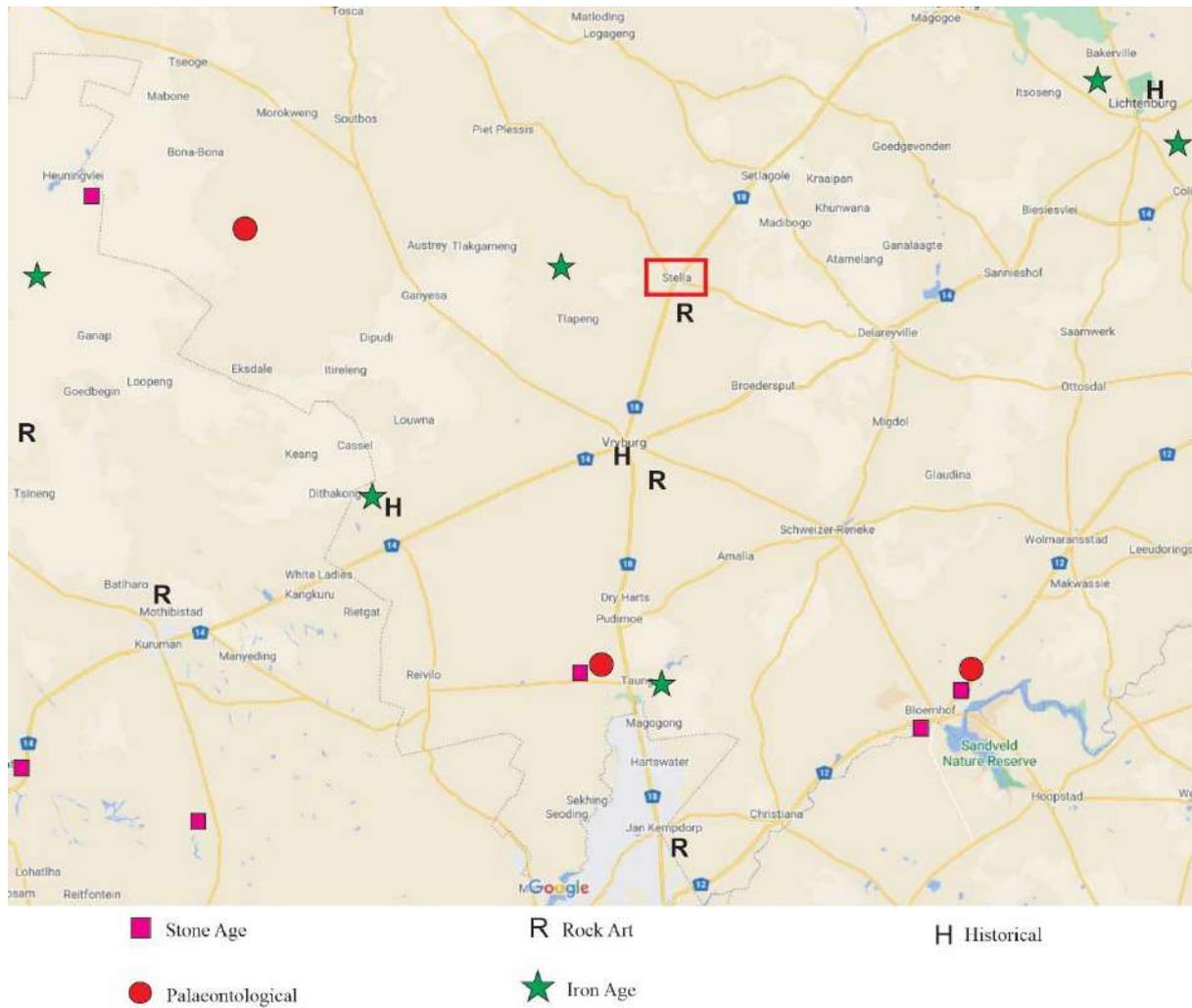


Figure 6. Map showing known historical, archaeological and palaeontological sites in the region.



Figure 7. Extensive stone wall enclosures are found near Dithakong. Archaeological investigations conducted during the 1980's have revealed that the ruins were built during the 15th century A.D.

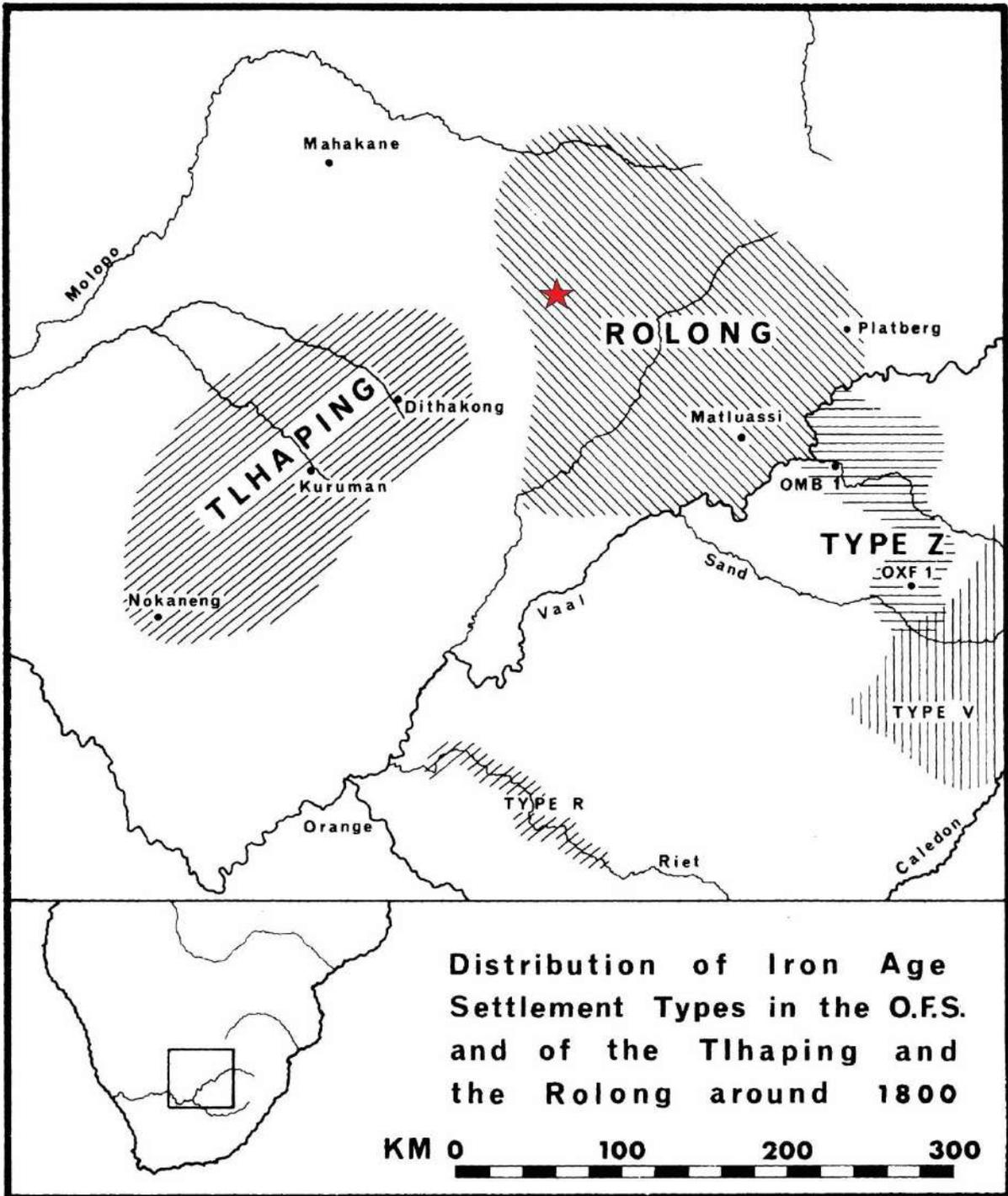


Figure 8. Distribution of the Tlhaping and Rolong in the region at the beginning of the 19th century according to Maggs (1972). Position of Stella indicated by red star.

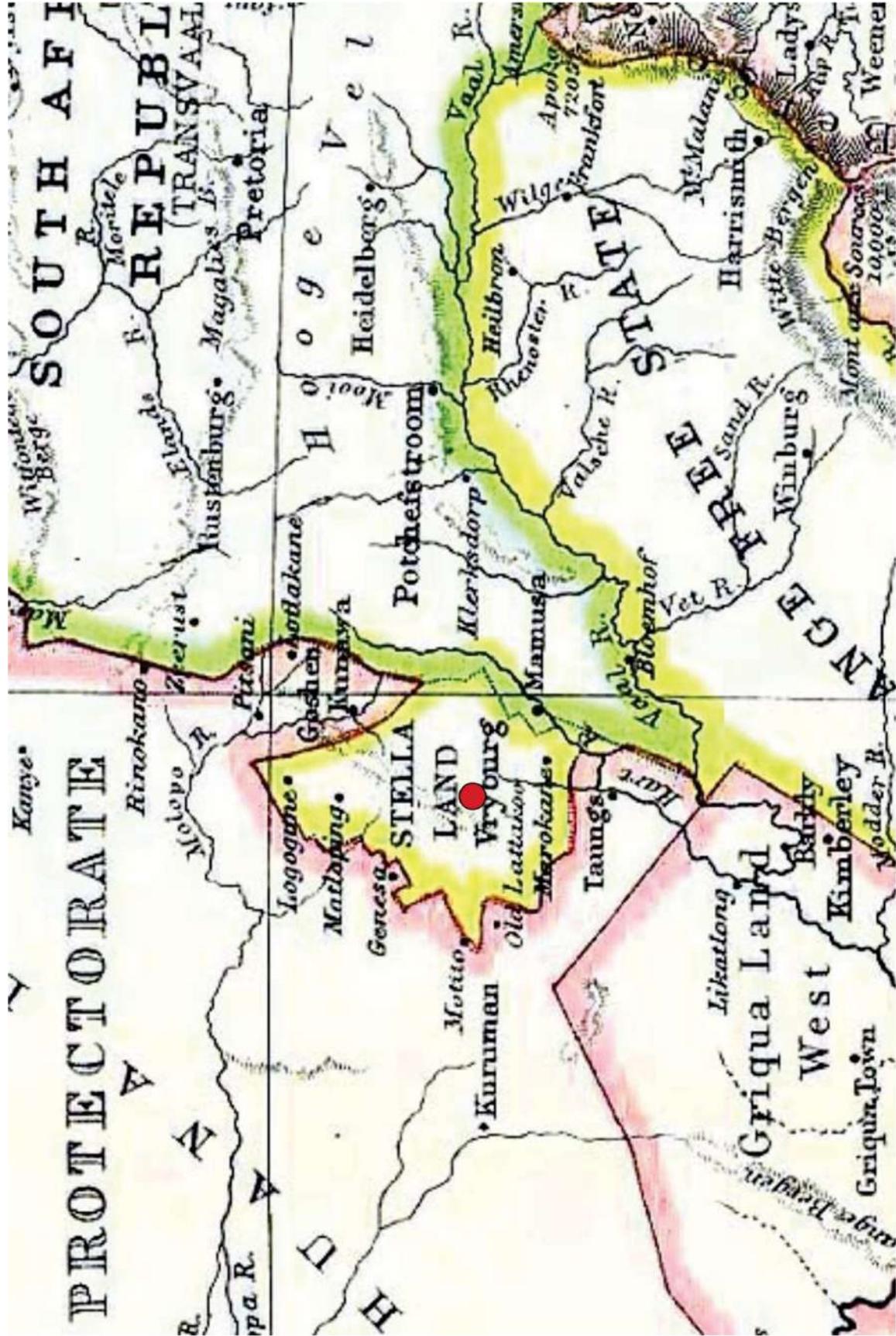


Figure 9. Contemporary map of Stellaland prior to its incorporation as a British protectorate in 1884.



Figure 10. Remains of degraded modern structures identified within the WWTW footprint.



Figure 11. General view of the Centre Pivot area, looking west (above) and north (below).

Appendix 1: Archaeological Chance Finds Protocol for Developer

Archaeology

If any evidence of archaeological sites or remains, e.g. stone tool artifacts (**Fig. 10 & 11**), ostrich eggshell fragments, charcoal and ash heaps, or remnants of stone-made structures (**Fig. 12**) or unmarked graves (**Fig. 13**) are found during the proposed development, the SAHRA APM Unit (Phillip Hine 021 462 5402) must be alerted.

In the meantime, *potential archaeological structures such as stone-build enclosures, buildings or graves* must be avoided by a no-go buffer zone until further confirmation by the archaeologist. Smaller *in situ* material must be kept in place and protected from further damage by covering it with light but rigid object like a box, bucket or metal sheet.

If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit must be alerted immediately. A professional archaeologist must be contracted as soon as possible to inspect the findings.

If the newly discovered heritage resources prove to be of archaeological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;



Figure 1. Example of general appearance of Stone Age artifacts rarely found intact as open sites and largely derived as isolated scatter on the landscape



Figure 2. Example of rare stone tool knapping site occasionally found near dolerite intrusions in the region.



Figure 3. Example of historical stone-build enclosure frequently found in the region.

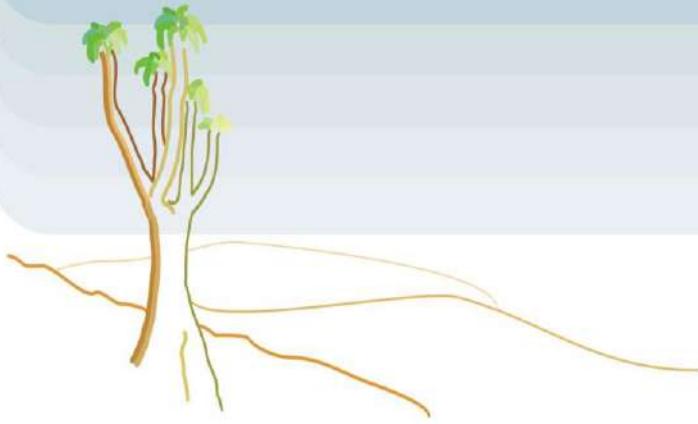


Figure 4. Typical example of unmarked (above) and marked grave (below) - distinctive mound with occasional head markers and a characteristic dolerite cobble or limestone rubble dome.

Appendix D (ii): Ecological Assessment







DPR
Ecologists & Environmental Services

Report on the ecological assessment of a proposed Waste Water Treatment Works (WWTW) in Stella, North West Province.

July 2020

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DECLARATION OF INDEPENDENCE

DPR Ecologists and Environmental Services is an independent company and has no financial, personal or other interest in the proposed project, apart from fair remuneration for work performed in the delivery of ecological services. There are no circumstances that compromise the objectivity of the study.

Report Version	Final 1.0		
Title	Report on the ecological assessment of a proposed Waste Water Treatment Works (WWTW) in Stella, North West Province.		
Author	DP van Rensburg (Pr.Sci.Nat)		Jul'20

Executive Summary

The proposed Waste Water Treatment Works (WWTW) will form part of the new bulk sewer network of the town of Stella and will include large oxidation ponds as well as a centre-pivot to utilise the final effluent from the system. The WWTW will be construction adjacent to the current oxidation ponds to the west of the town (Map 1). The total extent of the WWTW will be approximately 18 hectares.

According to Mucina & Rutherford (2006) the area consists of Stella Bushveld (SVk 2). This vegetation type is listed as being of Least Concern (LC) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Map 2). The North West Biodiversity Sector Plan (NW BSP – 2015) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site in question is however not listed as either a Terrestrial or Aquatic Critical Biodiversity Area (CBA) (Map 3). As a result, overall, the loss of habitat and vegetation will not exceed a moderate impact.

The main impact affecting the site is associated with it forming part of the municipal grazing area as well as its proximity to the adjacent urban area. Dirt tracks and especially footpaths are abundant. These paths also provide access to the area and consequently rubbish dumping and littering is evident. In addition, it was notable that the trees and shrubs were also heavily affected by cutting for firewood. Probably the most prominent impact on the site is associated with communal grazing by domestic livestock. Since this is not practised according to a structured grazing schedule and grazing capacity the amount of overgrazing and trampling is quite high which does lead to significant disturbance of the vegetation layer. In addition, to these impacts, the frequent burning of the area due to its proximity to the adjacent urban area is also considered a notable impact. From the description of the impacts on the site it would seem that vegetation would still be largely natural although modified to some extent by current land use.

The topography of the site consists of an almost completely flat area without any discernible slope. Consequently, the site and surroundings are devoid of any watercourses, streams or drainage lines (Map 1). However, though the topography is quite flat and therefore watercourses are absent, it does promote the formation of pans or depression wetlands. The site and immediate surroundings were therefore also purposefully surveyed for such a wetland system. A definite pan system was identified and confirmed to be a depression wetland approximately 500 meters to the west of the site (Map 1). Coupled with the flat topography and distance from the site it is highly unlikely that the development will have any effect on it and this system will therefore not be assessed any further by this study.

The site does not contain any rare or endangered species. However, two protected species still occur which still have some conservation value (Appendix C). These are *Vachellia erioloba* and *Babiana hypogea*. They are both widespread and their loss on the site would be largely a moderate impact. However, *B. hypogea* is a small geophytic species which transplants easily. Transplanting those specimens on the site which will be affected by the development to an adjacent area where they will remain intact will also further decrease the anticipated impact. The necessary permits should be obtained for the removal and transplanting of protected species on the site.

From the description of the vegetation on the site it is clear that a natural grass layer with a sparse tree and shrub layer is present. The species composition is still similar to the natural vegetation type. However, clear signs of overgrazing is present, pioneer and unpalatable species is abundant and may dominate in some areas. The species diversity is not significant and no species of high conservation value could be identified. Furthermore, though it cannot be discounted, due to the uniformity of the vegetation type and disturbance caused by overgrazing the likelihood of such a species occurring is considered relatively low. The conservation value of the vegetation and ecology on the site is therefore regarded as relatively low. This is also in large part confirmed by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) which regards the vegetation type as being of Least Concern (LC) as well as the North West Biodiversity Sector Plan (NWBSP – 2015) which does not regard the site as a CBA or ESA (Map 1 & 2). However, the site still retains two protected species which, although they are widespread, still retain some conservation value (Appendix C). Mitigation as recommended should be applied in order to decrease the anticipated impact on them.

Table of contents

Ecological assessment

Declaration of Independence

Executive Summary

1. Introduction	6
1.1 Background	
1.2 The value of biodiversity	
2. Scope and limitations	8
2.1 Vegetation	
2.2 Fauna	
2.3 Limitations	
3. Methodology	9
3.1 Desktop study	
3.2 Survey	
3.3 Criteria used to assess sites	
3.4 Biodiversity sensitivity rating (BSR)	
4. Ecological overview of the site	12
4.1 Overview of ecology and vegetation types	
4.2 Overview of fauna	
5. Anticipated impacts	16
6. Site specific results	18
7. Biodiversity sensitivity rating (BSR) interpretation	20
8. Discussion and conclusions	21
9. Recommendations	24
10. References	25
Annexure A: Maps and Site photos	27
Annexure B: Species list	34
Annexure C: Protected species on the site	35
Annexure D: Impact methodology	36

Ecological assessment

1. INTRODUCTION

1.1 Background

Natural vegetation is an important component of ecosystems. Some of the vegetation units in a region can be more sensitive than others, usually as a result of a variety of environmental factors and species composition. These units are often associated with water bodies, water transferring bodies or moisture sinks. These systems are always connected to each other through a complex pattern. Degradation of a link in this larger system, e.g. tributary, pan, wetland, usually leads to the degradation of the larger system. Therefore, degradation of such a water related system should be prevented.

Though vegetation may seem to be uniform and low in diversity it may still contain species that are rare and endangered. The occurrence of such a species may render the development unviable. Should such a species be encountered the development should be moved to another location or cease altogether.

South Africa has a large amount of endemic species and in terms of plant diversity ranks third in the world. This has the result that many of the species are rare, highly localised and consequently endangered. It is our duty to protect our diverse natural resources.

South Africa can be regarded as a country with a dry climate and it can be said that we inhabit a water scarce area. Thus, it should be clear that we need to protect our water resources so that we may be able to utilise this renewable resource sustainably. Areas that are regarded as crucial to maintain healthy water resources include wetlands, streams as well as the overall catchment of a river system. Any development that would degrade such a system must not be allowed to continue.

Through our usage of our water resources for our daily needs we are also degrading the quality of our water resources. Thus, it is vital to improve the quality of the effluent before it is returned to our water-ways and groundwater resources. Therefore it is necessary to construct sewage plants at strategic locations to treat the waste water generated in residential and industrial areas on a daily basis. These waste plants must also be maintained and expanded as the growing population necessitates it. They must not be allowed to process a larger amount of waste than its capacity is able to process. If this is the case the plant should be expanded to prevent spillage of untreated waste into the natural water system.

Developments around towns are necessary to sufficiently accommodate and provide services to the ever-growing population. Areas along the boundaries of built up areas are usually in a degraded state due to the impact of the large population these areas house. Though this may be the case in most situations there may still be areas that consist of sensitive habitats such as water courses, wetlands or rare vegetation types that need to be conserved. These areas may also contain endangered fauna and flora.

The proposed Waste Water Treatment Works (WWTW) will form part of the new bulk sewer network of the town of Stella and will include large oxidation ponds as well as a centre-pivot to utilise the final effluent from the system. The WWTW will be construction adjacent to the current oxidation ponds to the west of the town (Map 1). The total extent of the WWTW will be

approximately 18 hectares. The site is located within a natural area dominated by grassland but still within the communal municipal area and as a result significant impacts are still evident.

A site visit was conducted on 21 July 2020. The entire footprint of the site was surveyed. The site survey was conducted during winter and a portion of the site had also been affected by a veld fire and consequently species identification was not optimal. However, sufficient plant identification was still possible in order to assess the ecological condition with protected species also noted. It does however remain likely that several species, including subterranean protected species, were overlooked.

For the above reasons it is necessary to conduct an ecological assessment of an area proposed for development.

The report together with its recommendations and mitigation measures should be used to minimise the impact of the proposed development.

1.2 The value of biodiversity

The diversity of life forms and their interaction with each other and the environment has made Earth a uniquely habitable place for humans. Biodiversity sustains human livelihoods and life itself. Although our dependence on biodiversity has become less tangible and apparent, it remains critically important.

The balancing of atmospheric gases through photosynthesis and carbon sequestration is reliant on biodiversity, while an estimated 40% of the global economy is based on biological products and processes.

Biodiversity is the basis of innumerable environmental services that keep us and the natural environment alive. These services range from the provision of clean water and watershed services to the recycling of nutrients and pollution. These ecosystem services include:

- Soil formation and maintenance of soil fertility.
- Primary production through photosynthesis as the supportive foundation for all life.
- Provision of food, fuel and fibre.
- Provision of shelter and building materials.
- Regulation of water flows and the maintenance of water quality.
- Regulation and purification of atmospheric gases.
- Moderation of climate and weather.
- Detoxification and decomposition of wastes.
- Pollination of plants, including many crops.
- Control of pests and diseases.
- Maintenance of genetic resources.

2. SCOPE AND LIMITATIONS

- To evaluate the present state of the vegetation and ecological functioning of the area proposed for the development.
- To identify possible negative impacts that could be caused by the proposed development.

2.1 Vegetation

Aspects of the vegetation that will be assessed include:

- The vegetation types of the region with their relevance to the proposed site.
- The overall status of the vegetation on site.
- Species composition with the emphasis on dominant-, rare- and endangered species.

The amount of disturbance present on the site assessed according to:

- The amount of grazing impacts.
- Disturbance caused by human impacts.
- Other disturbances.

2.2 Fauna

Aspects of the fauna that will be assessed include:

- A basic survey of the fauna occurring in the region using visual observations of species as well as evidence of their occurrence in the region (burrows, excavations, animal tracks, etc.).
- The overall condition of the habitat.
- A list of species that may occur in the region (desktop study).

2.3 Limitations

Some geophytic or succulent species may have been overlooked due to a specific flowering time or cryptic nature.

Due to the time of year (winter), many annual and subterranean species would not be present above-ground and would consequently be overlooked by the assessment.

A recent veld fire had removed the above-ground vegetation of a large portion of the site, further complicating species identification.

Overgrazing by domestic stock removes the inflorescences of grasses, complicating their identification.

Although a comprehensive survey of the site was done it is still likely that several species were overlooked.

Some animal species may not have been observed as a result of their nocturnal and/or shy habits.

3. METHODOLOGY

3.1 Several literature works were used for additional information.

Vegetation:

Red Data List (Raymondo *et al.* 2009)

Vegetation types (Mucina & Rutherford 2006)

Field guides used for species identification (Bromilow 1995, 2010, Coates-Palgrave 2002, Fish *et al* 2015, Gibbs-Russell *et al* 1990, Manning 2009, Roberts & Fourie 1975, Shearing & Van Heerden 2008, Van Oudtshoorn 2004, Van Rooyen 2001, Van Rooyen & Van Rooyen 2019, Van Wyk & Malan 1998, Van Wyk & Van Wyk 1997)

Terrestrial fauna:

Field guides for species identification (Cillié 2018, Smithers 1986a, Child *et al* 2016).

3.2 Survey

The site was assessed by means of transects and sample plots.

Noted species include rare and dominant species.

The broad vegetation types present on the site were determined.

The state of the environment was assessed in terms of condition, grazing impacts, disturbance by humans, erosion and presence of invader and exotic species.

Animal species were also noted as well as the probability of other species occurring on or near the site according to their distribution areas and habitat requirements.

The state of the habitat was also assessed.

3.3 Criteria used to assess sites

Several criteria were used to assess the site and determine the overall status of the environment.

Vegetation characteristics

Characteristics of the vegetation in its current state. The diversity of species, sensitivity of habitats and importance of the ecology as a whole.

Habitat diversity and species richness: normally a function of locality, habitat diversity and climatic conditions.

Scoring: Wide variety of species occupying a variety of niches – 1, Variety of species occupying a single nich – 2, Single species dominance over a large area containing a low diversity of species – 3.

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species can potentially be a fatal flaw.

Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely – 3.

Ecological function: All plant communities play a role in the ecosystem. The ecological importance of all areas though, can vary significantly e.g. wetlands, drainage lines, ecotones, etc.

Scoring: Ecological function critical for greater system – 1, Ecological function of medium importance – 2, No special ecological function (system will not fail if absent) – 3.

Degree of rarity/conservation value:

Scoring: Very rare and/or in pristine condition – 1, Fair to good condition and/or relatively rare – 2, Not rare, degraded and/or poorly conserved – 3.

Vegetation condition

The sites are compared to a benchmark site in a good to excellent condition. Vegetation management practises (e.g. grazing regime, fire, management, etc.) can have a marked impact on the condition of the vegetation.

Percentage ground cover: Ground cover is under normal and natural conditions a function of climate and biophysical characteristics. Under poor grazing management, ground cover is one of the first signs of vegetation degradation.

Scoring: Good to excellent – 1, Fair – 2, Poor – 3.

Vegetation structure: This is the ratio between tree, shrub, sub-shrubs and grass layers. The ratio could be affected by grazing and browsing by animals.

Scoring: All layers still intact and showing specimens of all age classes – 1, Sub-shrubs and/or grass layers highly grazed while tree layer still fairly intact (bush partly opened up) – 2, Mono-layered structure often dominated by a few unpalatable species (presence of barren patches notable) – 3.

Infestation with exotic weeds and invader plants or encroachers:

Scoring: No or very slight infestation levels by weeds and invaders – 1, Medium infestation by one or more species – 2, Several weed and invader species present and high occurrence of one or more species – 3.

Degree of grazing/browsing impact:

Scoring: No or very slight notable signs of browsing and/or grazing – 1, Some browse lines evident, shrubs shows signs of browsing, grass layer grazed though still intact – 2, Clear browse line on trees, shrubs heavily pruned and grass layer almost absent – 3.

Signs of erosion: The formation of erosion scars can often give an indication of the severity and/or duration of vegetation degradation.

Scoring: No or very little signs of soil erosion – 1, Small erosion gullies present and/or evidence of slight sheet erosion – 2, Gully erosion well developed (medium to large dongas) and/or sheet erosion removed the topsoil over large areas – 3.

Faunal characteristics

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species or very unique and sensitive habitats can potentially be a fatal flaw.

Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely.

3.4 Biodiversity sensitivity rating (BSR)

The total scores for the criteria above were used to determine the biodiversity sensitivity ranking for the sites. On a scale of 0 – 30, six different classes are described to assess the suitability of the sites to be developed. The different classes are described in the table below:

Table 1: Biodiversity sensitivity ranking

BSR	BSR general floral description	Floral score equating to BSR class
Ideal (5)	Vegetation is totally transformed or in a highly degraded state, generally has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area has lost its inherent ecological function. The area has no conservation value and potential for successful rehabilitation is very low. The site is ideal for the proposed development.	29 – 30
Preferred (4)	Vegetation is in an advanced state of degradation, has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area's ecological function is seriously hampered, has a very low conservation value and the potential for successful rehabilitation is low. The area is preferred for the proposed development.	26 – 28
Acceptable (3)	Vegetation is notably degraded, has a medium level of species diversity although no species of concern are present. Invasive plants are present but are still controllable. The area's ecological function is still intact but may be hampered by the current levels of degradation. Successful rehabilitation of the area is possible. The conservation value is regarded as low. The area is acceptable for the proposed development.	21 – 25
Not preferred (2)	The area is in a good condition although signs of disturbance are present. Species diversity is high and species of concern may be present. The ecological function is intact and very little rehabilitation is needed. The area is of medium conservation importance. The area is not preferred for the proposed development.	11 – 20
Sensitive (1)	The vegetation is in a pristine or near pristine condition. Very little signs of disturbance other than those needed for successful management are present. The species diversity is very high with several species of concern known to be present. Ecological functioning is intact and the conservation importance is high. The area is regarded as sensitive and not suitable for the proposed development.	0 - 10

4. ECOLOGICAL OVERVIEW OF THE SITE

4.1 Overview of ecology and vegetation types

Refer to the list of species encountered on the site in Appendix B.

According to Mucina & Rutherford (2006) the area consists of Stella Bushveld (SVk 2). This vegetation type is listed as being of Least Concern (LC) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Map 2). It is being significantly affected by dryland crop cultivation but not yet to such an extent as to regard the vegetation type as a threatened ecosystem.

The North West Biodiversity Sector Plan (NW BSP – 2015) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site in question is however not listed as either a Terrestrial or Aquatic Critical Biodiversity Area (CBA) (Map 3). The oxidation ponds will border on an Ecological Support Area 1 (ESA) but is not anticipated to significantly alter the ecological support for surrounding aquatic systems.

The proposed Waste Water Treatment Works (WWTW) will form part of the new bulk sewer network of the town of Stella and will include large oxidation ponds as well as a centre-pivot to utilise the final effluent from the system. The WWTW will be construction adjacent to the current oxidation ponds to the west of the town (Map 1). The total extent of the WWTW will be approximately 18 hectares. The site is located within a natural area dominated by grassland but still within the communal municipal area and as a result significant impacts are still evident.

The site is still largely natural and is dominated by a well-developed grass layer with scattered and scant tree specimens. The site is completely free of structures and buildings although the remains of a stock watering point and cement dam was observed. The main impact affecting the site is associated with it forming part of the municipal grazing area as well as its proximity to the adjacent urban area. Dirt tracks and especially footpaths are abundant. These will have a limited transformation impact but may also contribute to erosion. These paths also provide access to the area and consequently rubbish dumping and littering is evident. In addition, it was notable that the trees and shrubs were also heavily affected by cutting for firewood and this will have a significant impact on the tree layer. Probably the most prominent impact on the site is associated with communal grazing by domestic livestock. Since this is not practised according to a structured grazing schedule and grazing capacity the amount of overgrazing and trampling is quite high which does lead to significant disturbance of the vegetation layer. In addition, to these impacts, the frequent burning of the area due to its proximity to the adjacent urban area is also considered a notable impact. Although the area forms part of the Savannah Biome, well known to be adapted to a fire regime, too frequent fires, such as occurs on the site, will have a negative impact on the vegetation including the species diversity. From the description of the impacts on the site it would seem that vegetation would still be largely natural although modified to some extent by current land use. This should also be confirmed by the vegetation description in the following paragraphs.

The topography of the site consists of an almost completely flat area without any discernible slope. This is common in the region which is largely devoid of hills and similar positive landscape forms. As a result, vegetation may be quite uniform over large areas. However, as a result of the absence of a slope and consequently concentrated surface runoff patterns it also

promotes the formation of pans or depression wetlands. The site has an elevation of 1312m and also confirms the absence of a discernible slope. Consequently, the site and surroundings are devoid of any watercourses, streams or drainage lines (Map 1).

As indicated in the previous paragraph, though the topography is quite flat and therefore watercourses are absent, it does promote the formation of pans or depression wetlands. Such pans are abundant in the area and often identified by forming a circular landform with a slight depression and also often containing a higher density of trees around its perimeter. The site and immediate surroundings were therefore also purposefully surveyed for such a wetland system. A few circular landforms on the site and surroundings were identified but however confirmed to be associated with either old termite mounds, burrow colonies of small mammals or a disused stock watering point (Figure 1). A definite pan system was identified and confirmed to be a depression wetland approximately 500 meters to the west of the site (Map 1). Coupled with the flat topography and distance from the site it is highly unlikely that the development will have any effect on it and this system will therefore not be assessed any further by this study.



Figure 1: View of the WWTW layout with an indication of circular landforms surveyed and confirmed not be pans (blue) as well as a circular landform to the west confirmed to be a pan system (yellow).

The mean annual rainfall for Stella varies between 400 to 480 mm. Rainfall occurs in summer, with very dry winters and frequent frosts. The mean annual temperature is 18°C.

The underlying geology of the region consists of andesitic lavas of the Allanridge Formation of the Ventersdorp Supergroup. Outcrops are absent on the site although a few scattered boulders were observed consisting of weathered andesitic lavas. Sandy soils dominate and were also prominent on the site.

As indicated, the site consists largely of natural vegetation with a dominant grass layer. The following description of the vegetation on the site should provide an indication of its condition and the presence of elements of conservation value. The grass layer is dominated to a large extent by a single grass species, *Eragrostis rigidior*, and although it is a natural component of

this vegetation type, it is a sub-climax species and where it dominates, as is the case here, it indicates overgrazing of the grass layer. Other grass species which are also common but do not dominate include *Cymbopogon pospischillii*, *Cynodon dactylon*, *Chloris virgata*, *Sporobolus fimbriatus*, *Themeda triandra*, *Aristida congesta*, *Stipagrostis uniplumis* and *Digitaria eriantha*. This is a mixture of climax and pioneer species and also confirms that the site consists of natural grassland, but which has been significantly affected by overgrazing of domestic stock. As indicated, the tree layer is sparse and scattered. Tree and shrub species observed include *Vachellia karroo*, *V. tortillis*, *V. erioloba*, *Searsia lancea*, *Grewia flava*, *Tarchonanthus camphoratus* and *Lycium hirsutum*. These are also often concentrated around termite mounds or burrow colonies of small mammals. Other low shrubs also common on the site include *Vachellia hebeclada* and *Searsia ciliata*. Underneath these trees, the shady environment promotes the establishment of *Setaria verticillata*, a shade-loving grass. Disturbance caused by mammal burrows and underneath trees also promote the establishment of pioneer herbs such as *Nidorella* sp. and other exotic weeds such as *Bidens bipinnata* and *Tagetes minuta*. Imbedded within the grass layer is a variety of other growth forms. Dwarf shrubs such as *Hertia pallens*, *Asparagus suaveolens*, *Pentzia viridis*, *Lycium horridum* and *Gnidia polycephala* are abundant and also indicate that overgrazing of the grass layer is present. Common herbaceous species include *Barleria macrostegia* and *Berkheya onopordifolia* and noted succulent species include *Aloe grandidentata* and *Ruschia semidentata*. It was also evident that numerous geophytic species are present, most probably due to the sandy soils, and included *Boophone distichia*, *Eriospermum porphyrium*, *Babiana hypogea*, *Albuca* sp. and *Moraea pallida*. These are all relatively widespread, although *B. hypogea* is listed as a protected species and therefore of some conservation value (Appendix C). Where disturbance is evident, other exotic weeds were also noticeable and included *Alternanthera pungens* and *Argemone ochroleuca*.

From the description of the vegetation on the site it is clear that a natural grass layer with a sparse tree and shrub layer is present. The species composition is still similar to the natural vegetation type. However, clear signs of overgrazing is present, pioneer and unpalatable species is abundant and may dominate in some areas. The species diversity is not significant and no species of high conservation value could be identified. Furthermore, though it cannot be discounted, due to the uniformity of the vegetation type and disturbance caused by overgrazing the likelihood of such a species occurring is considered relatively low. The conservation value of the vegetation and ecology on the site is therefore regarded as relatively low. This is also in large part confirmed by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) which regards the vegetation type as being of Least Concern (LC) as well as the North West Biodiversity Sector Plan (NW BSP – 2015) which does not regard the site as a CBA or ESA (Map 2 & 3).

However, the site still retains two protected species which, although they are widespread, still retain some conservation value (Appendix C). Only a few small specimens of the protected tree, *Vachellia erioloba*, were noted on the site. These are currently also affected by wood cutting for firewood. It would therefore not provide any significant advantages of replacing these few specimens and consequently it is recommended that the necessary permits be obtained to remove them where they are situated within the WWTW footprint. The second protected species is a small geophytic species, *Babeana hypogea*. It is widespread but as a protected species, retains a significant conservation value. Being a small geophytic species and the area containing sandy soils it would be easy to transplant these plants to an adjacent area where they will remain intact. The necessary permits should be obtained and specimens transplanted to an adjacent area where they will remain unaffected by the development.

4.2 Overview of terrestrial fauna (actual & possible)

Signs and tracks of mammals are still present on the site despite the impacts, disturbances and proximity of urban areas. This mammal population is however most likely to only consist of generalist species. Rare or threatened species are often shy and only able to occur in natural areas in good condition and are therefore unlikely to occur on and around the site.

The following signs of mammals were observed:

- Excavations of a small mammal, most likely that of the Porcupine (*Hystrix africaeaustralis*) are common on the site.
- Burrow colonies of the Yellow Mongoose (*Cynictis penicillata*) and Ground Squirrel (*Xerus inauris*) are abundant. They are both generalist species commonly colonising degraded grasslands.
- Soil mounds of the Common Molerat (*Cryptomys hottentotus*) are abundant on the site. This is a generalist species common even in urban areas.
- A specimen of Cape Hare (*Lepus capensis*) was also observed on the site.

It is also likely that several other mammal species occur on the site but were overlooked during the survey. It is however unlikely that any of these would consist of rare or threatened species.

The impact that the proposed development will have is mainly concerned with the loss of habitat which will decrease the available habitat for faunal species. The faunal population will vacate the site into adjacent natural areas which will put a strain on surrounding populations. However, as indicated, the mammal population is likely already modified from the natural composition and given the relatively small extent of the development and extensive surrounding natural areas this impact is not anticipated to exceed moderate values.

In order to ensure no direct impact on the mammals on the site the hunting, capturing or trapping of mammals on the site should be strictly prohibited during the construction and operational phases.

Table 2: Red Listed mammals occurring or likely to occur in the study area (Child *et al* 2016).

Common name	Scientific name	Status
SA hedgehog	<i>Erinaceus frontalis</i>	Near Threatened
Pangolin	<i>Smutsia temmincki</i>	Vulnerable
Small spotted cat	<i>Felis nigripes</i>	Vulnerable
Brown hyena	<i>Parahyyaena brunnea</i>	Near Threatened
Leopard	<i>Panthera pardus</i>	Vulnerable

It is considered unlikely that these species would occur on the site due to the proximity of the urban area. All of these species are well known for their shy and elusive nature and always avoid areas in close proximity to human dwellings.

5. ANTICIPATED IMPACTS

Anticipated impacts that the development will have is primarily concerned with the loss of habitat and species diversity.

As previously discussed, the site is still dominated by natural vegetation although it has been modified to some extent by the current land use. The vegetation is notably uniform and as a result, species diversity is not significant. Furthermore, the natural vegetation type, Stella Bushveld (SVk 2) is currently listed as being of Least Concern (LC) under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) and is consequently regarded as having a relatively low conservation value (Map 2). This is also confirmed by the North West Biodiversity Sector Plan (NW BSP – 2015) which does not list the site as either a Critical Biodiversity Area (CBA) or Ecological Support Area (ESA) (Map 3). As a result, overall, the loss of habitat and vegetation will not exceed a moderate impact.

Most probably as a result of the uniform vegetation layer and relatively low species diversity, the site does not contain any rare or endangered species. However, two protected species still occur which still have some conservation value (Appendix C). These are *Vachellia erioloba* and *Babiana hypogea*. They are both widespread and their loss on the site would be largely a moderate impact. However, *B. hypogea* is a small geophytic species which transplants easily. Transplanting those specimens on the site which will be affected by the development to an adjacent area where they will remain intact will also further decrease the anticipated impact. The necessary permits should be obtained for the removal and transplanting of protected species on the site.

Due to the flat topography of the area it does not contain any watercourses, streams or drainage lines (Map 1). However, pans or depression wetlands are common. These are sensitive systems and coupled with the nature of the development, any impacts on such a system would be regarded as high. The site and surroundings were therefore purposefully surveyed for such a system. The site and immediate surroundings are devoid of any pans. A small pan was identified approximately 500 meters to the west of the site but due to the distance and flat topography is highly unlikely to be affected by the WWTW (Map 1). The anticipated impact on any surface water resources in terms of runoff is anticipated to be quite low.

The site does not contain an abundance of exotic weeds (Appendix B). However, construction activities will definitely increase disturbance and therefore increase the susceptibility for the establishment of weeds. Monitoring of weed establishment and eradication should form a prominent part of management of the development. Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.

The impact that the proposed development will have on fauna is mainly concerned with the loss of habitat which will decrease the available habitat for faunal species. The faunal population will vacate the site into adjacent natural areas which will put a strain on surrounding populations. However, as indicated, the mammal population is likely already modified from the natural composition and given the relatively small extent of the development and extensive surrounding natural areas this impact is not anticipated to exceed moderate values. In order to ensure no direct impact on the mammals on the site the hunting, capturing or trapping of

mammals on the site should be strictly prohibited during the construction and operational phases.

The impact significance has been determined and it is clear that most impacts before mitigation will be moderate and with adequate mitigation several can be decreased even further to low-moderate.

Please refer to Appendix D for the impact methodology.

Significance of the impact:

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Before Mitigation								
Loss of vegetation type and clearing of vegetation	3	5	3	3.6	4	3	3.5	12.6
Loss of protected species	3	5	3	3.6	5	3	4	14.4
Impact on watercourses	1	5	1	2.3	1	1	1	2.3
Infestation with weeds and invaders	3	4	3	3.3	4	3	3.5	11.55
Impact on Terrestrial fauna	3	4	3	3.6	4	3	3.5	12.6
After Mitigation								
Loss of vegetation type and clearing of vegetation	3	5	3	3.6	4	3	3.5	12.6
Loss of protected species	2	5	1	2.6	2	2	2	5.2
Impact on watercourses	1	5	1	2.3	1	1	1	2.3
Infestation with weeds and invaders	2	2	2	2	3	2	2.5	5
Impact on Terrestrial fauna	3	4	3	3.6	4	3	3.5	12.6

6. SITE SPECIFIC RESULTS

Habitat diversity and species richness:

From the description of the habitat, topography and vegetation on the site it should be quite clear that habitat diversity is low, with a uniform topography, dominated by a flat plain, grassland layer with sparse tree and shrub component. Consequently, species diversity is also quite low, but may increase somewhat during the rainy season.

Presence of rare and endangered species:

Due to the uniform habitat and low species diversity the site does not contain any rare or endangered species or a multitude of protected species. However, two protected species still remain and these will have some conservation value (Appendix C). A few small specimens of the protected Camel Thorn (*Vachellia erioloba*) occur on the site. Although protected, there are so few and small specimens on the site and transplanting or replacing them would not yield any significant advantages and as a result permits should be obtained to remove the specimens on the site. Another protected species, *Babiana hypogea*, also occurs on the site. This is a small geophyte which transplants easily and consequently permits should be obtained to transplant them to adjacent areas where they will remain unaffected.

Ecological function:

The ecological function of the site is still largely intact though some modification is present. The site functions as habitat for fauna, sustains a specific vegetation type, i.e. Stella Bushveld and also forms part of the catchment of surrounding pan systems (Map 1 & 2). The natural vegetation and vegetation type is still largely intact though overgrazing and associated land use does cause some modification. As a result, the site is still available as largely natural habitat to fauna, however, the proximity of the urban area and current land use will modify this function to a significant extent. The site does not contain any natural watercourses or wetlands but still functions as part of the catchment of surrounding pan systems. However, due to the flat topography and the distance to the nearest pan system, this function, at least in terms of surface runoff, will be quite limited. Furthermore, the function of the site is not paramount to the continued functioning of the surrounding natural areas. In other words, development of the site should not impair the functioning of the surrounding area to a large extent.

Degree of rarity/conservation value:

According to Mucina & Rutherford (2006) the area consists of Stella Bushveld which is currently listed as being of Least Concern (LC) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Map 2). As a result, this will not significantly increase the conservation value of any natural vegetation on the site. Furthermore, this is also confirmed by the North West Biodiversity Sector Plan (NWBSP – 2015) which does not list the site as either a Critical Biodiversity Area (CBA) or Ecological Support Area (ESA) (Map 3). Overall, the conservation value of the site is relatively low.

Aspects of significant conservation value are therefore largely absent. However, two remaining protected species on the site still retain some conservation value (Appendix C). These are the tree, *Vachellia erioloba* and geophyte, *Babiana hypogea*. Both are widespread species and not especially rare though as protected species they do still have some conservation value. Mitigation as recommended should be applied in order to decrease the anticipated impact on them.

Percentage ground cover:

The percentage vegetation cover is moderate. The percentage vegetation cover has been modified somewhat as a result of overgrazing by domestic stock.

Vegetation structure:

The vegetation structure is still largely natural though modified at a moderate level by woodcutting, which decreases the tree layer, and overgrazing by domestic stock which has resulted in an increase in dwarf shrubs and other unpalatable species.

Infestation with exotic weeds and invader plants:

Exotic weeds are not abundant on the site though a few exotic weeds were present and also likely to increase during the rainy season.

Degree of grazing/browsing impact:

The site forms part of the communal grazing area of Stella and consequently overgrazing by domestic stock is considered quite high. High levels of trampling were prominent in some areas and modification of the vegetation composition due to overgrazing was also noted.

Signs of erosion:

Although signs of erosion are not prominent, mostly due to the flat topography, the impacts as discussed above would cause at least a moderate level of sheet erosion.

Terrestrial animals:

Signs and tracks of mammals are still present on the site despite the impacts, disturbances and proximity of urban areas. This mammal population is however most likely to only consist of generalist species. Rare or threatened species are often shy and only able to occur in natural areas in good condition and are therefore unlikely to occur on and around the site. It is also likely that several other mammal species occur on the site but were overlooked during the survey. It is however unlikely that any of these would consist of rare or threatened species.

Table 2: Biodiversity Sensitivity Rating for the proposed Stella Waste Water Treatment Works development.

	Low (3)	Medium (2)	High (1)
Vegetation characteristics			
Habitat diversity & Species richness	3		
Presence of rare and endangered species		2	
Ecological function		2	
Uniqueness/conservation value		2	
Vegetation condition			
Percentage ground cover		2	
Vegetation structure		2	
Infestation with exotic weeds and invader plants or encroachers		2	
Degree of grazing/browsing impact	3		
Signs of erosion		2	
Terrestrial animal characteristics			
Presence of rare and endangered species	3		
Sub total	9	14	0
Total		23	

7. BIODIVERSITY SENSITIVITY RATING (BSR) INTERPRETATION

Table 3: Interpretation of Biodiversity Sensitivity Rating.

Site	Score	Site Preference Rating	Value
Waste Water Treatment Works	23	Acceptable	3

8. DISCUSSION AND CONCLUSION

The proposed development has been rated as being acceptable for the site mostly as a result of the uniform habitat, relatively low species diversity and the absence of any elements of high conservation value such as watercourses or wetlands.

The proposed Waste Water Treatment Works (WWTW) will form part of the new bulk sewer network of the town of Stella and will include large oxidation ponds as well as a centre-pivot to utilise the final effluent from the system. The WWTW will be construction adjacent to the current oxidation ponds to the west of the town (Map 1). The total extent of the WWTW will be approximately 18 hectares. The site is located within a natural area dominated by grassland but still within the communal municipal area and as a result significant impacts are still evident.

According to Mucina & Rutherford (2006) the area consists of Stella Bushveld (SVk 2). This vegetation type is listed as being of Least Concern (LC) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Map 2). The North West Biodiversity Sector Plan (NW BSP – 2015) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site in question is however not listed as either a Terrestrial or Aquatic Critical Biodiversity Area (CBA) (Map 3). The oxidation ponds will border on an Ecological Support Area 1 (ESA) but is not anticipated to significantly alter the ecological support for surrounding aquatic systems. As a result, overall, the loss of habitat and vegetation will not exceed a moderate impact.

The site is still largely natural and is dominated by a well-developed grass layer with scattered and scant tree specimens. The main impact affecting the site is associated with it forming part of the municipal grazing area as well as its proximity to the adjacent urban area. Dirt tracks and especially footpaths are abundant. These will have a limited transformation impact but may also contribute to erosion. These paths also provide access to the area and consequently rubbish dumping and littering is evident. In addition, it was notable that the trees and shrubs were also heavily affected by cutting for firewood and this will have a significant impact on the tree layer. Probably the most prominent impact on the site is associated with communal grazing by domestic livestock. Since this is not practised according to a structured grazing schedule and grazing capacity the amount of overgrazing and trampling is quite high which does lead to significant disturbance of the vegetation layer. In addition, to these impacts, the frequent burning of the area due to its proximity to the adjacent urban area is also considered a notable impact. Although the area forms part of the Savannah Biome, well known to be adapted to a fire regime, too frequent fires, such as occurs on the site, will have a negative impact on the vegetation including the species diversity. From the description of the impacts on the site it would seem that vegetation would still be largely natural although modified to some extent by current land use.

The topography of the site consists of an almost completely flat area without any discernible slope. This is common in the region which is largely devoid of hills and similar positive landscape forms. As a result, vegetation may be quite uniform over large areas. Consequently, the site and surroundings are devoid of any watercourses, streams or drainage lines (Map 1). However, though the topography is quite flat and therefore watercourses are absent, it does promote the formation of pans or depression wetlands. Such pans are abundant in the area and often identified by forming a circular landform with a slight depression and also often containing a higher density of trees around its perimeter. The site and immediate surroundings

were therefore also purposefully surveyed for such a wetland system. A few circular landforms on the site and surroundings were identified but however confirmed to be associated with either old termite mounds, burrow colonies of small mammals or a disused stock watering point (Figure 1). A definite pan system was identified and confirmed to be a depression wetland approximately 500 meters to the west of the site (Map 1). Coupled with the flat topography and distance from the site it is highly unlikely that the development will have any effect on it and this system will therefore not be assessed any further by this study.

Most probably as a result of the uniform vegetation layer and relatively low species diversity, the site does not contain any rare or endangered species. However, two protected species still occur which still have some conservation value (Appendix C). These are *Vachellia erioloba* and *Babiana hypogea*. They are both widespread and their loss on the site would be largely a moderate impact. However, *B. hypogea* is a small geophytic species which transplants easily. Transplanting those specimens on the site which will be affected by the development to an adjacent area where they will remain intact will also further decrease the anticipated impact. The necessary permits should be obtained for the removal and transplanting of protected species on the site.

The site does not contain an abundance of exotic weeds (Appendix B). However, construction activities will definitely increase disturbance and therefore increase the susceptibility for the establishment of weeds. Monitoring of weed establishment and eradication should form a prominent part of management of the development. Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.

The impact that the proposed development will have on fauna is mainly concerned with the loss of habitat which will decrease the available habitat for faunal species. The faunal population will vacate the site into adjacent natural areas which will put a strain on surrounding populations. However, as indicated, the mammal population is likely already modified from the natural composition and given the relatively small extent of the development and extensive surrounding natural areas this impact is not anticipated to exceed moderate values. In order to ensure no direct impact on the mammals on the site the hunting, capturing or trapping of mammals on the site should be strictly prohibited during the construction and operational phases.

From the description of the vegetation on the site it is clear that a natural grass layer with a sparse tree and shrub layer is present. The species composition is still similar to the natural vegetation type. However, clear signs of overgrazing is present, pioneer and unpalatable species is abundant and may dominate in some areas. The species diversity is not significant and no species of high conservation value could be identified. Furthermore, though it cannot be discounted, due to the uniformity of the vegetation type and disturbance caused by overgrazing the likelihood of such a species occurring is considered relatively low. The conservation value of the vegetation and ecology on the site is therefore regarded as relatively low. This is also in large part confirmed by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) which regards the vegetation type as being of Least Concern (LC) as well as the North West Biodiversity Sector Plan (NW BSP – 2015) which does not regard the site as a CBA or ESA (Map 1 & 2). However, the site still retains two protected species which, although they are widespread, still retain some conservation value (Appendix C). These are the tree, *Vachellia erioloba* and geophyte, *Babiana hypogea*. Both are widespread species and not especially rare though as protected species they do still have some conservation value.

Mitigation as recommended should be applied in order to decrease the anticipated impact on them.

9. RECOMMENDATIONS

- Two protected species were recorded on the site and the applicable mitigation will have to be implemented to decrease the impact on them (Appendix C):
 - A few small specimens of Camel Thorn (*Vachellia erioloba*) occur on the site. Transplanting will not be feasible and permits should be obtained to remove them.
 - A population of the small geophyte, *Babiana hypogea*, transplants easily and affected specimens should be transplanted to adjacent areas where they will remain unaffected.
 - This should be done by conducting a search-and-rescue operation which should be overseen by a suitably qualified botanist or ecologist. Monitoring of the success of establishment should also be undertaken.

- The hunting, capturing or trapping of fauna, including mammals, reptiles, birds and amphibians, on the site should be strictly prohibited during construction and operation.

- Adequate monitoring of weed establishment and their continued eradication must be maintained (Appendix B). Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.

- After construction has ceased all construction waste should be removed from the area.

- Monitoring of construction including weed establishment and erosion should take place.

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Annexure A: Maps and Site photos



Locality map for the proposed Waste Water Treatment Works (WWTW) in Stella, North West Province.



Map 1: Locality map of the proposed WWTW in Stella. The footprint of the WWTW and centre pivot is indicated. Note the existing WWTW and landfill site and urban area to the east of the site. The site is visibly quite uniform with a small pan system to the west, but which will not be affected by the development.



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Legend:

-  Road network
-  Watercourses
-  Site location
-  Centre Pivot location
-  Wetlands and impoundments

Map Information

Spheroid: WGS 84

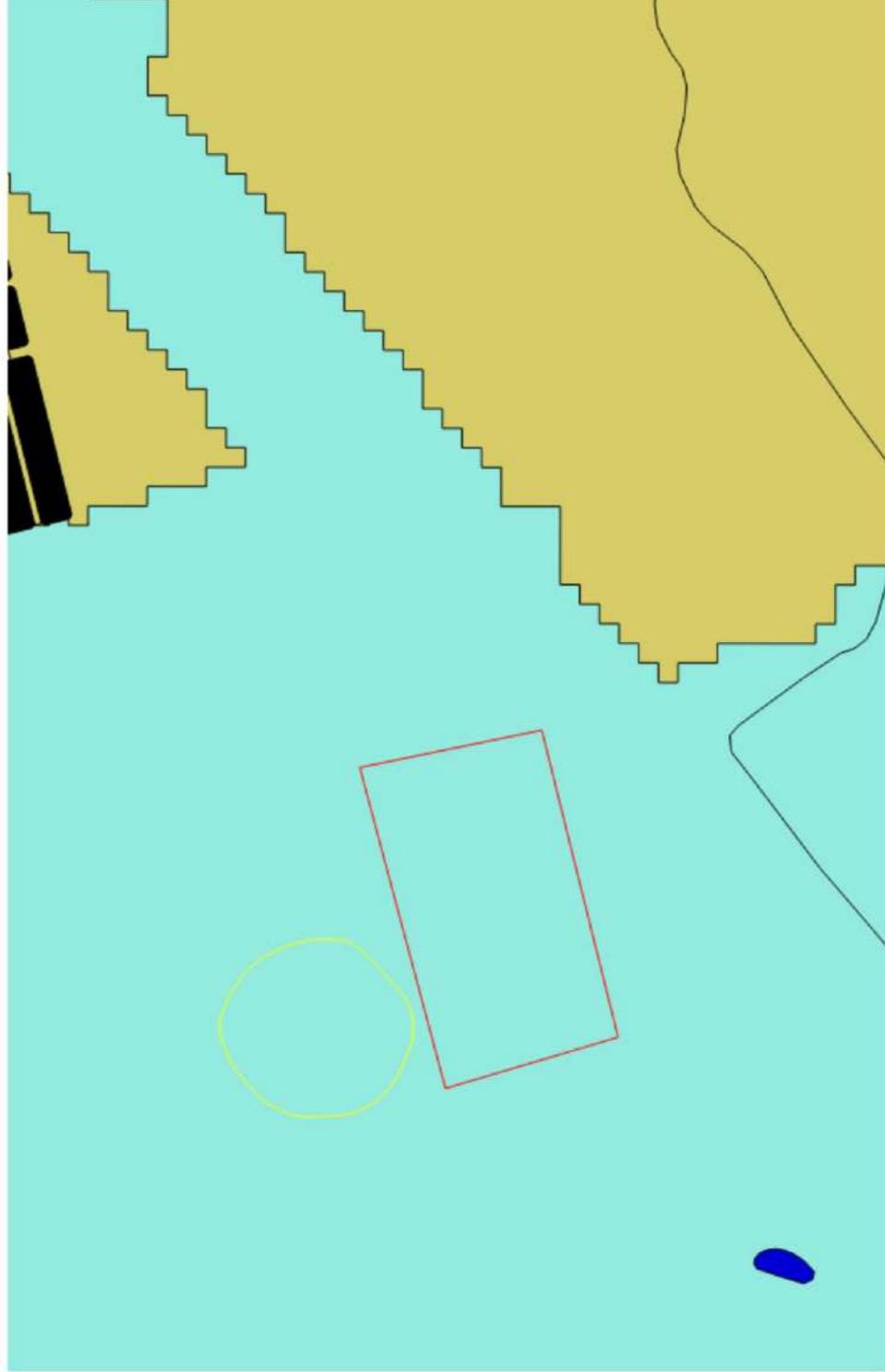
Quantum GIS

Scale: 1:10 000

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General ecology map for the proposed Waste Water Treatment Works (WWTW) in Stella, North West Province.



Map 2: General ecology map of the proposed WWTW in Stella. The footprint of the WWTW and centre pivot is indicated. The vegetation type in the area (Stella Bushveld) is indicated as well as the portions of remaining natural vegetation (National Biodiversity Assessment 2018).



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Legend:

- Road network
- Watercourses
- Site location
- Centre Pivot location
- Wetlands and impoundments
- Stella Bushveld
- Remaining vegetation (NEA 2018)

Map Information

Spheroid: WGS 84

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Scale: 1:10 000

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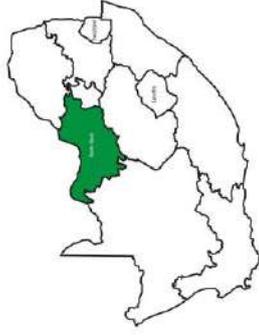




North West Biodiversity Sector Plan map for the proposed Waste Water Treatment Works (WWTW) in Stella, North West Province.



Map 3: Biodiversity Sector Plan map of the proposed WWTW in Stella. The footprint of the WWTW and centre pivot is indicated. Note that the site does not fall within a CBA or ESA although it does border on an Ecological Support Area 1 to the east.



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Legend:

- Road network
- Watercourses
- Site location
- Centre Pivot location
- Wetlands and impoundments
- Critical Biodiversity Area 1
- Critical Biodiversity Area 2
- Ecological Support Area 1
- Ecological Support Area 2
- Other

Map Information

Spheroid: WGS 84

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Scale: 1:10 000

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Figure 1: View of the existing WWTW to the east of the proposed site.



Figure 2: Panorama of the site which indicates a well-developed but rather uniform grass layer with a few scattered trees.



Figure 3: Remnants of an old livestock watering point is one of the only manmade structures on the site.



Figure 4: One of the circular clumps of trees present on the site. These are centred around the burrow colonies of small mammals.



Figure 5: A large portion of the site had been affected by a recent veld fire.



Figure 6: Tree cutting for firewood collection is common in the area and will negatively affect the tree layer.



Figure 7: Panorama of the small pan to the west of the site. Note high amount of trampling within it which is also indicative of overgrazing by domestic stock.



Figure 8: Signs of mammals on the site clockwise from the top are soil mounds of the Common Molerat (*Cryptomys hottentotus*), scat and foraging excavations of a small mammal, either a Yellow Mongoose (*Cynictis penicillatus*) or Ground Squirrel (*Xerus inauris*).

Appendix B: Species list

Species indicated with an * are exotic.

Protected species are coloured orange and Red Listed species red.

Species	Growth form
* <i>Alternanthera pungens</i>	Herb
* <i>Argemone ochroleuca</i>	Herb
* <i>Bidens bipinnata</i>	Herb
* <i>Tagetes minuta</i>	Herb
<i>Albuca sp.</i>	Geophyte
<i>Aloe grandidentata</i>	Succulent
<i>Aristida congesta</i>	Grass
<i>Asparagus suaveolens</i>	Dwarf shrub
<i>Babiana hypogea</i>	Geophyte
<i>Barleria macrostegia</i>	Herb
<i>Berkheya onopordifolia</i>	Herb
<i>Boophone distichia</i>	Geophyte
<i>Chloris virgata</i>	Grass
<i>Cymbopogon pospischillii</i>	Grass
<i>Cynodon dactylon</i>	Grass
<i>Digitaria eriantha</i>	Grass
<i>Eragrostis rigidior</i>	Grass
<i>Eriospermum prophyrium</i>	Geophyte
<i>Gazania krebsiana</i>	Herb
<i>Gnidia polycephala</i>	Dwarf shrub
<i>Grewia flava</i>	Shrub
<i>Hertia pallens</i>	Dwarf shrub
<i>Lycium hirsutum</i>	Shrub
<i>Lycium horridum</i>	Dwarf shrub
<i>Moraea pallida</i>	Geophyte
<i>Nidorella sp.</i>	Herb
<i>Pentzia viridis</i>	Dwarf shrub
<i>Ruschia semidentata</i>	Dwarf shrub
<i>Searsia ciliata</i>	Dwarf shrub
<i>Searsia lancea</i>	Tree
<i>Setaria verticillata</i>	Grass
<i>Sporobolus fimbriatus</i>	Grass
<i>Stipagrostis uniplumis</i>	Grass
<i>Tarchonanthus camphoratus</i>	Shrub
<i>Themeda triandra</i>	Grass
<i>Vachellia erioloba</i>	Tree
<i>Vachellia hebeclada</i>	Dwarf shrub
<i>Vachellia karroo</i>	Tree
<i>Vachellia tortillis</i>	Tree

Appendix C: Protected species on the site

Protected species on the site may not be limited to these species but these species have identified on and around the site. Additional sources should be consulted to confirm the presence of protected species.



Vachellia erioloba
Camel Thorn/Kameeldoring

Protected species

National Red List Status: **Least Concern (LC)**

Only a few small specimens are present on the site. It would not be feasible to transplant them and permits should be obtained to remove them.



Babiana hypogea
Dwarf babiana/Bobbejaankalkoentjie

Protected in the North West Province

National Red List Status: **Least Concern (LC)**

Remove this species where present on the site and transplant to a suitable adjacent area where no disturbance will take place. Transplants easily.

Appendix D: Impact methodology

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood

Determination of Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: **Severity/Intensity, Duration and Extent/Spatial Scale**. Each factor is assigned a rating of 1 to 5, as described below and in tables 6, 7, 9 and 10.

Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.

Table 7 will be used to obtain an overall rating for severity, taking into consideration the various criteria.

Table 7: Rating of severity

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small Potentially harmful	Significant / Harmful	Great / Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible	Low cost to mitigate	Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate / Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 8: Rating of Duration

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Determination of Extent/Spatial Scale

Extent refer to the spatial influence of an impact be local (extending only as far as the activity, or will be limited to the site and its immediate surroundings), regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders).

Table 9: Rating of Extent / Spatial Scale

Rating	Description
1: Low	Immediate, fully contained area
2: Low-Medium	Surrounding area
3: Medium	Within Business Unit area of responsibility
4: Medium-High	Within Mining Boundary area
5: High	Regional, National, International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 4.

Table 10: Example of calculating Overall Consequence

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	10
TOTAL CONSEQUENCE:(Subtotal divided by 4)	3.3

Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in Table 11 and Table 12.

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Table 11: Rating of frequency

Rating	Description
1: Low	Once a year or once/more during operation/LOM
2: Low-Medium	Once/more in 6 Months
3: Medium	Once/more a Month
4: Medium-High	Once/more a Week
5: High	Daily

Determination of Probability

Probability refers to how often the activity/event or aspect has an impact on the environment.

Table 12: Rating of probability

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Table 13: Example of calculating the overall likelihood

Consequence	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	6
TOTAL LIKELIHOOD (Subtotal divided by 2)	3

Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH, as shown in the table below.

Table 14: Determination of overall environmental significance

Significance or Risk	Low	Low-Moderate	Moderate	Moderate-High	High
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 - 19.9	20 - 25

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision making process associated with this event, aspect or impact.

Table 15: Description of the environmental significance and the related action required.

Significance	Low	Low-Moderate	Moderate	Moderate-High	High
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company	Impact is real and substantial in relation to other impacts. Pose a risk to the company. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.

Appendix D (iii): Geohydrological Assessment







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Geohydrological Draft Report

Stella Waste Water Treatment Works

Geohydrological Investigation of the New Proposed Position of the Stella Waste Water Treatment Works by Conducting Geophysics and Field Investigations.

Zoutpans Fontein 546/3, Stella, Ratlou Local Municipality, North-West Province.

September 2020

EMG

Prepared for:

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Declaration:

I act as an independent, professionally registered Geohydrologist for this proposed project requiring geohydrological services. Work relating to the project will be conducted in an objective manner, even if this results in views and findings that are not favourable to the applicant.

I have no, and will not engage in, conflicting interests in the undertaking of the activity. I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed.

Project Name:	Geohydrological Investigation of the New Proposed Position of the Stella Waste Water Treatment Works by Conducting Geophysics and Field Investigations. Version 1
Date Finished:	15 September 2020
Specialist:	Morné van Wyk SACNASP Candidate 121107 GSSA Member  Signature
Date Reviewed:	
Reviewer:	Sampie van Rooyen <i>Director & Environmental Assessment Practitioner</i> <i>Environmental Management Group</i>  Signature

Table of Contents

Foreword	6
1. Introduction	7
1.1. Site Location	7
Alternative 1 (Preferred Alternative)	7
Alternative 2	9
1.2. Site Visit for Alternative 1	9
2. Geographical setting	10
2.1. Topography and drainage	10
2.2. Climate	11
3. Scope of Work	13
4. Methodology	14
4.1. Hydro-census	14
4.2. Geophysical survey and results	14
4.3. Drilling and siting of boreholes	20
4.4. Sampling and chemical analysis	21
5. Prevailing groundwater conditions	25
5.1. Geology	25
5.1.1. Regional geology	25
5.1.2. Local geology	26
5.2. Groundwater levels	28
5.3. Groundwater potential contaminants	28
5.4. Groundwater quality	29
6. Aquifer Characterisation	30
6.1. Groundwater vulnerability	30
6.2. Aquifer classification	30
7. Geohydrological Impacts	31
7.1. Methodology	31
7.1.1. Determination of Consequence	31
7.1.2. Determination of Likelihood	33
7.1.3. Determination of Overall Environmental Significance	34
8. Conclusion and Recommendations	49
Bibliography	51

List of Tables

Figure 1: Preferred Alternative's layout and location.	7
Figure 2: Elevation profile for Alternative 1.	10
Figure 3: Elevation intensity map for the surrounding area.	11
Figure 4: Climate Classification for Alternative 1.	12
Figure 5: Average monthly rainfall for the area of Stella.	12
Figure 6: Planned Magnetic Survey for the Preferred Alternative.	14
Figure 7: Actual walked traverses. Notice the interference of the rural settlement (purple line).	15
Figure 8: Traverse 1 data and geological representation.	15
Figure 9: Traverse 2 data and geological representation.	16
Figure 10: Traverse 3 data and geological representation.	16
Figure 11: Traverse 4 data and geological representation.	17
Figure 12: Traverse 5 data and geological representation.	17
Figure 13: Traverse 6 data and geological representation.	18
Figure 14: Traverse 7 data and geological representation.	18
Figure 15: Traverse 8 data and geological representation.	19
Figure 16: Recommended monitoring boreholes.	20
Figure 17: Hydro-census for the whole area of Stella.	21
Figure 18: Lithology of the Ventersdorp Supergroup and the Formation found on site.	25
Figure 19: Geological Outcrops of the Archean Greenstone Belt.	26
Figure 20: Outcrops of different formations belonging to the Ventersdorp Supergroup.	27
Figure 21: Geological outcrops identified during the geophysical survey.	27
Figure 22: Results from the magnetic survey.	28
Figure 23: National Groundwater Vulnerability Map for South Africa.	30
Figure 24: Diagram illustrating a possible mitigation measure for improving water quality within the aquifer.	50

List of Tables

Table 1: Site Coordinates for the Preferred Alternative.	8
Table 2: Proposed location for new developments.	8
Table 3: Location for monitoring boreholes.....	21
Table 4: Chemical analysis for Borehole AB.....	22
Table 5: Chemical analysis for Borehole M.....	23
Table 6: Chemical analysis for Borehole NK.	24
Table 7: Rating Criteria for the determination of severity of the impact.	31
Table 8: Rating criteria for determination of duration.	32
Table 9: Rating criteria for determination of duration.	32
Table 10: Calculation of Overall Consequence.	32
Table 11: Rating criteria for determination of frequency.	33
Table 12: Rating criteria for determination of probability.	33
Table 13: Calculation of Likelihood.	33
Table 14: Rating criteria for impact significance.....	34
Table 15: Rating criteria for impact.	34

Abbreviations

°C	Degrees Celsius
Cfu	coli forming unit
DWS	Department of Water and Sanitation
mbgl	meters below ground level
m	meter
mm	millimetre
mS/m	Millisiemens Per Meter
NEMA	National Environmental Management Act
NWA	National Water Act
PPP	Public Participation Process
WWTW	Waste Water Treatment Works

Foreword

In October 2018 a full Geohydrological investigation was conducted by Sustainable GeoHydrological Solutions (Pty) Ltd., for the upgrading of the existing Waste Water Treatment Works (“**WWTW**”), situated next to the N18 and the salt pan. The project in 2018 was motivated by poor utilization of the existing waste water treatment work’s (WWTW) oxidation ponds. These ponds were reported to be polluted by the adjacent landfill site that was not retained, west of Stella.

In early 2020, it was decided by NEP Consulting Engineers (“**Applicant**”) and the Department of Water and Sanitation (“**DWS**”) to move the WWTW from the proposed site to the back of the town (West), to the old oxidation ponds near the informal landfill site. This decision came as a result of the Public Participation Process (“**PPP**”) whereby the residents of Stella made objection to the new development that was situated so close to the salt pan and concerns were raised about the high possibility of pollution if the WWTW were to fail.

The new site is situated 2 km away from the existing plant and thus requires a new Geohydrological assessment to be conducted. The Geohydrological assessment conducted in 2018 is still applicable on numerous parameters gathered during that study and relevant data will be used. The new Geohydrological study will mainly focus on the new location’s geophysical properties and geology to determine if this site poses any risk to subsurface water and deeper aquifers if the WWTW are constructed.

Reference will be made to the Geohydrological study conducted in 2018 and will be attached in **Appendix A** for easy reference.

1. Introduction

Environmental Management Group (Pty) Ltd was appointed by NEP Consulting Engineers (Pty) LTD to perform and update their current Geohydrological assessment for their proposed WWTW, South of Stella, and conduct a similar Geohydrological study on the old oxidation ponds, West of Stella, situated around 2km away from the N18 and salt pan.

After consultation with DWS and the residence of Stella, the applicant decided to move the project to the old oxidation ponds. This area, in and around the old oxidation ponds, are polluted and used as a dump site for the rural settlement situated North, adjacent to the site. This area will need to undergo extensive clean-up and require additional upgrading to accommodate the population of Stella.

It was indicated by DWS that a more in-depth assessment of the geology on-site will need to be conducted. This prompted the magnetic study to be performed which would give an indication on geological structures and suitability of the oxidation ponds for this area. In-field observations on geological outcrops and structure related geology was also conducted during the magnetic study and will be reflected in the report. Information on the general geology, hydro-census and water quality was assessed in the 2018 Geohydrological report and was found to be of appropriate significance and applicable to the new Geohydrological study. Note that during the magnetic survey no boreholes were observed within the radius of investigation.

1.1. Site Location

Alternative 1 (Preferred Alternative)

The new proposed position of the WWTW is located West of Stella at centre position -26.558620°S and 24.845987°E. The new proposed position encompasses an area of 56.8 ha, is situated next to the rural settlement and contains existing but degraded oxidation dams. As recorded in the 2018 Geohydrological Report (**Appendix A pg. 1**): “The project is motivated by poor utilization of the existing waste water treatment work’s (WWTW) oxidation ponds. Current ponds are reported to be polluted by the adjacent landfill site that is not retained, west of Stella”. The following coordinates delineate the expected area for the new development (**Figure 1 and Table 1 and 2**):

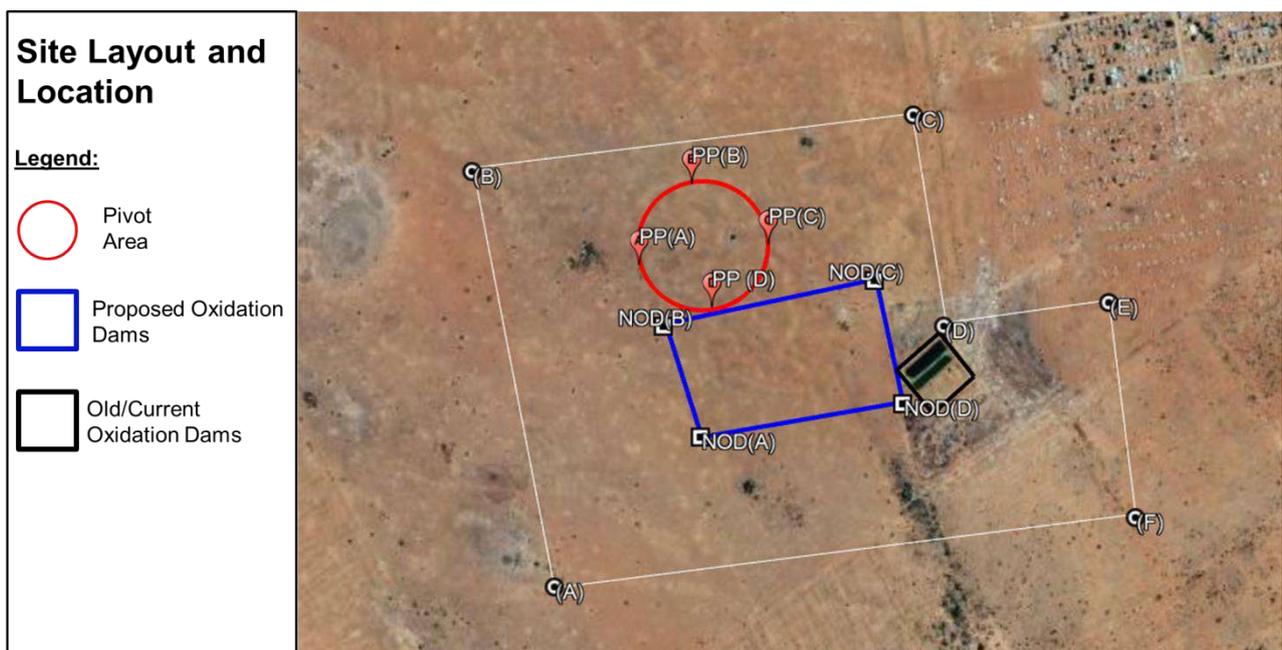


Figure 1: Preferred Alternative's layout and location.

Table 1: Site Coordinates for the Preferred Alternative.

Site Boundaries		
Position	Latitude (S)	Longitude (E)
(A)	-26.563534°	24.837986°
(B)	-26.555269°	24.835527°
(C)	-26.553547°	24.845308°
(D)	-26.557763°	24.846301°
(E)	-26.557069°	24.849953°
(F)	-26.561367°	24.850869°

The following coordinates delineate the proposed structures which included the new oxidation dams and proposed pivot point:

Table 2: Proposed location for new developments.

New Oxidation Dams		
Position	Latitude (S)	Longitude (E)
NOD (A)	-26.560320°	24.841026°
NOD (B)	-26.558136°	24.840033°
NOD (C)	-26.556934°	24.844681°
NOD (D)	-26.559381°	24.845499°
Pivot Point		
Position	Latitude (S)	Longitude (E)
PP (A)	-26.556945°	24.839372°
PP (B)	-26.555237°	24.840429°
PP (C)	-26.556366°	24.842230°
PP (D)	-26.557702°	24.841063°

Alternative 2

The 2nd alternative was discussed in great detail in the Geohydrological report of 2018 done by Sustainable GeoHydrological Solutions (Pty) Ltd and attached in **Appendix A**. In conclusion the Geohydrological study revealed that the aquifer in this area will be highly susceptible to contamination and subsequently comes with a high to very high risk to the groundwater system.

1.2. Site Visit for Alternative 1

The site visit was conducted during the magnetic survey of Alternative 1. The following was observed:

- The old oxidation ponds are completely abandoned and badly deteriorated. The fence (metal and concrete) is not locked or monitored allowing casual access to the old ponds as well as drinking water for domestic animals (observed on site).
- The area around the old oxidation ponds is used as an informal dump site by the rural settlement to the North situated 200 m away. It was noticed that some recycling of metal occurs on the dump site and that the main constituents of the garbage are mainly disposable nappies and plastics.
- The old oxidation dams are still “active”, meaning a strong odour was noticed 100 m around the site.
- The whole area west of the old oxidation ponds is natural veld used by the people of the rural settlement for grazing cattle and collection of wood. This veld seems to be in a relatively good condition.

In conclusion the site has a very low environmental condition around the old oxidation dams and the rural settlement as a result of the occasional use of the old oxidation ponds and dumping around them. However, West and South of the site the environmental conditions rapidly improve with natural veld dominating the surface.

2. Geographical setting

2.1. Topography and drainage

The topography of Stella is influenced by large geological highs and topographical lows surrounded by the larger characteristic undulating hills of the North-West Province.

Notice that both the North-South and West-East lines are relatively flat with an average gradient of between 0.4 – 0.6% (**Figure 2**). The larger and surrounding areas slightly slope towards the South-West. Local topography on the other hand varies significantly from the main direction of slope and is influenced by the outcropping of various geological structures which will be discussed in Chapter 5. **Figure 3** shows the elevation intensity map of the whole Stella area as well as preferred flow directions. It indicates that the geological outcrop influences local flow direction and creates a South-East drainage to the pan and a South-West drainage which is the main regional direction of flow.

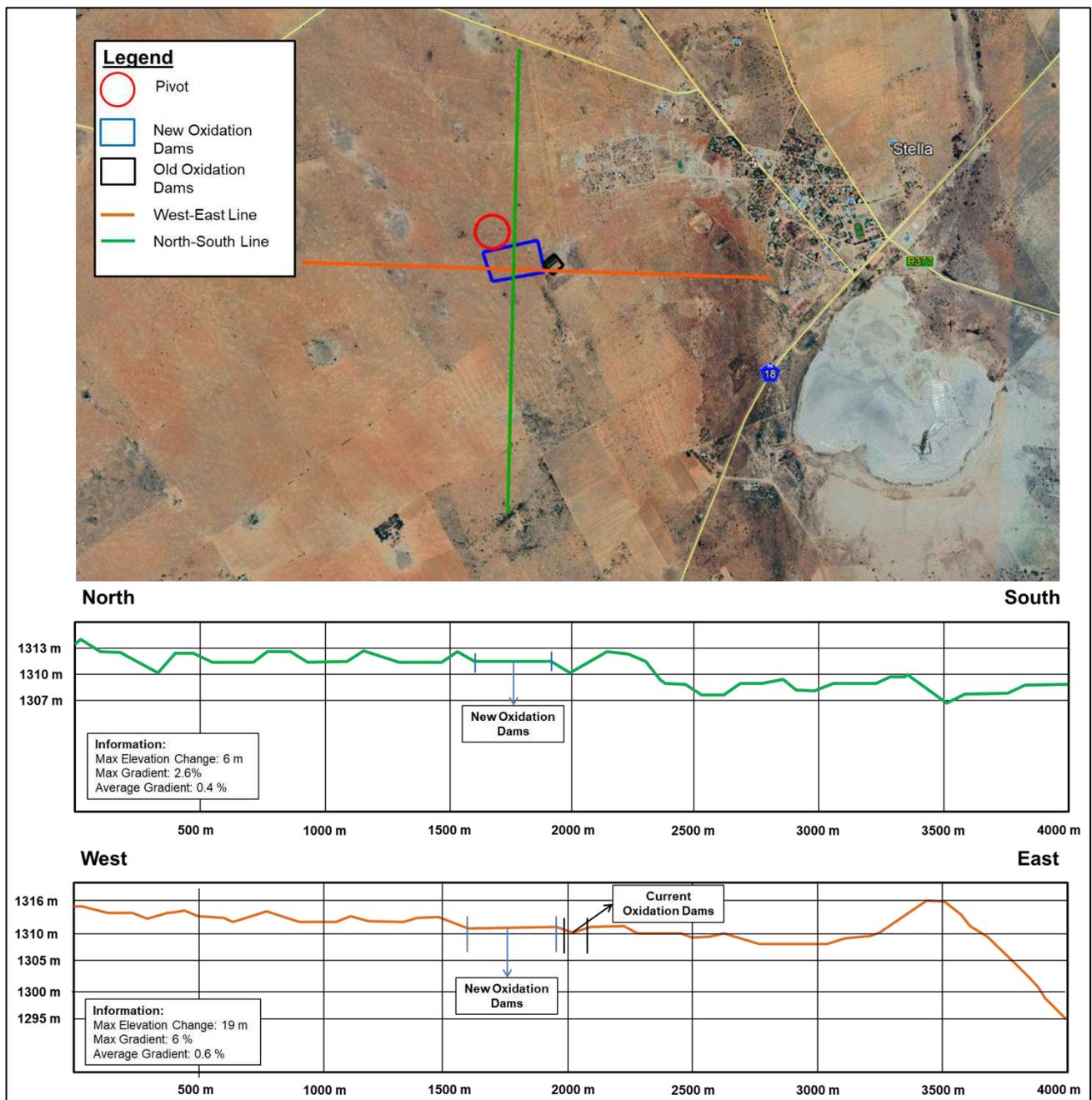


Figure 2: Elevation profile for Alternative 1.

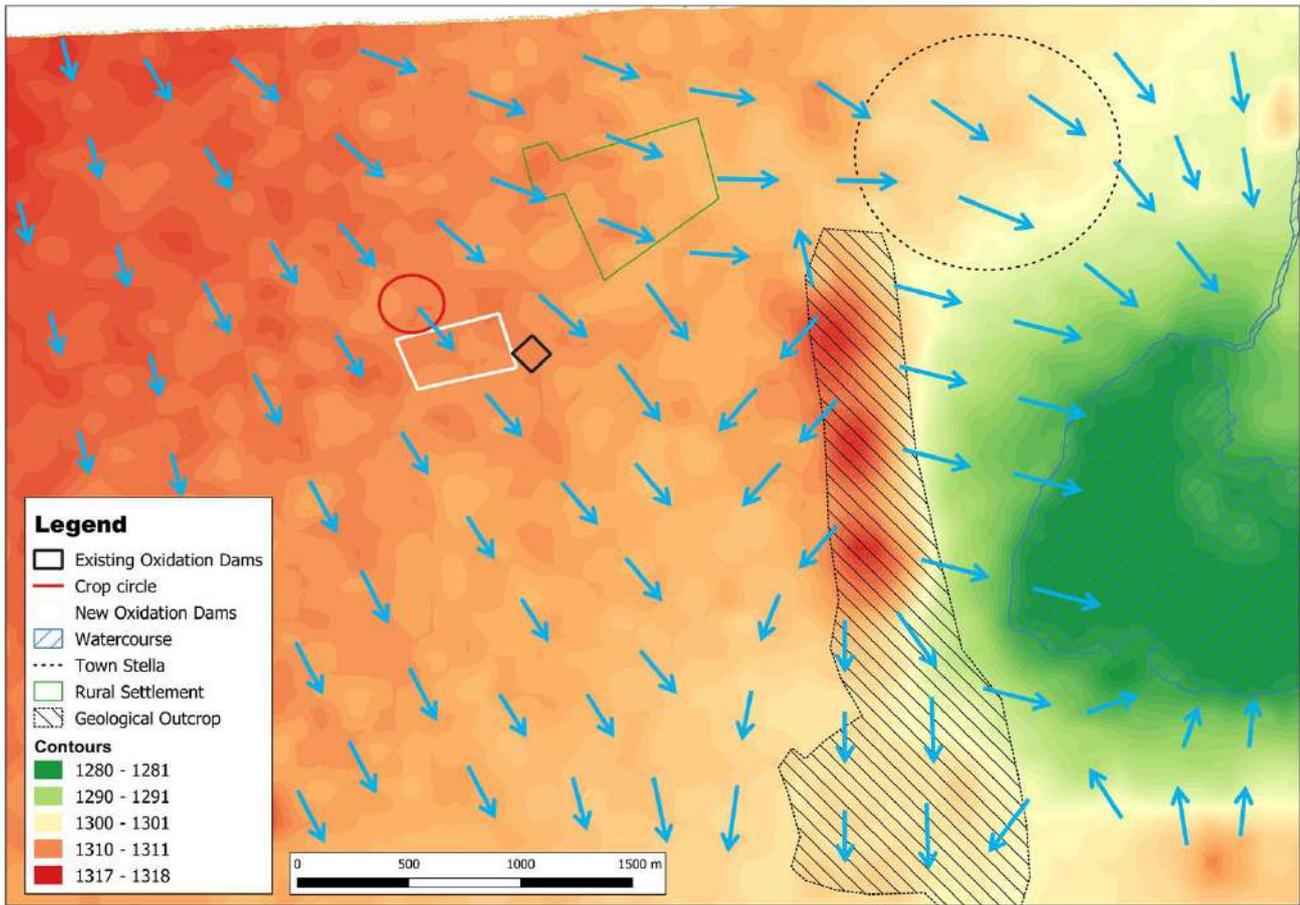


Figure 3: Elevation intensity map for the surrounding area.

Figure 2 and **Figure 3** indicate that the Preferred Alternative is situated on a very flat area and is associated with minimal risk concerning contaminated runoff. As a natural mitigation measure, if contaminated runoff occurs, the geological outcrop will act as an impermeable structure to cease contaminated runoff from entering the low lying pan area situated East of the proposed site.

2.2. Climate

Stella has the semi-arid climate prevailing defined as a Bsh (Arid, Steppe, Hot Arid) Climate zone. It is warm to hot all year round and trees don't grow here because of the drought. It consists mainly of sand with grasses and sometimes shrubs (**Figure 4**).

“The Stella area normally receives 311 mm of rain per year, with most rainfall only occurring during mid-summer months. **Figure 5** shows the average rainfall values for Stella per month. This area receives its lowest rainfall during June (0 mm) and the most rainfall during January (63 mm). The monthly distribution of average daily maximum temperatures shows that the average midday temperatures range from 18.1°C in June to 32°C in January. The region is the coldest during June when the mercury drops to 0°C on average during the night.”(J.W. Haumann, 2018-**Appendix A**).

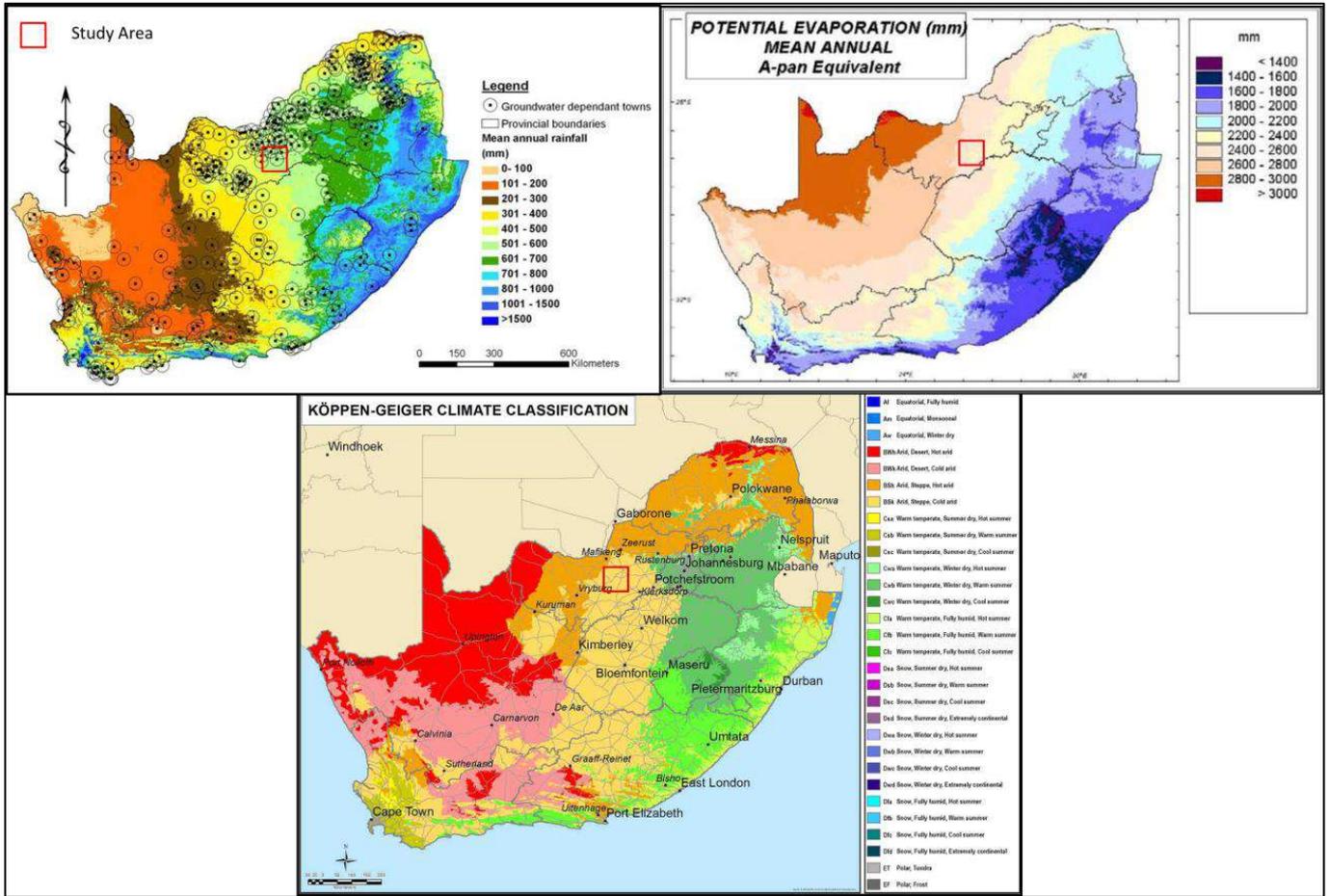


Figure 4: Climate Classification for Alternative 1.

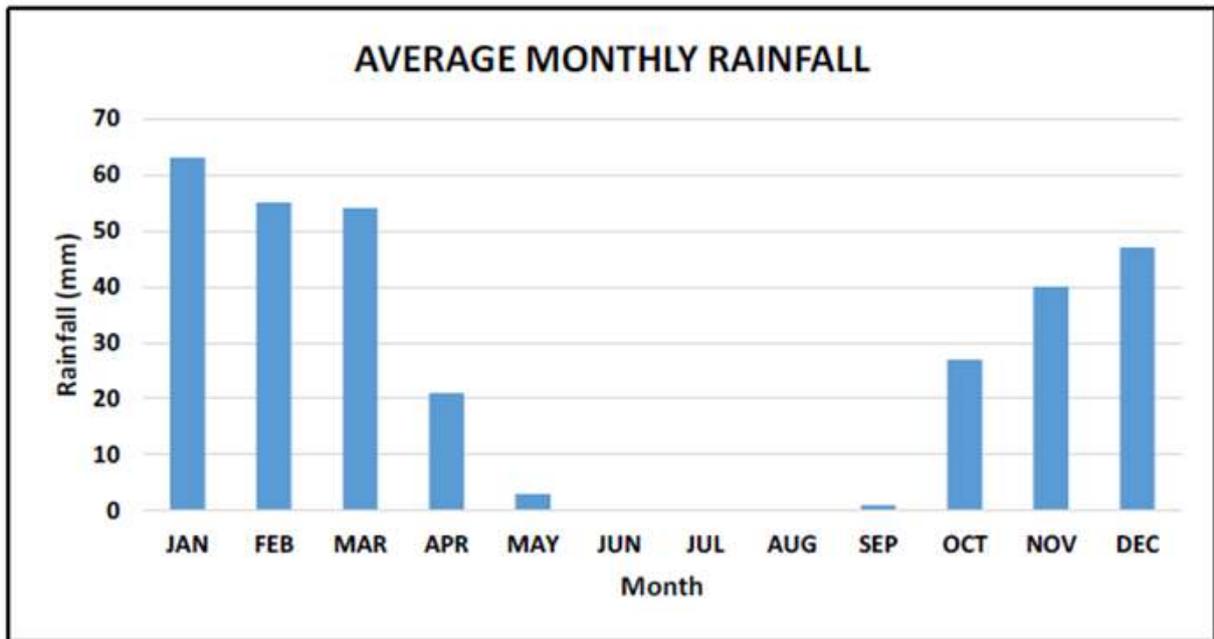


Figure 5: Average monthly rainfall for the area of Stella.

3. Scope of Work

NEP Consulting approached EMG Environmental Consulting, to conduct a new Geohydrological Investigation, on the Preferred Alternative site as per National Environmental Management Act (Act No. 107 of 1998) and National Water Act (Act 36 of 1998).

The Geohydrological Investigation is partly based on the study conducted in 2018 on Alternative 2, which already conducted most of necessary Geohydrological investigations. This new study incorporates data already gathered for the 2018 study with additional data gathering around the preferred alternative. This data gathering involves the following:

- Site visit and assessment of current environmental condition.
- Review of the Geohydrological Investigation for Alternative 2, conducted in 2018, by J.W Haumann
- Magnetic Geophysical Investigation to determine underlying geology and geological structures.
- Geohydrological Impact Assessment for the Preferred Alternative.

4. Methodology

4.1. Hydro-census

A full and in-depth hydro-census was conducted for the whole area (2km Radius) of Stella as well as chemical sampling in the 2018 Geohydrological Study (**Appendix A pg. 26**). The preferred alternative (current oxidation dams) has no monitoring boreholes close or in the surrounding vicinity.

It was concluded for the 2018 study that the average water level for the area of Stella is between 7 and 17 meters below ground level (“mbgl”) and groundwater primarily used for irrigation purposes.

No other data on aquifer characteristics or aquifer yield have been established and it is recommended that monitoring boreholes be drilled around the new proposed site to establish water quality, aquifer characteristics and geology.

4.2. Geophysical survey and results

A full magnetic geophysical investigation was conducted on the preferred alternative to determine geology and any crucial geological structures that might affect the development of the WWTW and the aquifer below.

The geophysical study commenced on the 2nd July 2020 and was completed on the 3rd July 2020. The survey encompassed an area of 190 ha with a total of eight (8) traverses being executed (**Figure 6**) and deemed sufficient enough to detect any geological anomalies that might be present below ground. Magnetic readings were taken in 50 m intervals. **Figure 7** indicates the actual path taken on site. Notice some traverses are shorter than previously planned due to magnetic interference from the rural settlement such as buildings, metal fences and garbage.

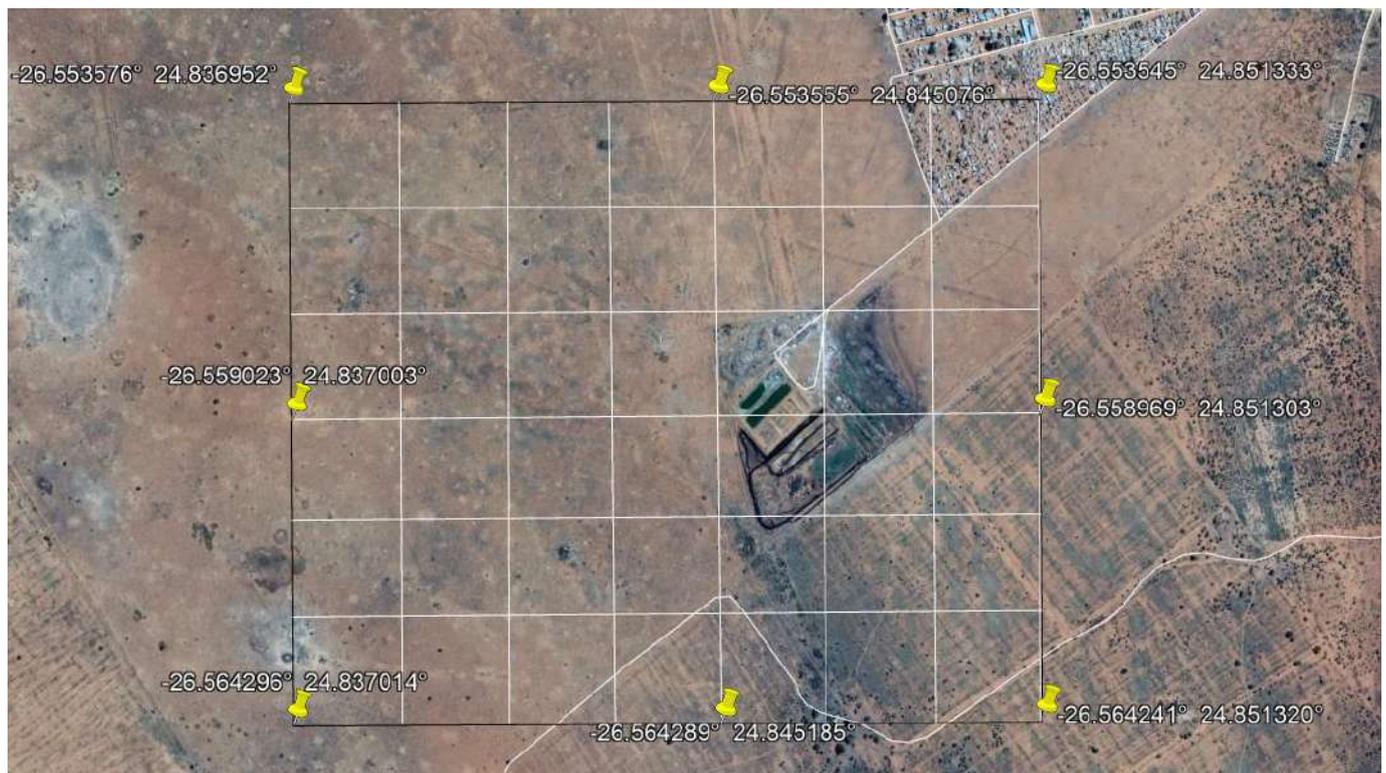


Figure 6: Planned Magnetic Survey for the Preferred Alternative.

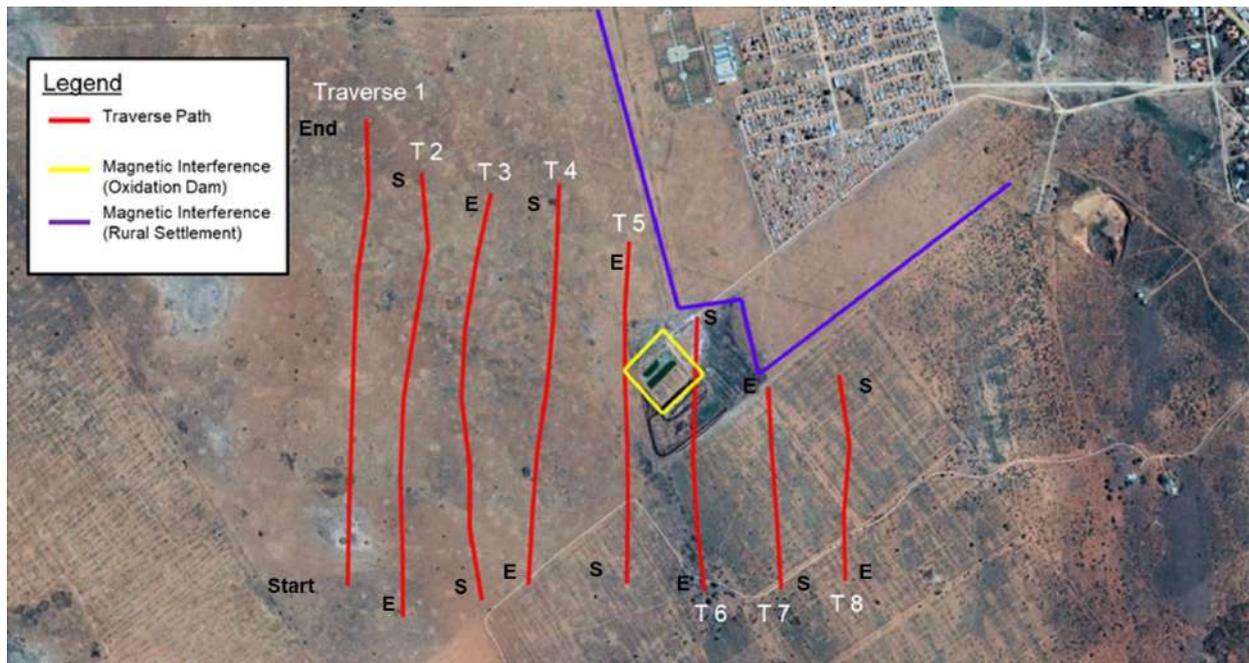


Figure 7: Actual walked traverses. Notice the interference of the rural settlement (purple line).

What follows is the cross-section and interpretation of the magnetic data:

Traverse 1:

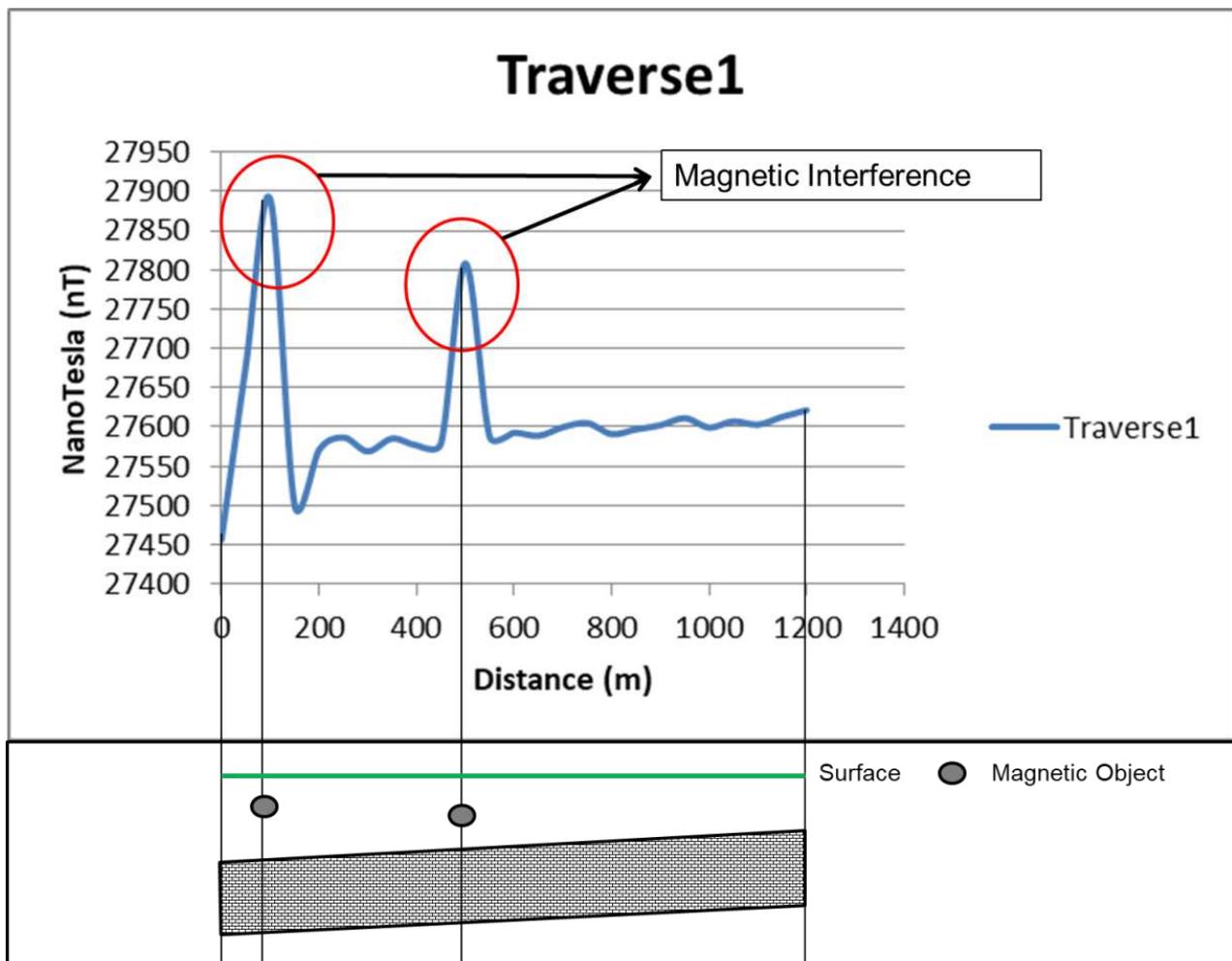


Figure 8: Traverse 1 data and geological representation.

Travers 2

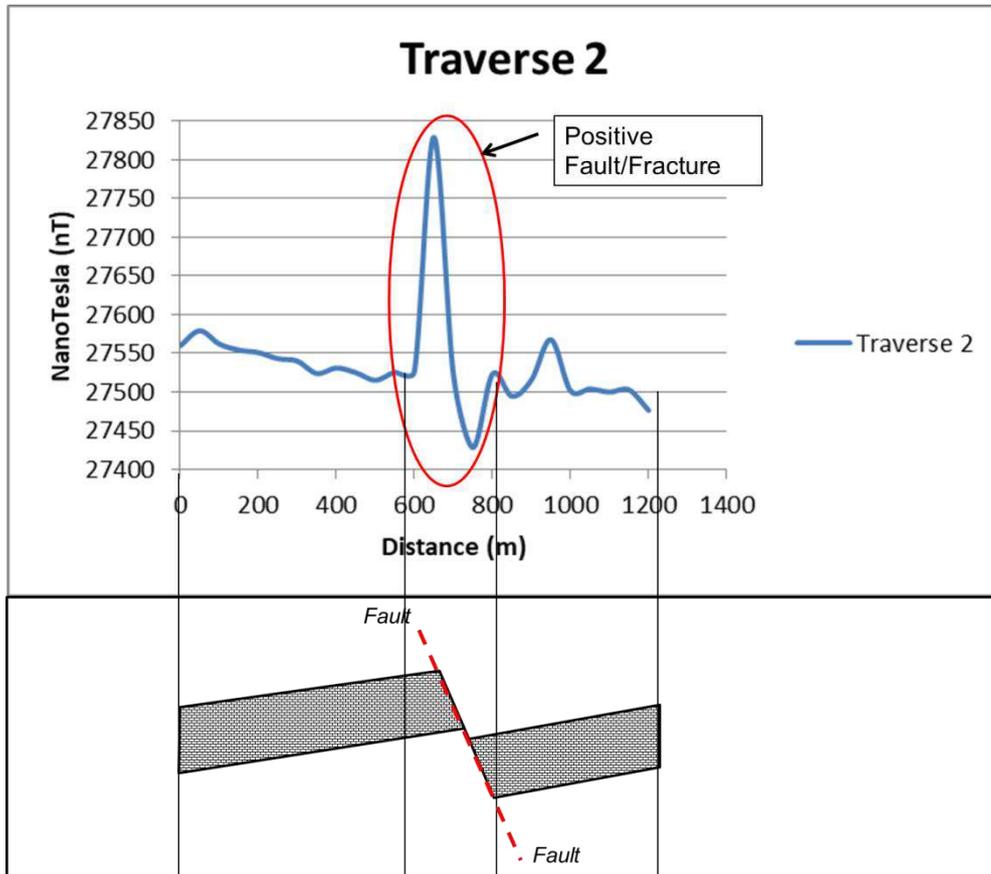


Figure 9: Traverse 2 data and geological representation.

Traverse 3

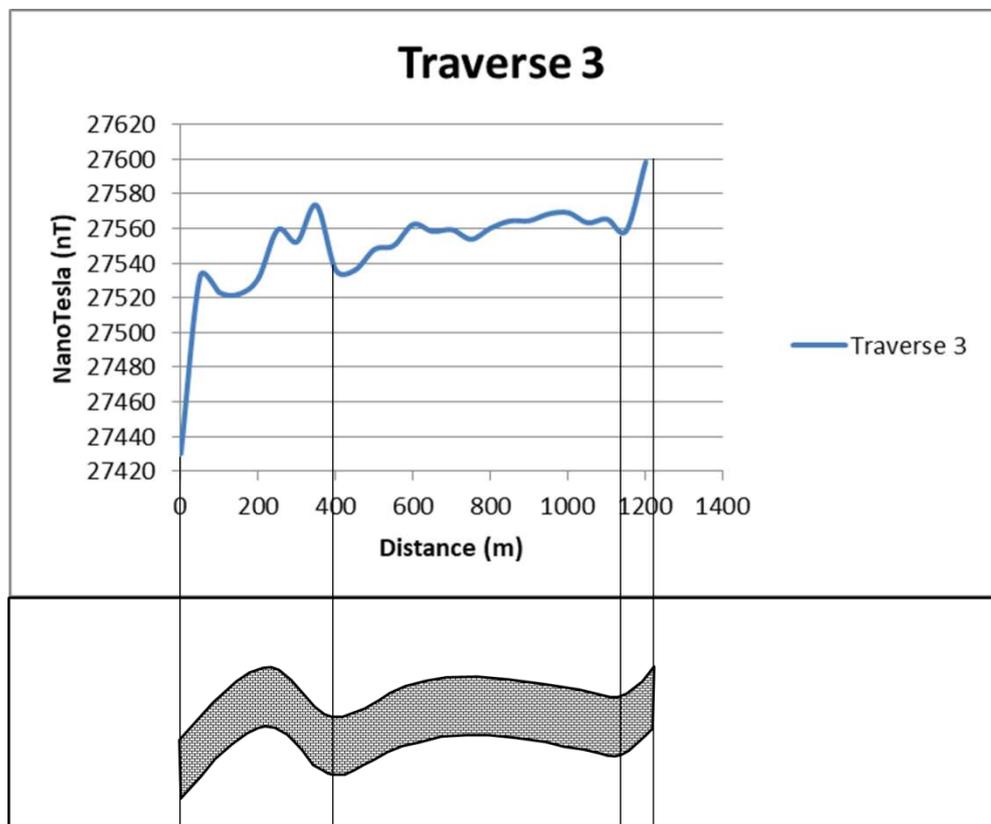


Figure 10: Traverse 3 data and geological representation.

Traverse 4

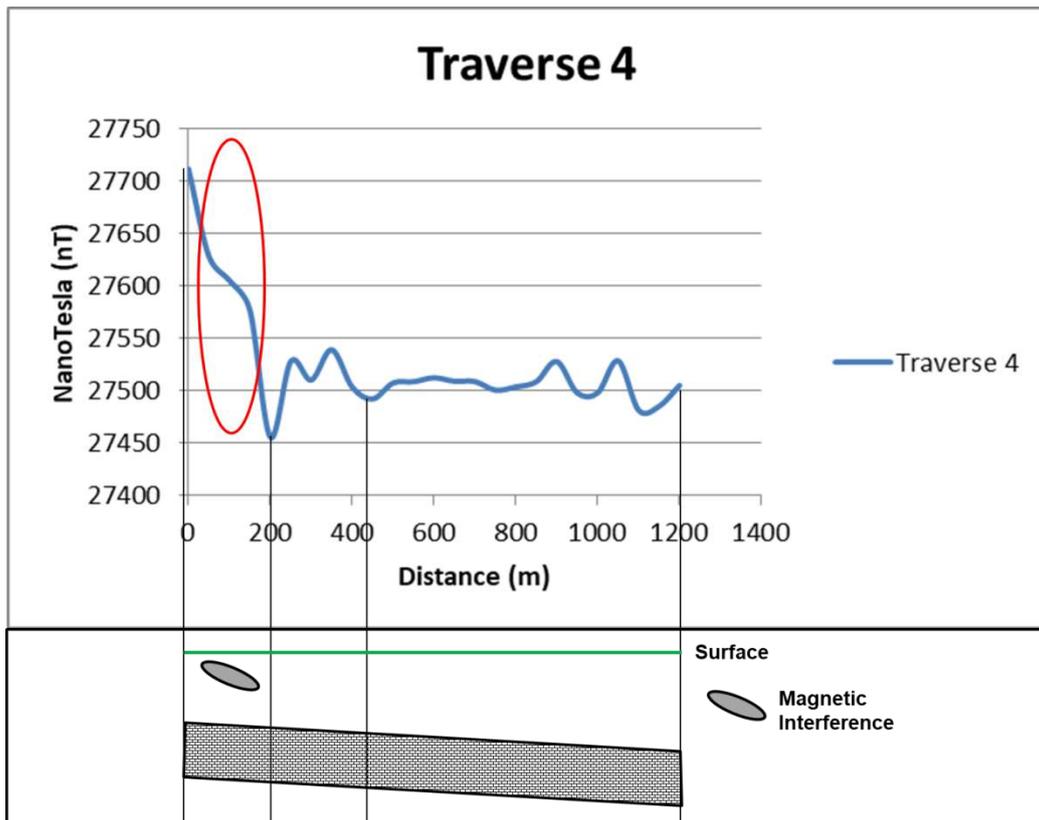


Figure 11: Traverse 4 data and geological representation.

Traverse 5

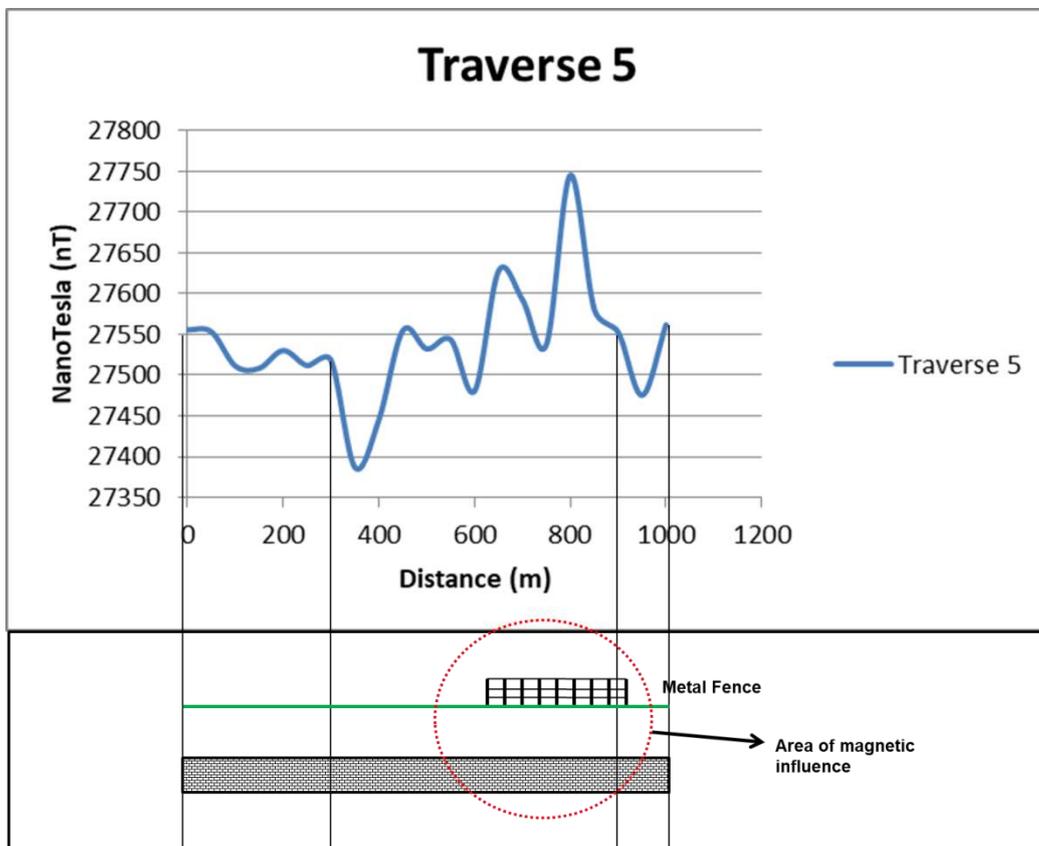


Figure 12: Traverse 5 data and geological representation.

Traverse 6

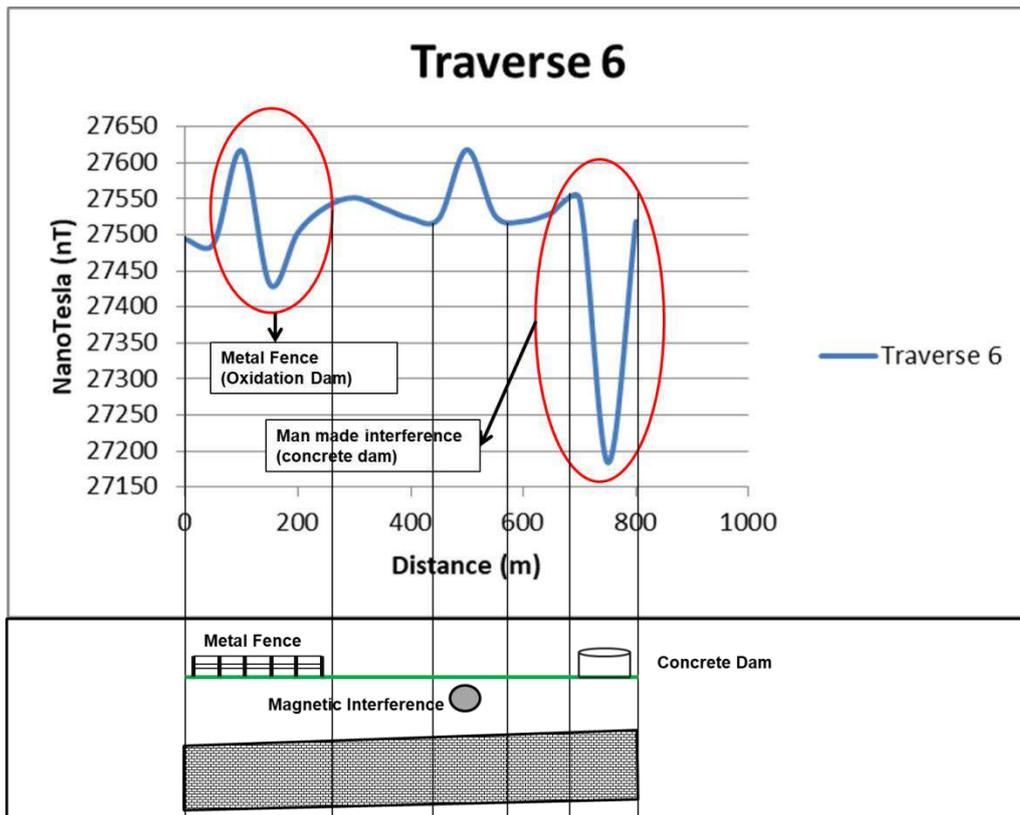


Figure 13: Traverse 6 data and geological representation.

Traverse 7

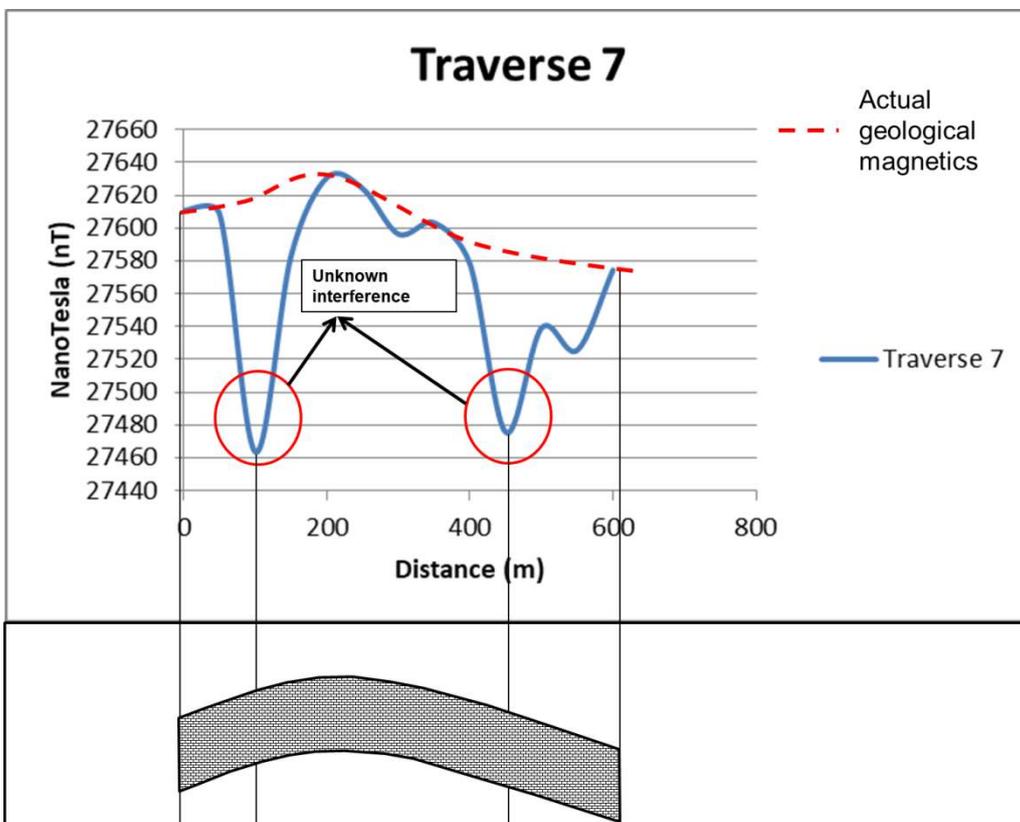


Figure 14: Traverse 7 data and geological representation.

Traverse 8

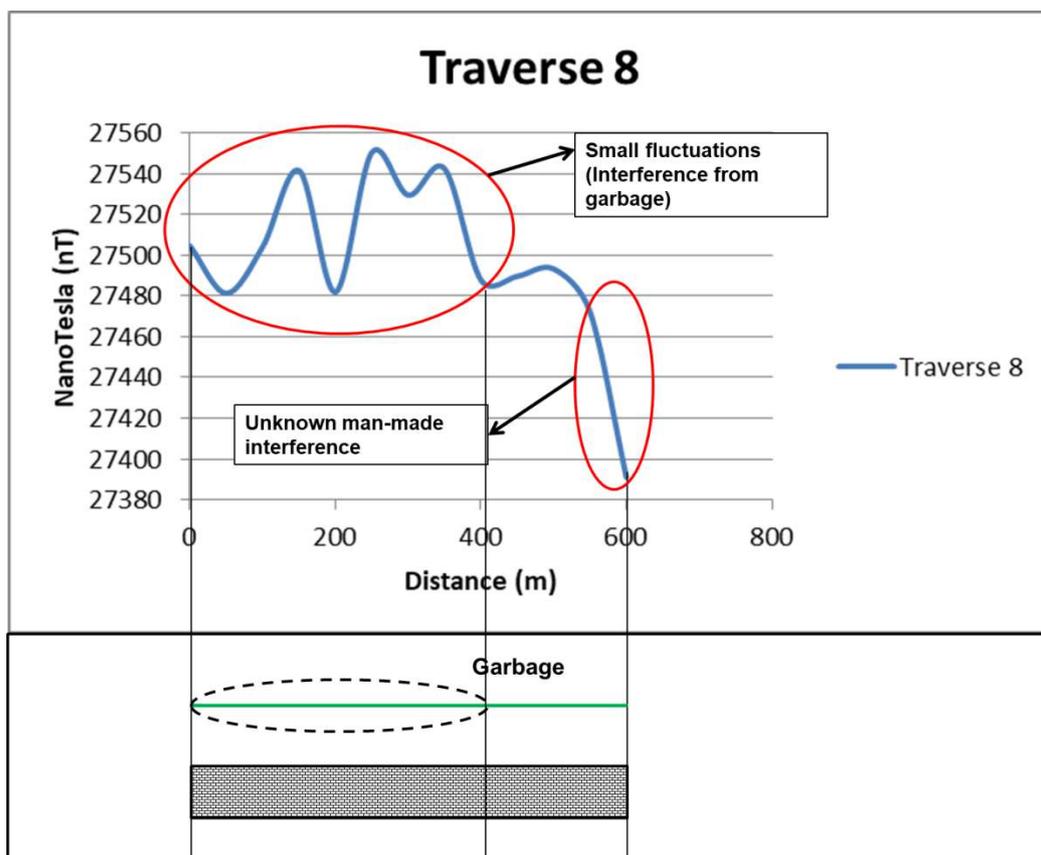


Figure 15: Traverse 8 data and geological representation.

It can be concluded from interpreting the magnetic data and surface data that an accurate geological magnetic survey will be difficult due to numerous man-made magnetic interferences caused by objects such as metal in the garbage, metal fence of the oxidation dams and negative anomalies like concrete and plastics. However, it can be said with a high degree of certainty that Traverse 2 intercepted a fault or large fracture at 700 m. The area between Traverse 5 and Traverse 6 might also contain a small fracture/fault but will be difficult to confirm as there are numerous magnetic interferences. It is recommended that no development occurs near these geological structures or within 100 m as infiltration to the aquifer occurs more rapidly along preferred pathways.

From interpreting the magnetic data it can also be estimated that the geology in the area has a small dip in degrees (flat angle 0 – 6%) with small undulating hills stretched over a distance of 600 m. When the forces applied during deformation exceed the rock strength a fault or fracture occur as highlighted in Traverse 2 near distance marker 700m. It is also worth mentioning that certain geology does outcrop (hills) on the surface and photographic evidence is given in **Figure 20**.

4.3. Drilling and siting of boreholes

As previously mentioned no boreholes are present at the preferred site, thus no data could be collected on the geology, aquifer characteristics and water quality for that area. Due to a lack of data as well as complying with the National Water Act No.36 and the need for monitoring boreholes, the following is proposed (**Figure 16 and Table 3**):

- Drilling of four (4) shallow monitoring boreholes around the new proposed oxidation dams.
 - These should not exceed the average depth of the aquifer and it is suggested that it should be a maximum of 20 m deep and 50 m away from each corner of the area.
- Drilling one (1) upstream borehole 50 m deep or up until the second aquifer for quality standards.
 - Drilling of an upstream borehole is to determine the standard of groundwater quality for the area before it passes through the area of activity.
- Drilling (2) boreholes downstream, 500 m away for the activity for pollution plume monitoring and delineation.
 - This is done in order to track water quality and to delineate the extent and concentration of a possible pollution plume downstream.

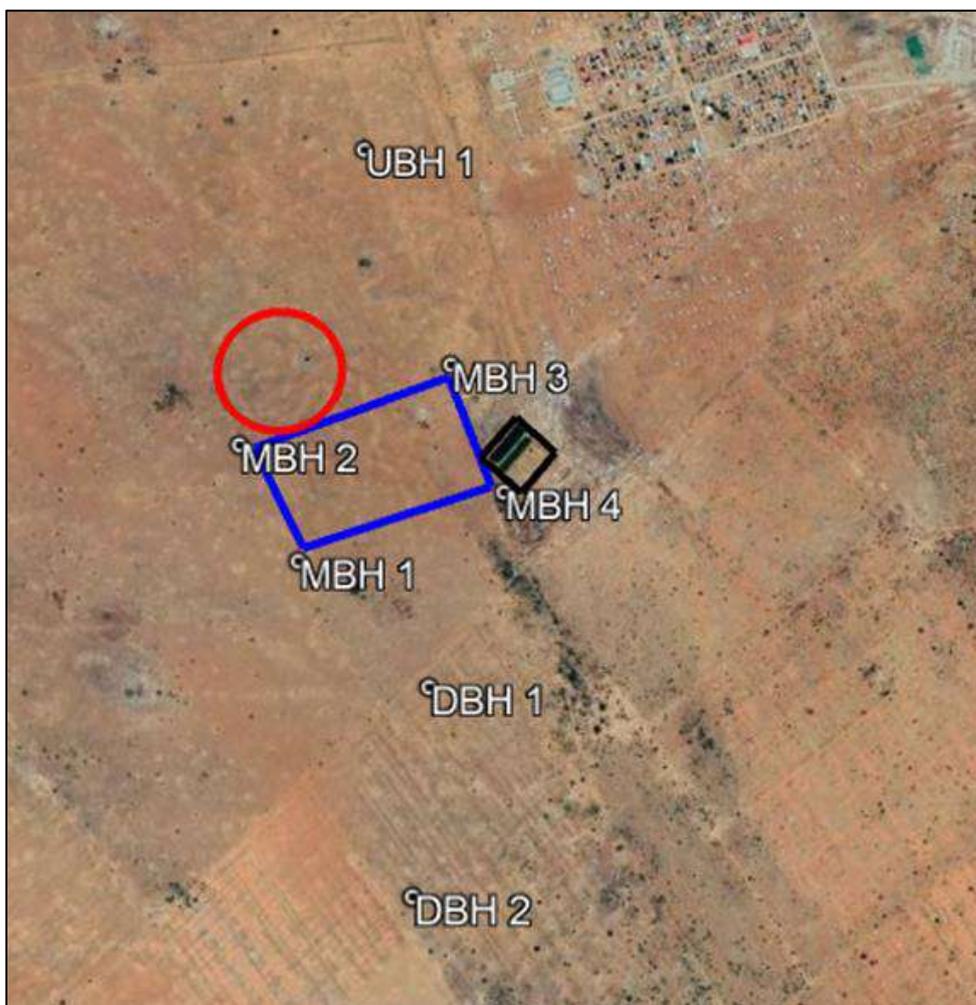


Figure 16: Recommended monitoring boreholes.

Table 3: Location for monitoring boreholes

Recommended Monitoring Borehole Positions			
Borehole Name	Latitude	Longitude	Description
Facility Monitoring			
MBH 1	-26.560669°	24.840926°	Four (4) boreholes are required, on each corner of the facility, to determine from which direction the contamination originates from.
MBH 2	-26.558071°	24.839743°	
MBH 3	-26.556717°	24.844793°	
MBH 4	-26.559572°	24.845775°	
Upstream Monitoring			
UBH 1	-26.551777°	24.843154°	At least one (1) borehole is required to measure the environmental standard for the area's groundwater quality.
Downstream Monitoring			
DBH 1	-26.563552°	24.843705°	Two (2) boreholes are required to measure the extent and intensity of any possible contamination that might originate from the facility.
DBH 2	-26.567809°	24.842971°	

4.4. Sampling and chemical analysis

A full hydro-census was conducted by J.W Haumann in the 2018 Geohydrological Report and deemed to be sufficient enough for the current preferred location (**Figure 17**). Additionally, the preferred site contains no boreholes for water sampling thus the 2018 hydro-census data was used to determine the water quality for the area. What follows is the data collected from the 2018 Geohydrological Study and the interpretation.

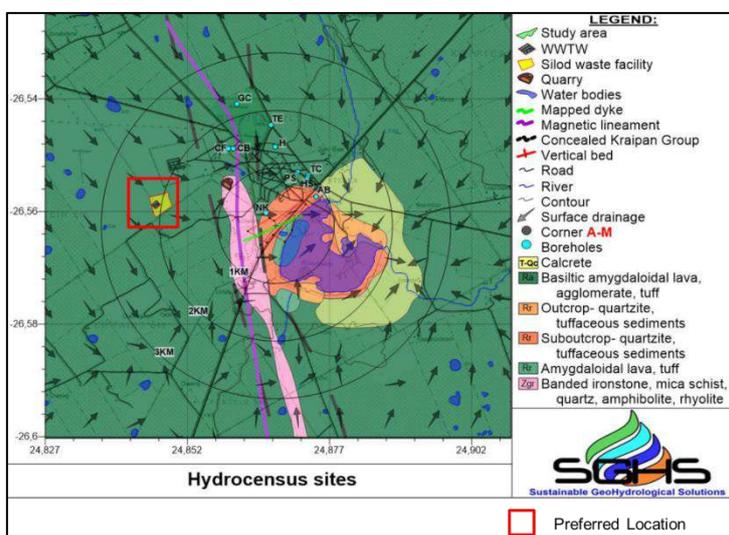


Figure 17: Hydro-census for the whole area of Stella.

Boreholes AB, M and NK were sampled and analysed (In Appendix A, 2018 Geohydrological Report Appendix D pg. 56). The following results were obtained:

Table 4: Chemical analysis for Borehole AB.

Borehole AB			
Parameters	Units	Threshold	Analysis Obtained
pH	pH Unit	5.5 – 9.5	7.49
Electrical Conductivity as EC	mS/m	70 -150	128.9
Ammonia (NH ₃) as N	mg/L	6	0.31
Chemical Oxygen Demand as COD	mg/L	75	4
Nitrate (NO ₃) and Nitrite (NO ₂) as N	mg/L	15	6.22
Orthophosphate (PO ₄) as P	mg/L	10	0.82
Suspended Solids as SS	mg/L	25	2.72
Heterotrophic Plate Count	Cfu/1ml	<1000	23
Total Coliforms	Cfu/100ml	<10	0
E.coli	Cfu/100ml	0	0
Faecal Coliforms	Cfu/100ml	<1000	0

“Borehole AB, downstream of the study area, does not show any sign of chemical or bacteriological pollution. It does however have moderately elevated EC concentration of 128,9 mS/m. This is expected to be due to salinization from the intersected soutpan” (J.W Haumann, 2018).

Table 5: Chemical analysis for Borehole M.

Borehole M			
Parameters	Units	Threshold	Analysis Obtained
pH	pH Unit	5.5 – 9.5	7.23
Electrical Conductivity as EC	mS/m	70 -150	138.4
Ammonia (NH ₃) as N	mg/L	6	0.24
Chemical Oxygen Demand as COD	mg/L	75	5
Nitrate (NO ₃) and Nitrite (NO ₂) as N	mg/L	15	38.24
Orthophosphate (PO ₄) as P	mg/L	10	0.68
Suspended Solids as SS	mg/L	25	5.30
Heterotrophic Plate Count	Cfu/1ml	<1000	0
Total Coliforms	Cfu/100ml	<10	17
E.coli	Cfu/100ml	0	0
Faecal Coliforms	Cfu/100ml	<1000	0

“Borehole M, located 7km south east of the study area, shows extremely elevated concentrations of nitrate (NO₃) at a concentration of 38,24 mg/l. This site has moderately high concentrations of EC (138,4 mS/m) and very high concentrations of total coliforms. Bacteriological analyses suggest that borehole M may contain highly elevated concentrations of pathogenic organisms of faecal origins. Elevated nitrates found in borehole M are expected to be related to fertilizer contamination or the oxidation of animal and human excrement. Due to the location and surrounding farming activities, elevated nitrate and total coliforms concentrations may originate from a leaking septic tank or overall faulty sewer system at the Middelkop farmhouse. This borehole was reported to supply the Stella town with drinking water during local municipal water supply failure” (J.W Haumann, 2018).

Table 6: Chemical analysis for Borehole NK.

Borehole NK			
Parameters	Units	Threshold	Analysis Obtained
pH	pH Unit	5.5 – 9.5	6.99
Electrical Conductivity as EC	mS/m	70 -150	209.5
Ammonia (NH ₃) as N	mg/L	6	0.39
Chemical Oxygen Demand as COD	mg/L	75	9
Nitrate (NO ₃) and Nitrite (NO ₂) as N	mg/L	15	38.96
Orthophosphate (PO ₄) as P	mg/L	10	0.62
Suspended Solids as SS	mg/L	25	10.7
Heterotrophic Plate Count	Cfu/1ml	<1000	25
Total Coliforms	Cfu/100ml	<10	3
E.coli	Cfu/100ml	0	0
Faecal Coliforms	Cfu/100ml	<1000	0

“Borehole NK, upstream of the investigated site, shows extremely elevated concentrations of nitrate (NO₃) and EC, at concentrations of 38.96 mg/l and 209,5 mS/m. This site also has fairly elevated suspended solids (10,7 mg/l) compared to surrounding sampled sites. Borehole NK was analyzed to contain total coliforms of 3 cfu/100ml and a heterotropic plate count of 25 cfu/1ml. Bacteriological analyses suggest that pathogenic organisms of faecal origins may be present in the borehole NK. Elevated nitrates are associated with fertilizer, explosive residue and the oxidation of animal and human excrement. Treated sewage waste may also contain elevated concentrations of nitrate”. (J.W Haumann, 2018)

“It is HIGHLY recommended that all persons dependable on borehole M and NK for domestic use, be notified of its deteriorated state, making it not fit for human consumption. Special attention should be given to pregnant women and infants from consuming water from these sources to prevent methaemoglobinaemia (blue baby syndrome)”.

It is expected that the preferred alternative’s groundwater will also have high concentrations in Nitrates (N) as a result of the informal dumping of garbage, which most consists of baby diapers. To add to the concentration of Nitrates expected in the groundwater, the old oxidation dams are still in use and constantly filled with honey sucker trucks which empty septic tanks from the rural settlements. This site isn’t maintained or monitored and large seepage into the aquifer is expected.

5. Prevailing groundwater conditions

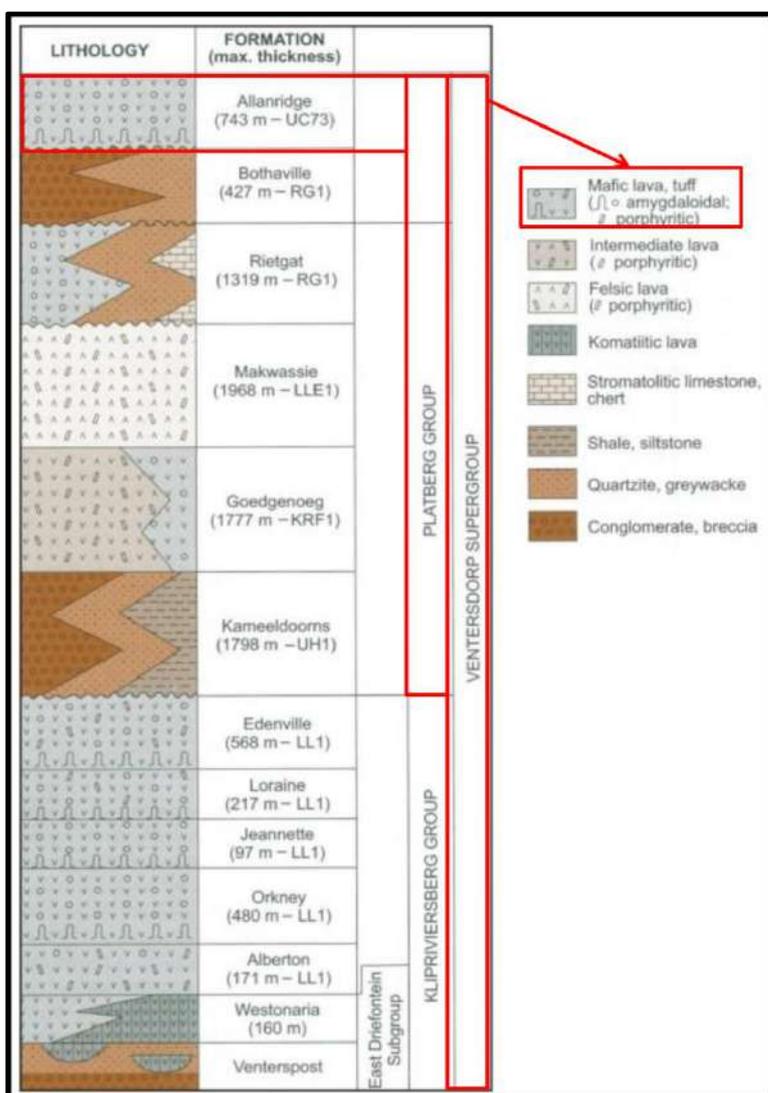
The geology is described in great detail in the 2018 Geohydrological Report of J.W Haumann and attached in Appendix A. For this study the basic geology will be described which are applicable to the preferred alternative.

5.1. Geology

5.1.1. Regional geology

The following description of the geology is what can be found on site and the surrounding larger scale area.

The **Ventersdorp Supergroup** provides a unique volcano-sedimentary supracrustal record (**Figure 18**) and contains the largest and most widespread sequence of volcanic rocks on the Kaapvaal Craton and unconformably overlies the Witwatersrand Supergroup and is best exposed at/in the North West, Northern Cape and the Gauteng Province (**Van Der Westhuizen et al., 2006**). The Ventersdorp Supergroup is subdivided into two lower groups and two upper formations which are as follows:

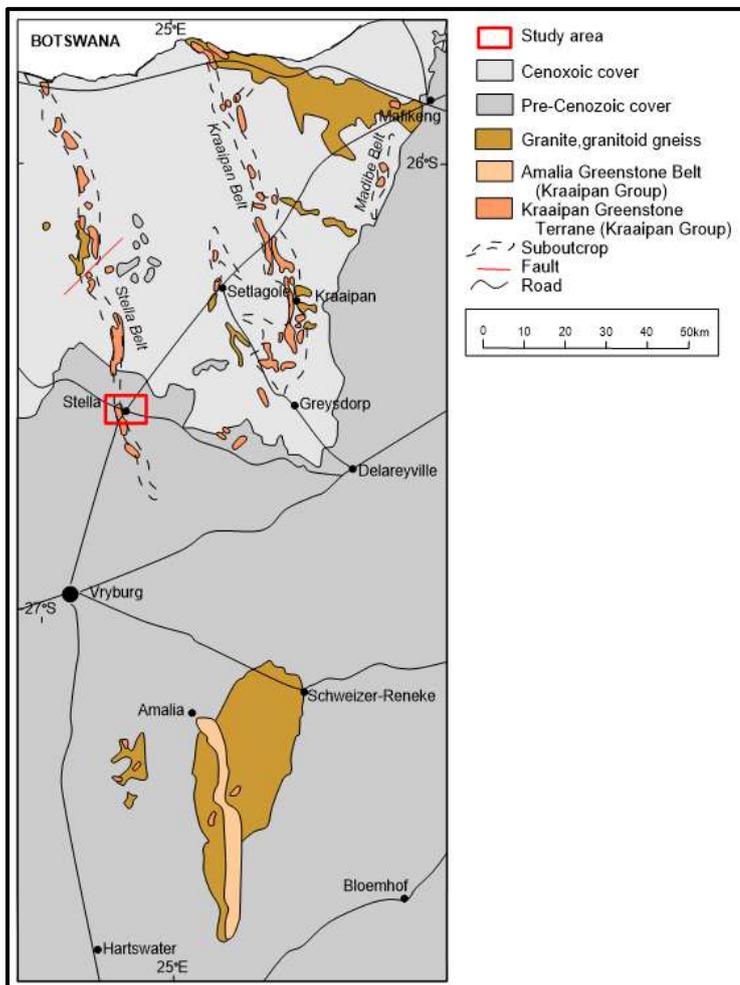


Allanridge Formation (on site)

- Bothaville Formation
- Platberg Group
- Klipriviersberg Group

Figure 18: Lithology of the Ventersdorp Supergroup and the Formation found on site.

The **Archean Greenstone Belts** (outside site boundaries) constitutes the oldest preserved material on the earth's surface (**Brandl et al., 2006**). These Greenstone Belts are linear to irregularly shaped features situated on the Kaapvaal Craton of South Africa. There are several greenstone belts or their remnants still preserved of which the Barberton, Pietersburg, Murchison, Giyani and Kraaipan greenstone belts are of importance. The Kraaipan belt, stretches from the southern parts of the North West Province northwards to the Botswana-North West border and is mapped to outcrop near the preferred alternative (**Figure 19**).



The Kraaipan Greenstone Terrain comprises of the following series of greenstone belts:

- Madibe
- Kraaipan
- Stella
- Amalia

Figure 19: Geological Outcrops of the Archean Greenstone Belt.

5.1.2. Local geology

The local geology present on site comprises predominantly of mafic lavas and tuff which are and porphyritic in nature. These lavas belong to the Ventersdorp Supergroup and further subdivided into the Allanridge Formation and are uniform across the site and the surrounding areas. These lavas are massive and uniform intrusions and can reach a maximum depth of 743 m. It is expected that the lavas on site have less thickness due to surface erosion, but are still thick enough to encompass an area on regional scale as seen in **Figure 20**.

The presence of the Allanridge Formation on site was confirmed during the site visit where numerous outcrops of the characteristic green lavas, which were amygdaloidal in nature, were encountered (**Figure 21 Left**). Hydrothermal quartz veins (**Figure 21 Right**) were also observed near the surface and formed as part of the initial magma intrusion and later deformed as a result of movement within the greenstone mobile belt.

“The **Allanridge Formation** consists of lavas that are basaltic andesites in composition and is characterized by red chalcidony amygdales in the upper part of the formation and less in the lower units (**Van der Westhuizen et al., 2006**)”.

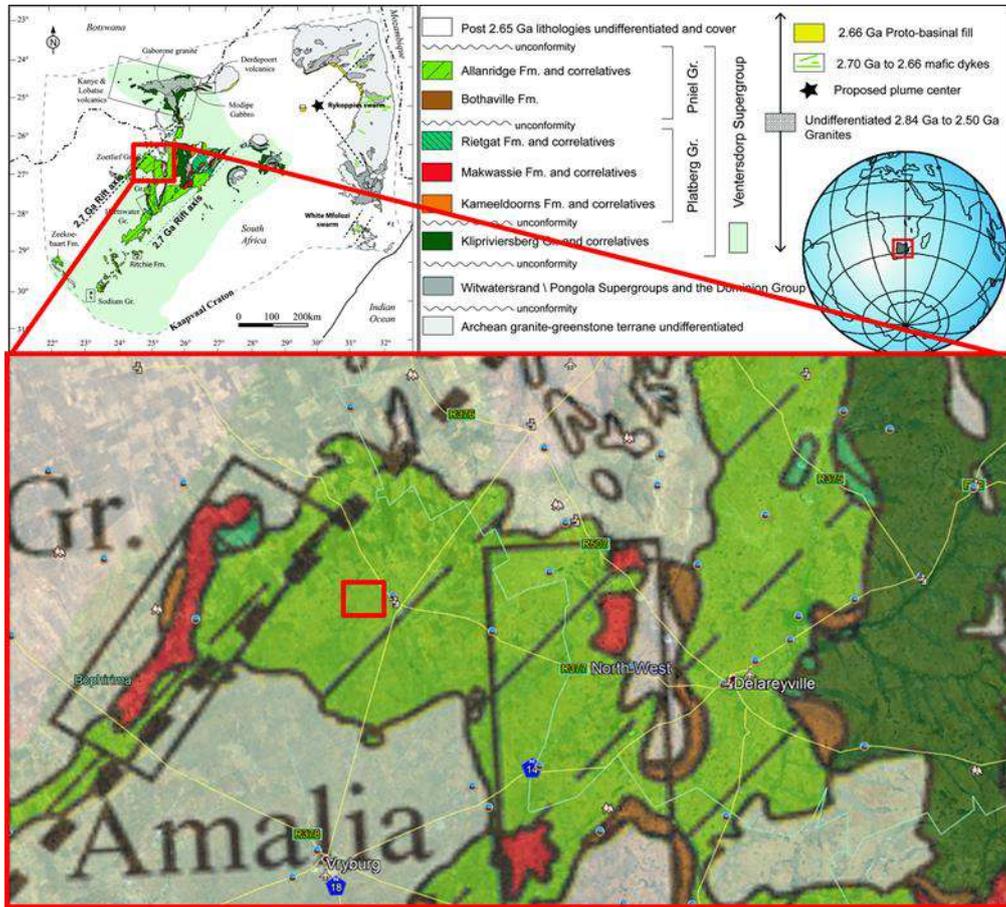


Figure 20: Outcrops of different formations belonging to the Ventersdorp Supergroup.

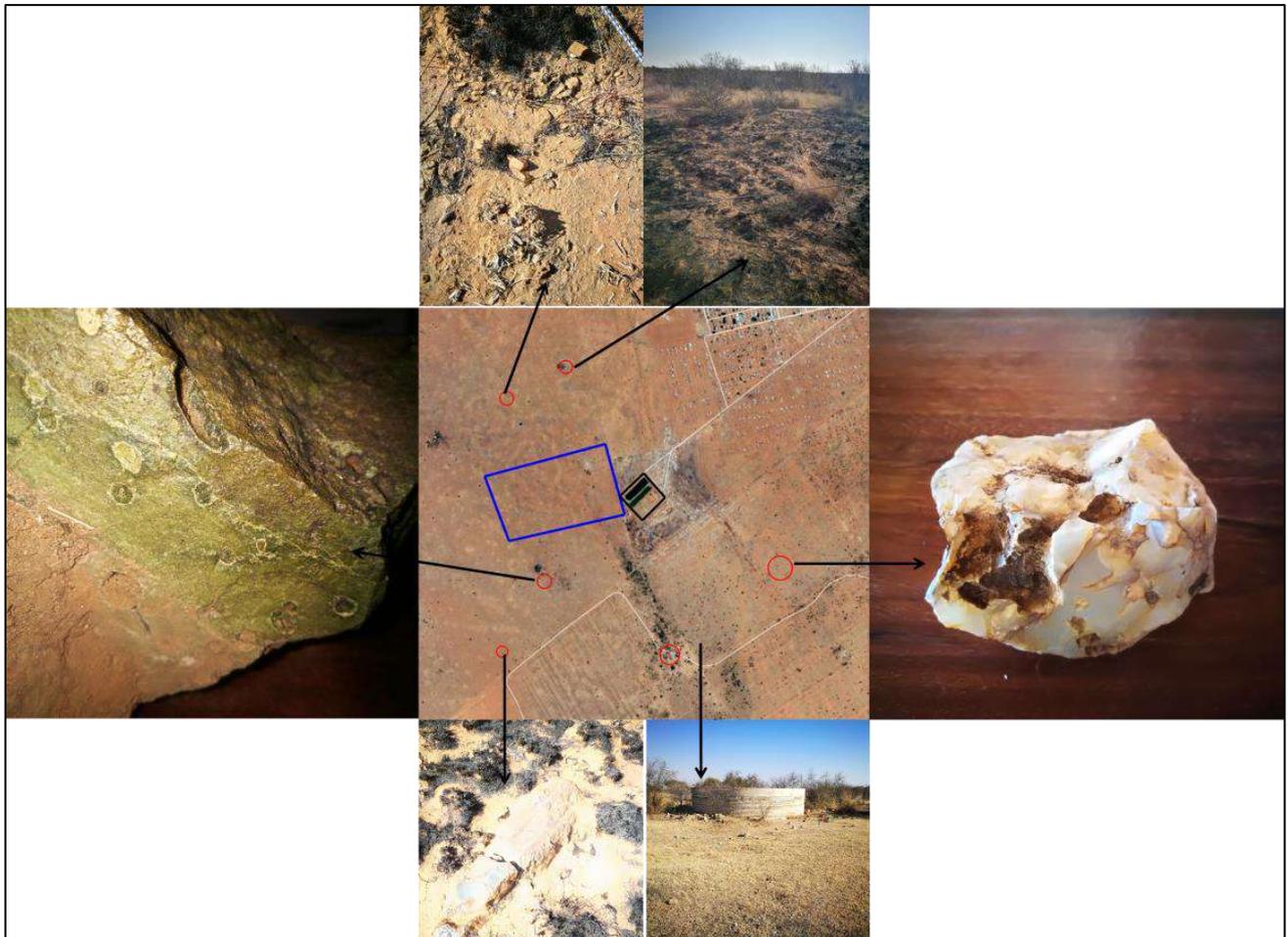


Figure 21: Geological outcrops identified during the geophysical survey.

From the magnetic geophysics conducted on site it is clear than there are no major inconsistencies (structurally) within this geological unit. It shows a relatively flat geological surface with some undulating elevations and one confirmed fracture/fault to the West of the preferred location. A geological unit with an undulating base is to be expected for the area as the greenstone mobile belt significantly deformed once flat geology. This movement alongside the greenstone belt could also overcome rock strength during deformation and caused fractures or faults as seen in **Figure 22**.

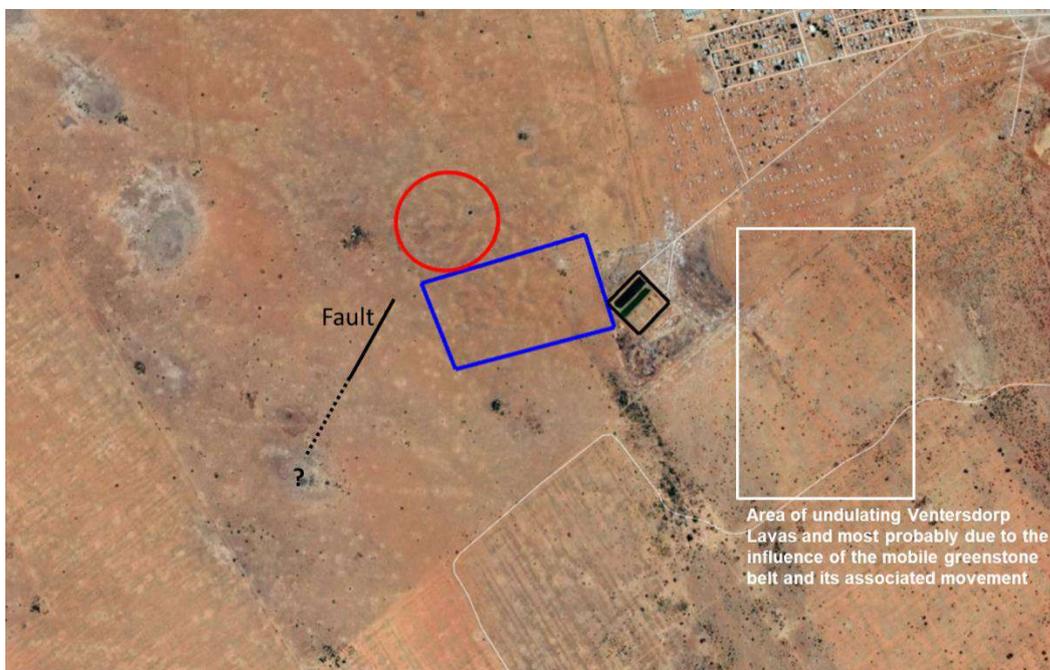


Figure 22: Results from the magnetic survey.

5.2. Groundwater levels

According to the Hydro-Census conducted by J.W Haumann in 2018 (Appendix A) the minimum and maximum water levels are between 7.58 – 16.25 mbgl respectively with an average for the area around 12 -13 mbgl.

5.3. Groundwater potential contaminants

As stated by J.W Haumann in his 2018 report, most of the groundwater use in the area is allocated or associated with agriculture. As a result of seepage and fertilizer use, the groundwater contains elevated concentrations of nitrates. The electrical conductivity is also slightly elevated and could be directly linked to the presence of the salt pan near Stella.

For the study area no water samples near the proposed site could be taken as no boreholes were present. It is expected that the water within the oxidation dams are highly contaminated with nitrates and faecal coliforms, which is expected from raw sewage. The environmental concern however, is that the current oxidation dams can be classified as highly deteriorated and not maintained. This leads to the assumption that a large portion of the raw sewage will infiltrate to the groundwater and lead to elevated concentrations of Nitrates and faecal coliforms. In addition to the seeping raw sewage the informal dump adjacent to the oxidation dam contains a large portion of discarded diapers which can also seeps faecal coliforms into the groundwater system.

It comes highly recommended that the old oxidation dam and the informal garbage dump be rehabilitated before the construction of the new proposed oxidation dam continues, as monitoring of the new oxidation dams will show contamination, which originates from the old oxidation dam.

5.4. Groundwater quality

The study area is located on a minor aquifer system which is regarded as a moderately-yielding aquifer of variable quality. Groundwater quality for this area is expected to range greatly from 70 to 370 mS/m. Due to the study area's location on both the Gold Ridge and Allanridge Formation, the underlain geology is expected to be intergranular, fractured and highly weathered with highly increased recharge on the western boundary of the study area.

The study area is regarded as being located on a least vulnerable regional aquifer system, becoming vulnerable to conservative pollutants in the long term when continuously discharged or leached. The regional aquifer system is also associated with a low susceptibility to contamination while ranging to medium susceptibility to conservative pollutants in the long term when continuously discharged or leached.

It is expected that due to the specific geological placement of the study area, the local aquifer will have a moderate to most vulnerability rating with a medium to high susceptibility for continuously discharged or leached pollutants.

6. Aquifer Characterisation

6.1. Groundwater vulnerability

J.W Haumann classified Site Alternative 2 as being **HIGH** to **VERY HIGH** (39.17 – 44.69), using the DRASTIC model.

Using the Groundwater Vulnerability Map (**Figure 23**), which is also based on the DRASTIC model, the Preferred Alternative can be classified as being either **LOW** to **MODERATE** (20 - 25 to 25 - 30). The main contributing factors are that the area has a minor aquifer system, least vulnerable Ventersdorp lavas and groundwater quality which already contains a high Electrical Conductivity.

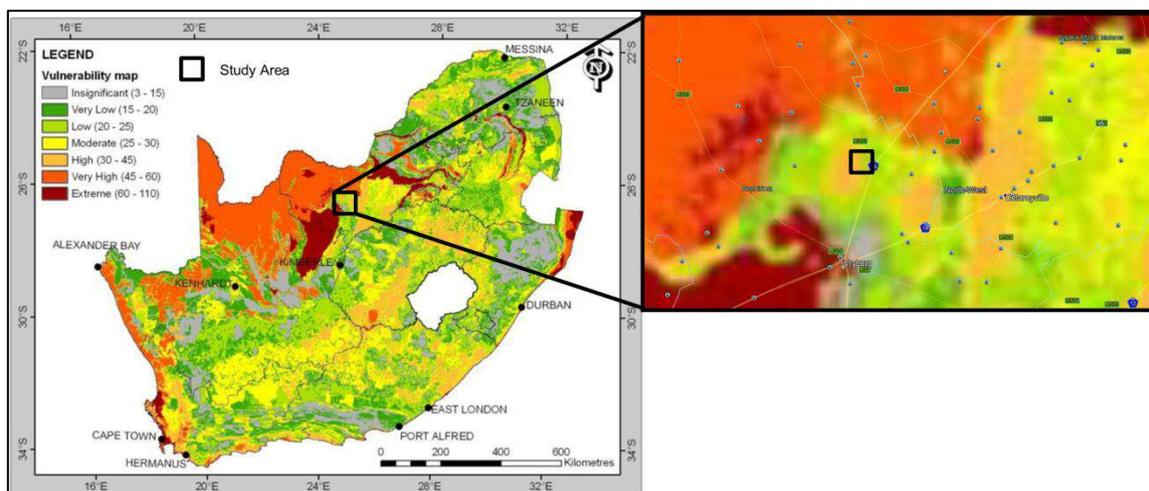


Figure 23: National Groundwater Vulnerability Map for South Africa.

6.2. Aquifer classification

The Ventersdorp Supergroup can be classified as an intergranular and fractured aquifer system. The volcanic and sedimentary rocks of the Ventersdorp Supergroup is generally characterised by very low porosities and hydraulic conductivities (**Van Dyk, 2011**). According to a report of **De Villiers (1961)**, the volcanic rocks, in the vicinity of Klerksdorp, weathers to a clay material with low permeability. In between the impermeable highly weathered zone and underlying solid rock, there is highly permeable transition zone of fractured and jointed volcanic rock (confined aquifer) that has the capability to produce significant quantities of groundwater. However, there are instances where these rocks, in depth, does not appear permeable, even when weathered or extensively fractured (**Burger, 2010**), acting as an aquiclude rather than an aquifer, restricting downward groundwater movement from shallower or overlying aquifers. In the instances where the sedimentary rocks and volcanic rocks occur simultaneously, the former seems to be a better aquifer for the development of groundwater resources due to the fact that the volcanic rocks did not weather deep enough (**De Villiers, 1961**).

The volcanic rocks of the Ventersdorp Supergroup are regarded as low yielding aquifer systems with the majority of borehole yields less than 2 l/s. Whereas, the sedimentary rocks the Ventersdorp Supergroup is regarded as low to moderate yielding aquifer systems with the majority of yields ranging between 0.5 to 2 l/s as well as greater than 2l/s. However, there are areas where boreholes with in the Ventersdorp Group have yields of up to 20 l/s (**Barnard, 2000; Baran, 2003; Van Wyk G., 2011**). The water level depth within the Ventersdorp Supergroup is relatively shallow and ranges between 5 and 40 mbgl (**Barnard, 2000; Baran, 2003; Van Wyk G., 2011**). According to **De Villiers (1961)** the felsic volcanic units of the Ventersdrop Supergroup have the lowest success rate (44 %) of drilling a successful borehole, whereas the mafic volcanic units and sedimentary rocks have drilling success rates of 56 % and 59 % respectively.

7. Geohydrological Impacts

7.1. Methodology

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood.

7.1.1. Determination of Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: Severity/Intensity, Duration and Extent/Spatial Scale. Each factor is assigned a rating of 1 to 5, as described in the tables below.

Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment (**Table 7**).

Table 7: Rating Criteria for the determination of severity of the impact.

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant / Harmful	Great / Very harmful	Disastrous / Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible	Low cost to mitigate	Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate / Little or no mechanism to mitigate impact / Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Medium change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place (**Table 8**).

Table 8: Rating criteria for determination of duration.

Rating	Description
1: Low	1 Month
2: Low-Medium	1 – 3 Months
3: Medium	More than 3 Months
4: Medium-High	5 – 10 Years
5: High	More than 10 Years

Determination of Extent/Spatial Scale

Extent refers to the spatial influence of an impact, be it contained to the immediate surroundings (site), extending to the surrounding area, regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders) (**Table 9**).

Table 9: Rating criteria for determination of duration.

Rating	Description
1: Low	Immediate, fully contained area (site)
2: Low-Medium	Surrounding Area
3: Medium	Regional
4: Medium-High	National
5: High	International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 3 (**Table 10**).

Table 10: Calculation of Overall Consequence.

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	Example 10
TOTAL CONSEQUENCE:(Subtotal divided by 3(Severity, Duration, Extent))	Example 3.3

7.1.2. Determination of Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5 (Tables 5 and 6).

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken (Table 11).

Table 11: Rating criteria for determination of frequency.

Rating	Description
1: Low	Once a year / once during construction
2: Low-Medium	Once / more in 6 Months
3: Medium	Once / more a Month
4: Medium-High	Once / more a Week
5: High	Daily

Determination of Probability

Probability refers to how often the activity/event or aspect has an impact on the environment (Table 12).

Table 12: Rating criteria for determination of probability.

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2 (Table 13).

Table 13: Calculation of Likelihood.

Likelihood	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	Example 6
TOTAL LIKELIHOOD (Subtotal divided by 2 (Frequency, Probability))	Example 3

7.1.3. Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH (**Table 14**).

Table 14: Rating criteria for impact significance.

Significance or Risk	Low	Low-Medium	Medium	Medium-High	High
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision-making process associated with this event, aspect or impact (**Table 15**).

Table 15: Rating criteria for impact.

Significance	Low	Low-Medium	Medium	Medium-High	High
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company	Impact is real and substantial in relation to other impacts. Pose a risk to the company and environment. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.

7.2. Impact Assessment for the Preferred Alternative

7.2.1. Groundwater Quantity

Groundwater quantity refers to the amount of available groundwater in the aquifer at any one time, which is available for abstraction or for monitoring purposes. Factors that influence groundwater quantity are rainfall, recharge, and other abstraction points in the area and aquifer composition.

1. Abstraction of Groundwater								
Impact	Loss of aquifer and groundwater resources.							
Description of Impact	Over abstraction of groundwater can lead to total dewatering and collapse of the aquifer.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Mitigation								
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	3	2	2.3	4	2	3	7
Mitigation	<ul style="list-style-type: none"> There are no plans to abstract groundwater for the planned activity. Pollution control through safe dewatering of monitoring boreholes. Pump test will be conducted to determine the optimal abstraction for pollution control. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	1	1	1.3	1	1	1	1.3
Cumulative Impacts	None for the area							
Additional Notes:	Keep in mind that no groundwater abstraction is planned for the oxidation dams, but may become an option when pollution control is considered.							

Groundwater Quality Summary						
Impacts	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Abstraction of Groundwater	NO IMPACT		7	1.3	7	1.3
Total:					7	1.3

Concerning the risk the new facility poses to the groundwater quantity, only the operational phase will have an impact. The impact is rated to be **LOW-MEDIUM (7)** before mitigation and **LOW (1.3)** after mitigation. It is recommended that if the facility is contaminating the groundwater system, that low yield dewatering be implemented, which will stop contamination from spreading further into the surrounding areas and will protect the aquifer for over abstraction. If it is decided that this method will be implemented in the future, it is recommended that an initial pump test be conducted to determine the yield of the aquifer.

7.2.2. Groundwater Quality

Groundwater quality refers to the quality of water within the aquifer and measured as standard against the SANS 2015 for drinking water unless otherwise specified. This environmental parameter is assessed by determining what contamination might come forth from the development as well as external factors that contribute to a deteriorating water quality.

1. Facility seepage into the aquifer								
Impact	Pollution of the aquifer through seeping of contaminated water from the facility.							
Description of Impact	If impermeable layers are not properly installed and the facility not maintained, large amounts of raw sewage may seep into the aquifer and contaminate the groundwater resource.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	3	1	2	2	2	2	4
Mitigation	<ul style="list-style-type: none"> Ensure that impermeable materials (ex. Clays) are used for the base during construction. Any hazardous substances must be stored correctly and spillages clean and disposed of immediately. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	3	1	1.7	2	1	1.5	2.5
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	4	4	2	3.3	5	4	4.5	15
Mitigation	<ul style="list-style-type: none"> Ensure the installation of impermeable layers. Constant maintenance on the facility. Monitoring for any leaks from the facility. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3	2	2	2.3	2	3	2.5	5.8
Cumulative Impacts	A major cumulative impact has already occurred for the old oxidation dams which were not maintained and will continue to seep contaminated water into the aquifer.							
Additional Notes:	It will be difficult to determine the impact on the quality of water and if the new facility seeps contaminated water into the groundwater resources. This is due to the proximity of the new oxidation dams to the old oxidation dams, which is also currently seeping contaminated water into the aquifer.							

This impact is rated to be of **LOW** impact during the constructional phase as only the hazardous substances used during the construction of the facility will come into play. The operational phase carries more risk as it will actively store and treat raw sewage, which poses a large risk to the groundwater quality if it ever enters the system. The operational phase thus carries a **MEDIUM-HIGH (15)** risk and if proper mitigation measures are implemented can be brought down to a score of **LOW-MEDIUM (5.8)**, which will have a low order impact and will realistically have little to no effect on the aquifer system.

Keep in mind that this is one of the major impacts of the new facility and constant monitoring will be required to keep the impact low. If contamination is detected within the aquifer and originates from the facility, immediate action will be required, which is usually associated with fixing the leak and abstraction of contaminated water for the aquifer.

2. Nitrate contamination of the aquifer.								
Impact	Contaminating the aquifer with high concentrations of nitrate.							
Description of Impact	The facility may develop a leak or mismanagement of the facility can lead to seepage of raw sewage and subsequently the enrichment of water with nitrates.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Mitigation								
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	4	4	3	3.7	5	4	4.5	16.5
Mitigation	<ul style="list-style-type: none"> • Early detection of any facility leaks. • Constant monitoring of borehole and chemical sampling. • Ensuring the liners of the oxidation ponds are in optimal condition. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	1	2	1.7	3	2	2.5	4.2
Cumulative Impacts								
Cumulative Impacts	The old oxidation dams are in a deteriorating state and were not properly maintained. Therefore it is assumed that a major part of the raw sewage seeped into the groundwater aquifer and is still seeping contaminated water into the aquifer.							
Additional Notes:								
Additional Notes:	Since the new proposed facility is adjacent the old oxidation dams, it would be safe to assume that water sampled near the new facility would should nitrate contamination, although no seepage occurs from the new facility. It is therefore proposed that the old oxidation dams be fully rehabilitated and pollution control measures be implemented.							

Nitrate pollution is only prominent during the operational phase when the oxidation dams are filled with raw sewage. Without proper maintenance of the facility as well as replacing liners constantly, contaminated water will enter the aquifer system through infiltration and enrich the groundwater with nitrates and faecal coliforms which can lead to E.coli being detected in the water. Therefore a **MEDIUM-HIGH (16.5)** score is given before mitigation and a score of **LOW (4.2)** after mitigation.

Keep in mind that such a low score and minimal aquifer contamination can only be achieved if constant maintenance and monitoring is implemented.

3. Addition to contamination								
Impact	The addition of other contaminants to the groundwater from the surrounding area that may affect the quality of the groundwater.							
Description of Impact	Other facilities or activities upstream and downstream may affect the quality of groundwater measure on site.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	4	4	3	3.7	5	5	5	18.3
Mitigation	<ul style="list-style-type: none"> Removing/rehabilitating the current informal garbage dump. Rehabilitating the old oxidation dams. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	3	2	2.3	3	3	3	7
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	4	4	3	3.7	5	5	5	18.3
Mitigation	<ul style="list-style-type: none"> Removing/rehabilitating the current informal garbage dump. Rehabilitating the old oxidation dams. Early leak detection through borehole monitoring. Noting any sewage spillages in the informal settlement and no free ranging animals near the facility (not the applicant's responsibility). 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	1	1	1.3	2	2	2	2.7
Cumulative Impacts	A cumulative impact is currently occurring with the old oxidation dams seeping raw sewage into the groundwater resource. Additionally the rural settlement as well as the informal dumping of waste around the old oxidation dams adds to the total contamination.							
Additional Notes:	Keep in mind that this assessment is done on external factors and the additional risk they pose to the development and its own risks.							

The impact of other factors on the aquifer in the area far outweighs the potential risk the new facilities possess to the Geohydrological system.

These include the old oxidation dams (still in use) and the garbage dump from the rural settlement 200 m North-East of the development. These two external factors have already significantly degraded the area. With the development of the new facility and taking its own risks into account, would only exaggerate the contamination of the aquifer.

These external factors will have to be remedied if the new development wishes to show that it is not actively polluting. Both the construction and operational phases show a **MEDIUM-HIGH (18.3)** score without mitigation and taking into account that the new facility also adds to the contamination of the area. With mitigation measures the constructional phase show a **LOW-MEDIUM (7)** score and the operational phase a score of **LOW (2.7)**. These score after mitigation have been applied can only be achieved if all the mitigation measures have been successfully carried out. This includes constant monitoring water quality to see if mitigation measures are improving the quality of groundwater.

4. Monitoring								
Impact	Lack of monitoring and further environmental degradation							
Description of Impact	If no monitoring of groundwater quality and upkeep of the facility occurs, contaminated water can seep into the groundwater resources and continue to worsen.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Mitigation								
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	4	5	3	4	4	5	4.5	18
Mitigation	<ul style="list-style-type: none"> • Chemical sample analysis every 3 months. • Drilling of one upstream borehole for background quality. • Drilling four shallow boreholes around the facility for immediate leak detection. • Drilling two boreholes downstream for plume delineation and tracking speed and concentration of pollution. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	2	2	2	2	2	2	4
Cumulative Impacts								
Cumulative Impacts	A cumulative impact has already occurred with the old oxidation dams, which were not monitored and thus it can't be said with any certainty how far the contamination has spread.							
Additional Notes:								
Additional Notes:	It is crucial that the old oxidation dams be rehabilitated, preferably before the commencement of the new facility in an effort to remediate any groundwater contamination caused by the old facility. Monitoring boreholes are strongly recommended for early leak detection and contamination plume delineation.							

Monitoring the new facility can only be implemented once the facility has been constructed thus no impact will be scored during the constructional phase. The operational phase carries large environmental risk concerning monitoring of water quality. This is very evident in the old oxidation dams where no monitoring or maintenance occurred and is currently contaminating the aquifer. It is crucial that monitoring boreholes be drilled and samples analysed for any contamination. The impact is thus rated at a score of **MEDIUM-HIGH (18)** before mitigation (no monitoring boreholes) and a score of **LOW (4)** if all mitigation measures are implemented.

Groundwater Quality						
Impacts	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Facility seepage into the aquifer	4	2.5	15	5.8	9.5	4.2
2. Nitrate contamination of the aquifer.	NO IMPACT	NO IMPACT	16.5	4.2	16.5	4.2
3. Addition to contamination	18.3	7	18.3	2.7	18.3	4.8
4. Monitoring	NO IMPACT	NO IMPACT	18	4	18	4
Total:					15.6	4.3

Assessing groundwater quality as a whole, it scores an average of **MEDIUM-HIGH (15.6)** before mitigation and an average score of **LOW (4.3)** after mitigation. Improving and maintaining groundwater quality will be the most important environmental parameter facing the new facility, due to the nature of the facility handling raw sewage and previous external factors (old oxidation dams and garbage dumps) that already contaminated the aquifer.

7.2.3. Climate and Runoff

This impact refers to all aspects of the climate (temperature, evaporation, rainfall etc.) and the resulting total runoff. All the factors influence the condition of the Geohydrological system, specifically referring to quality and quantity of water of the aquifer.

1. Rainfall								
Impact	High rainfall events							
Description of Impact	High rainfall events can either flood the current oxidation holding dams or cause excessive runoff of contaminated water causing land pollution and infiltration into the aquifer.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
Mitigation	NO IMPACT							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3	2	3	2.7	1	2	1.5	4
Mitigation	<ul style="list-style-type: none"> Ensure that the oxidation ponds can handle a 1:50 rainfall event and the extra addition of water. Berms should be placed around the facility to stop any surface runoff from leaving or entering the site. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	1	1	1.3	1	2	1.5	2
Cumulative Impacts								
Cumulative Impacts	No cumulative impacts							
Additional Notes:								
Additional Notes:	It is not foreseen that a high rainfall (1 in 50 years) will have a significant impact on the activity.							

Rainfall as a risk will have no significant impact during the constructional phase and not rated. Rainfall however will have a small impact during the operational phase, referring to 1:50 year floods. The concern is that a significant flood event can possibly cause the oxidation dams to overflow and contaminate the surrounding surface area which will infiltrate into the aquifer. The impact is rate as **LOW (2 – 4)** for both the constructional and operational phases as it is assumed that this impact will be catered for during the facility designs. Also, the impact of rainfall is low due to the low frequency and probability that a large rainfall event will occur.

2. Recharge								
Impact	Excessive recharge from rainfall or unwanted artificial recharge from the facility.							
Description of Impact	If the facility isn't lined properly or unsuitable materials are used during the construction phase excessive infiltration of contaminated water may occur which may raise water levels and increase the speed at which pollution occurs.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	2	1	1.7	3	3	3	5
Mitigation	<ul style="list-style-type: none"> • During construction no pits can be left open for extended periods of time. • Any accumulation of water on the surface must be removed as soon as possible. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	2	1	1.3	2	2	2	2.7
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	2	2	2	3	3	3	6
Mitigation	<ul style="list-style-type: none"> • No ponding of water on-site or as a result of the facility may occur. • Accidental leaks from the facility must be immediately rectified. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	2	1	1.3	2	2	2	2.7
Cumulative Impacts	A small cumulative impact of unwanted artificial recharge has already occurred as a result of the old oxidation dams that were not maintained.							
Additional Notes:	This impact can only be applied on very small scale (immediate area surrounding the facility) were water levels will rise. No adverse effects are expected for clean uncontaminated water. However the groundwater is already contaminated (old oxidation dams) and there is potential for the new facility to pollute, will increase the speed at which the aquifer is contaminated.							

Recharge refers to the percentage water from rainfall entering the aquifer system through infiltration, but due to the construction phase and the nature of the facility, artificial recharge can also occur. In this case recharge can be caused in the constructional phase if excavations are left open during rainy seasons. During the operational phase large leaks in the oxidation ponds can lead to an influx of contaminated water which will raise the water level in that specific area.

Besides the contaminated nature of the recharge water to the aquifer, no adverse effects can be foreseen from rainfall or artificial recharge. The impact is rated to be **MEDIUM-LOW (5 -6)** before mitigation and **LOW (2.7)** after mitigation for both the constructional and operational phases.

3. Topography								
Impact	Current and changes made to gradient.							
Description of Impact	Changes made to the topography can either increase or decrease infiltration of surface water (ponds or rainfall) to the groundwater table.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3	3	2	2.7	2	4	3	8
Mitigation	<ul style="list-style-type: none"> Excavations have to be filled as soon as possible to mitigate the formation of ponds during the rainy seasons. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	1	1	1.3	1	2	1.5	2
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3	3	2	2.7	2	3	2.5	6.7
Mitigation	<ul style="list-style-type: none"> Any changes to the gradient must be done in such a manner as not to negatively affect runoff. All excavations must be filled and levelled. All open trenches or ponds must be lined. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	1	1	1.3	1	1	1	1.3
Cumulative Impacts	No cumulative impact							
Additional Notes:	Any excavation or infrastructure needs to be incorporate with the topography of the area.							

The risk the new facility poses to the topography without mitigation measures are **LOW-MEDIUM (8 – 6.7)** for both the constructional and operational phases. With mitigation measures applied the risk scores a **LOW (2 -1.3)** value, which will have nearly no effect on the environment. The main risks which can negatively affect the environment are linked to open trenches and major construction which requires large excavations.

Runoff/Climate						
Impacts	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Rainfall	NO IMPACT	NO IMPACT	4	2	4	2
2. Recharge	5	2.7	6	2.7	5.5	2.7
3. Topography	8	2	6.7	1.3	7.3	1.7
Total:					5.6	2.1

In conclusion the runoff and climatic factors rate an overall **LOW-MEDIUM (5.6)** score before mitigation and **LOW (2.1)** after mitigation measures have been applied. This impact will have little to no impact on the Geohydrological environment, with the main exception being open excavations which will affect rainfall causing ponding, recharge will be faster and topography will change depending on the scale of construction works

7.2.4. Geology and other factors

Geological risk refers to the composition of the main geology present on site, as well as the geological unit's physical properties (erosion, fractures etc.) in relation to the aquifer. Other factors refer to past or current risks associated with the site that are currently affecting the area.

1. Geology								
Impact	Altering the geology physically or chemically.							
Description of Impact	If the site geology (Ventersdorp Lavas) outcrops or is close to the surface construction activities can remove large amounts and may cause additional fractures within the rock. This in turns may create preferred pathways for contaminated water or runoff. Exposure of "fresh" geology to contaminated/ clean water may increase the erosion process with in turn may alter the shallow aquifer properties.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3	3	2	2.7	3	2	2.5	6.7
Mitigation	<ul style="list-style-type: none"> Keep excavation to a minimum and within designated area as per facility design. Preferably no blasting of the rock. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	2	1	1.7	2	1	1.5	2.5
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3	3	2	2.7	1	2	1.5	4
Mitigation	<ul style="list-style-type: none"> Additional expansion or trenches must be kept to certain depth and not excavated within the Ventersdorp Lavas. Any leaks from the facility must be rectified immediately to prevent chemical erosion of the host geology. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	1	1	1	1	1	1	1
Cumulative Impacts	No cumulative impact							
Additional Notes:	It is highly probable that Ventersdorp lava outcrops will be encountered during the construction phase. The removal of this hard rock will be acceptable as long as no blasting or the creation of new fractures occur.							

The main dominant geology is classified as Ventersdorp Lavas which carries a low environmental risk. The constructional phase carries a **LOW – MEDIUM (6.7)** risk for chemical erosion and the creation of new fractures if heavy constructional activities are implemented. The operational phase carries a lower risk with both scores before and after mitigation carrying a **LOW (2.5 – 1)** risk.

2. Current Area								
Impact	Assessment of current environmental conditions.							
Description of Impact	<p>This impact is based on current environmental conditions which may negatively affect the geohydrological environment and the overall risk it poses to the development of the new facility. These factors are as follows:</p> <ul style="list-style-type: none"> The badly deteriorated old oxidation dams. The informal garbage dump around the old oxidation dams. The rural settlement situated 200 m North-East of the old oxidation dams. 							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	4	3	3	3.3	5	5	5	16.7
Mitigation	<ul style="list-style-type: none"> Rehabilitation of the garbage dumps and cleanup of the area. Install signs that no illegal dumping is allowed in this area. An action plan to rehabilitate the old existing oxidation dams. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	3	1	1.7	4	4	4	6.7
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	5	5	3	4.3	5	4	4.5	19.5
Mitigation	<ul style="list-style-type: none"> During the operational phase the old oxidation dams should be rehabilitated. Active cleanup of the site should be implemented as the rural settlement will continue to dump garbage in that surrounding area. Constant groundwater sample should be taken at regular intervals to ensure that the aquifer quality improves and that the new facility doesn't add contaminates to the already deteriorated area. 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2	3	2	2.3	2	3	2.5	5.8
Cumulative Impacts	A major cumulative impact has already affected the geohydrological environment for the new proposed oxidation dam facility. These include the constant aquifer contamination by the old oxidation dams which are still being utilized. To further add negative environmental impacts to the aquifer, the illegal dumping of garbage around the old oxidation dams as well as the proximity of the rural settlement, all contribute to low water qualities for the aquifer.							
Additional Notes:	It comes highly recommended that rehabilitation of the area takes place and addressing the environmental issues raised above, before commencement of the construction phase.							

Due to the old oxidation dams that were not maintained, the informal garbage dump that was established around the old oxidation dams and the proximity of the rural settlement, the area can be classified as being already environmentally deteriorated. This rating will affect the new facility when assessing the Geohydrological environment as the activities proposed by the new development will only add to the environmental risk. It is therefore highly recommended that the area be rehabilitated to effectively determine if the new facility is contributing to the contamination of the aquifer or as a result of previous activities.

Due to the past activities affecting the new facility they carry a very large risk and both the constructional and operational phases have a **MEDIUM-HIGH (16.7 – 19.5)** risk before mitigation. Both phases carry a **LOW-MEDIUM (6.7 – 5.8)** risk after mitigation (rehabilitation) has occurred.

Geology and other factors						
Impacts	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Geology	6.7	2.5	4	1	5.3	1.8
2. Current Area	16.7	6.7	19.5	5.8	18.1	6.8
Total:					11.7	4

In conclusion the Geology carries low risk and impacts will not have a significant impact on the environment. Previous activities however have significantly degraded the Geohydrological environmental and carry a large risk in conjunction with the new development. In total this environmental parameter carries a **MEDIUM (11.7)** risk before mitigation and a **LOW (4)** risk if mitigation measures are applied.

7.2.5. Risk Assessment and conclusions

The Total Combined Impacts refer to all the environmental parameters concerning the Geohydrological environment before and after mitigation to assess the overall impact the development will have on the environment.

Total Combined Impacts		
Factors	Impact Before Mitigation	Impact After Mitigation
1. Groundwater Quantity	7	1.3
2. Groundwater Quality	15.6	4.3
3. Climate and Runoff	5.6	2.1
4. Geology and other factors	11.7	4
Overall Impact	10	3

In total the whole area and its Geohydrological environment is rated to be of **MEDIUM (10)** risk before mitigation, as previous activities have detrimentally affected the current condition of the environment. The major environmental parameters that are affected are the Groundwater Quality and Other Factors. However, these past risks can be rehabilitated with a high success rate which rates the environment after mitigation at a **LOW (3)** risk. This will mainly involve the rehabilitation of the old oxidation dams, clean-up of the garbage dump around the old oxidation dam and either dilution with clean water or low yield dewatering of the aquifer in an effort to clean the groundwater from excess contaminates.

8. Conclusion and Recommendations

Concerning the surface area of the new development (Alternative 1), the area is relatively flat with an average slope of between 0.4% - 0.6%. The climate is classified as an arid, hot climate zone characterised by little rainfall and high evaporation. This leads to the conclusion that minimal recharge (5%) from rainfall will occur as evaporation will remove excess surface water as well as lower runoff volumes. In conclusion the topography and climate will have little to no effect on the Geohydrological environment during the construction and operational phases of the new facility.

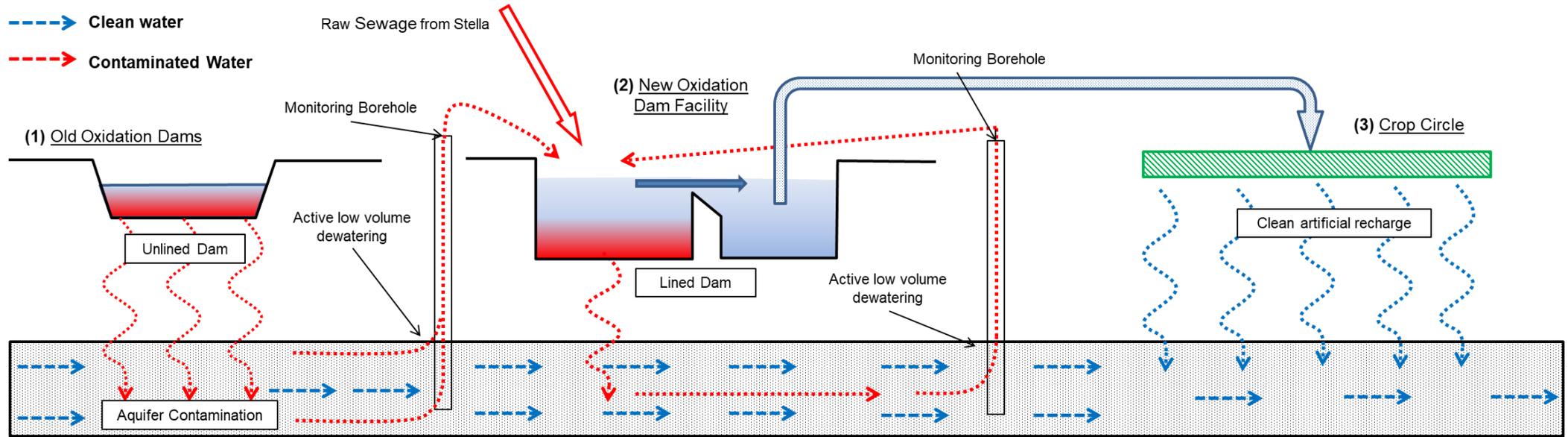
The hydro-census conducted in 2018 by J.W Huamann revealed that the average minimum and maximum water level heights are between 7 – 17 mbgl. It also revealed that a medium amount of nitrate contamination over a large scale area has already occurred and is partly due to the old oxidation dams which were not maintained as well as the informal garbage dump around these dams. It was also noted that no monitoring boreholes are present at the alternative 1 location. These factors thus carry a medium risk due to a shallow water table which can easily be contaminated by infiltrating water, already nitrate contaminated aquifer and lack of any groundwater monitoring system. It is thus recommended that new monitoring boreholes be drilled around the new proposed facility during the constructional phase to gauge the current water quality in the area as well as to monitor future water quality. The location, depth and purpose of the proposed monitoring boreholes are discussed in detail in Chapter 4.3.

The investigation and site visit indicated that the area is underlain by Ventersdorp Lavas which occasionally outcrop in certain areas of the proposed site. According to the Groundwater Vulnerability map of South Africa the aquifer in the area is rated to be a LOW-MEDIUM risk aquifer with a fractured intergranular system. The magnetic geophysics conducted on site, revealed that the roof of the Ventersdrop Lavas are undulating, causing certain peaks to outcrop, as a result of movement force along the greenstone mobile belt which deformed later intrusive geology. A fault was located within the Ventersdorp Lavas on Traverse 2 and it is recommended that no activities occur there as these faults act as preferential pathways for water and potentially any contaminants. As it currently stands the new facility will not be built on the fault. In conclusion the geology holds a LOW risk for the Geohydrological environment.

According to the Impact Assessment the major factors affecting the risk to the Geohydrological Environment is the Groundwater Quality and Past/Current parameters. The impacts are rated to be MEDIUM-HIGH as a direct result of the old oxidation dams which are currently contaminating the aquifer below. It is recommended that the adjacent area next to the new proposed area be fully rehabilitated. This will be done to distinguish between the contamination from the old oxidation dams and the new facility. If the adjacent area is felt as is there will be no way to determine which facility is causing the majority of nitrate contamination emanating for the aquifer. **Figure 24** illustrates the best solution to cleaning the aquifer while still protecting the resource using minimal resources and infrastructure that is already available.

In conclusion the area is already degraded and would hold a MEDIUM risk to the environment as it currently stands due to past and current activities that contaminate the aquifer. If proper mitigation measures are applied as discussed in the impact assessment the new development will hold a LOW risk to the Geohydrological environment. No major future risks can be foreseen if constant monitoring and maintenance is conducted.

System Process



Water Quality and Quantity

(1) Water Quality



(2) Water Quantity

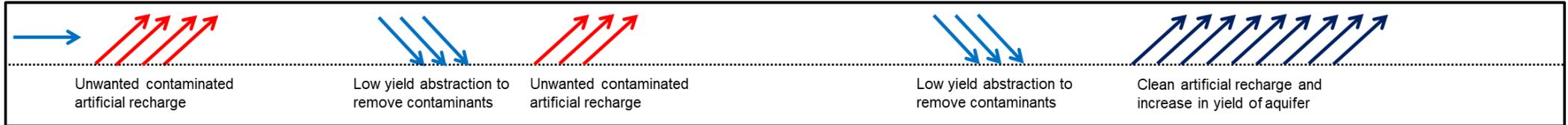


Figure 24: Diagram illustrating a possible mitigation measure for improving water quality within the aquifer.

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Appendix E: Public Participation Report







STELLA BULK SEWER AND INTERNAL RETICULATION

ENVIRONMENTAL
MANAGEMENT
GROUP

PUBLIC
PARTICIPATION
REPORT

Contents

1. INTRODUCTION.....	3
2. APPROACH AND METHODOLOGY	3
3. PUBLIC PARTICIPATION PROCESS CONDUCTED	3
3.1. NEWSPAPER ADVERTISEMENT	5
3.2. SITE NOTICES.....	3
3.2.1 The poster was placed in surrounding area.	6
3.3. DISTRIBUTION OF BACKGROUND INFORMATION DOCUMENT	11
BASELINE ENVIRONMENT	25
POTENTIAL ENVIRONMENTAL IMPACTS.....	26
ENVIRONMENTAL AUTHORISATION AND WULA PROCESS.....	28
3.4 NOTIFICATION TO LOCAL AUTHORITY	29
3.4.1 Notification was sent to Department of Agriculture and Rural Development.....	29
3.4.2 Notification was sent to Department of Agriculture Forestry and Fisheries	30
3.4.3 Department of Water and Sanitation	31
3.4.4 Executive Mayor of Mangaung Metro Municipality	32
3.3.5 Department of Public Works and Infrastructure	33
3.4.6 Department of Heritage.....	34
3.4.7 Mangaung Metro Municipality	35
3.4.8 Ward Councillor 2 Naledi Local Municipality	36
3.5 LIST OF I&AP's	37
3.6 COMMENTS RECEIVED & RESPONSE	39
4. CONCLUSION	40

ABBREVIATIONS

BID	Background Information Document
DWS	Department of Water and Sanitation
RI&APS	Registered Interested & Affected Parties
I&APS	Interested & Affected Parties
PPP	Public Participation Process

1. INTRODUCTION

The Public Participation Process (PPP) forms an integral part of the rectification application process. It provides people with the opportunity to raise their issues and concerns about the proposed Waste Water Treatment works in Stella. A comprehensive public participation process was conducted by EMG Consultants, to ensure that all identified Interested and Affected Parties (I&APs) were informed of the proposed project and their input is able to influence decision-making process with regards to the development.

2. APPROACH AND METHODOLOGY

The Public Participation Process was conducted as per Regulation 39, 40, 41, 42, 43 & 44 of the Environmental Impact Assessment Regulations 2014 (as amended 07 April 2017) and the Public Participation Guidelines, 2017 were considered. Steps, which were taken to inform the identified I&APs and surrounding community of the proposed development included:

- ♣ Newspaper advertisement;
- ♣ On site Notice and Posters;
- ♣ Notifications, i.e. Distribution of Background Information Document (BID) to neighbouring property Owners & Stakeholders.

3. PUBLIC PARTICIPATION PROCESS CONDUCTED

The methods that were undertaken during conducting of the public participation process as discussed in detail below.

3.1. NEWSPAPER ADVERTISEMENT

The project was advertised in a local newspaper, Kalahari Bulletin on the 23rd of July 2020 to inform the I&APs of the Application for Environmental Impact Assessment, Integrated Water Use Licencing for the proposed Stella Waste Water Treatment Works.

NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT, INTEGRATED WATER USE LICENSING

Notice is hereby given in terms of regulation 41 of Government Notice No. R328 under the National Environmental Management Act (Act 107 of 1998) as amended 7 April 2017, National Environmental Management: Waste Act, 2008 (Act 59 of 2008), National Heritage Resources Act (ACT 25 OF 1999) as well as in terms of the National Water Act (Act 36 of 1998) Section 21 of intent to carry out the following project:

UPGRADING OF STELLA WASTE WATER TREATMENT WORKS

NEMA: Listing Notice 1 (NO. 327, 07 APRIL 2017) –

- 25 The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.
- 27 The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation is required for—
- (i) the undertaking of a linear activity; or
 - (ii) maintenance purposes undertaken in accordance with a maintenance management plan.

NEMWA: Listed as Category A

Activity No.1: The storage of general waste in lagoons

Activity No. 6: The treatment of general waste using any form of treatment at a facility that has the capacity to process in excess of 10 tons but less than 100 tons.

NWA: Section 21 (ACT NO. 36 of 1998) as amended

- (B) Storing water
- (F) Discharging waste water into a water resource, pipe, canal, sewer
- (G) Disposing of waste in a manner which may detrimentally impact a water source

LOCATION: Stella, situated on portion 3 of farm Zoutpans Fontein 546, Naledi Local Municipality

PROPONENT: Dr Ruth Mompoti District Municipality

CONSULTANT: ENVIRONMENTAL MANAGEMENT GROUP
PO BOX 37473
LANGENHOVEN PARK, 9330
TEL: 051 412 8350
CELL: 083 222 9864
EMAIL: ckruger@envmgrp.com

In order to ensure that you are identified as an interested and/or affected party, please submit your name, contact information and interest in the matter to the consultant given above within 30 days of publication of this notice.

NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT, INTEGRATED WATER USE LICENSING

Notice is hereby given in terms of regulation 41 of Government Notice No. 8125 under the National Environmental Management Act (Act 107 of 1998) as amended 7 April 2017, National Environmental Management: Waste Act, 2008 (Act 59 of 2008), National Heritage Resources Act (Act 25 of 1999) as well as in terms of the National Water Act (Act 36 of 1998) Section 21 of intent to carry out the following project:
UPGRADING OF STELLA WASTE WATER TREATMENT WORKS

NEMA: Listing Notice 1 (NO. 127, OF APRIL 2017) – 25

The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.

27 The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation is required for—

- (i) the undertaking of a linear activity; or
- (ii) maintenance purposes undertaken in accordance with a maintenance management plan.

NEMWA: Listed as Category A

Activity No. 1: The storage of general waste in lagoons.

Activity No. 6: The treatment of general waste using any form of treatment at a facility that has the capacity to process in excess of 10 tons but less than 100 tons.

NWA: Section 21 (ACT NO. 36 of 1998) as amended

- (B) Storing water
- (F) Discharging waste water into a water resource, pipe, canal, sewer
- (G) Disposing of waste in a manner which may detrimentally impact a water source

LOCATION: Stella, situated on portion 3 of farms Zoutpans Fontein 546, Naledi Local Municipality

PROponent: Dr Ruth Mosepati District Municipality

CONSULTANT: ENVIRONMENTAL MANAGEMENT GROUP

PO BOX 37475
LANGENHUVEN PARK, 8530
TEL: 051 412 6350
CELL: 083 222 9864
EMAIL:
cknape@wemmgp.com

3.2. SITE NOTICES

Five site notices were placed on the 21st of July 2020, to bring the proposed Waste Water Treatment Works to the attention of I&APs including surrounding land users.

NOTICE OF APPLICATION FOR ENVIRONMENTAL IMPACT ASSESSMENT, INTEGRATED WATER USE LICENSING

Notice is hereby given in terms of regulation 41 of Government Notice No. R326 under the National Environmental Management Act (Act 107 of 1998) as amended 7 April 2017, National Environmental Management: Waste Act, 2008 (Act 59 of 2008), National Heritage Resources Act (ACT 25 OF 1999) as well as in terms of the National Water Act (Act 36 of 1998) Section 21 of intent to carry out the following project:

UPGRADING OF STELLA WASTE WATER TREATMENT WORKS

NEMA: Listing Notice 1: (GN R 327, 7 April 2017)

R327	25	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.
R327	27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation is required for— (I) the undertaking of a linear activity; or (II) maintenance purposes undertaken in accordance with a maintenance management plan.

NEMWA: Listed as Category A

Activity No.1: The storage of general waste in lagoons

Activity No.6: The treatment of general waste using any form of treatment at a facility that has the capacity to process in excess of 10 tons but less than 100 tons.

NWA: Section 21 (ACT NO. 36 of 1998) as amended

(B) Storing water

(F) Discharging waste water into a water resource, pipe, canal, sewer

(G) Disposing of waste in a manner which may detrimentally impact a water source

LOCATION: Stella, situated on portion 3 of farm Zoutpans Fontein 546, Naledi Local Municipality

PROponent: Dr Ruth Mompoti District Municipality

CONSULTANT: ENVIRONMENTAL MANAGEMENT GROUP
PO BOX 37473
LANGENHOVEN PARK, 9330
TEL: 051 412 6350
CELL: 083 222 9864
EMAIL: ekrugen@envmgrp.com



In order to ensure that you are identified as an interested and/or affected party, please submit your name, contact information and interest in the matter to the consultant given above within 30 days of publication of this notice.







3.3. DISTRIBUTION OF BACKGROUND INFORMATION DOCUMENT

For notification of I&APs about the proposed project, a BID, shown below was compiled, and it was sent to the identified I&APs.



STELLA BULK SEWER AND INTERNAL RETICULATION

ENVIRONMENT
MANAGEMENT GROUP
STELLA BULK SEWER AND INTERNAL
RETICULATION

CHRISTIEN KRUGER
BACKGROUND INFORMATION
DOCUMENT

STELLA BULK SEWER AND INTERNAL RETICULATION

Background Information Document for the Waste Water Treatment Works

February 2021

INTRODUCTION

Nep Consulting Engineers appointed Environmental Management Group as the Professional Service Providers to apply for all applicable Environmental Applications.

LOCALITY

The proposed development is situated near Stella in the North West Province, Naledi Local Municipality, Dr Ruth Segomotsi Mompati is the District Municipality, on portion 3 of the farm Zoutpans Fontein 546.

ENVIRONMENTAL AUTHORISATION

Prior to the commencement of the proposed project environmental authorisation in terms of the National Environmental Management Act (NEMA), 107 of 1998 from the Department of Economic Development, Environment Conservation and Tourism (DEDECT) as the competent authority.

The environmental assessment process will be conducted in terms of the EIA Regulations of 2014 NEMA, as amended. The environmental assessment includes an application phase, basic assessment phase with DEDECT as the competent authorities.

In addition to this, the proposed project will also require authorisation in terms of the National Water Act (NWA), 36 of 1998, with the Department of Water and Sanitation as the competent authority.

The following activities are applicable to this project:

NWA: Section 21 (ACT NO. 36 of 1998) as amended

(b): storing water;

(f): discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;

(g): disposing of waste in a manner which may detrimentally impact on a water resource;

PURPOSE OF THIS DOCUMENT

EMG has prepared this document to inform you about:

- ♣ The proposed project
- ♣ The current understanding of the baseline environmental and social conditions
- ♣ The required environmental assessment processes
- ♣ Possible environmental impacts and proposed specialist studies
- ♣ How you can have input into the Environmental Authorization
- ♣ Impact Assessment and Basic Assessment processes

YOU'RE ROLE

You have been identified as an interested and/or affected party (I&AP) who may want to be informed about the proposed project and have input into the environmental assessment processes and environmental reports.

You have an opportunity to review this document and provide your initial comments to us for incorporation in the environmental assessment process. You will also be given the opportunity to provide input at the public meeting, if the need arises. And to review and comment on some reports:

- ♣ Draft BAR

Comments will be recorded and included in the reports submitted to the relevant authorities for decision-making.

HOW TO RESPOND

If you are interested in receiving further information on the project please register your details with the persons listed below. Responses to this document can be submitted by means of the attached comments sheet and/or through communication with the persons listed below.

Christien Kruger

Tel: 051 412 6350 or E-mail:

ckruger@envmgrp.com

**STELLA WASTE WATER TREATMENT WORKS
PUBLIC PARTICIPATION REPORT**

PROCESS STEPS (in accordance with GN R326)	RESPONSIBLE PARTY	TIMEFRAME
Initial communication to clarify the application with the Authorising Department	EAP	1 day
EAP to conduct a site visit	EAP	1 day
EAP to submit Application for Environmental Authorisation to competent authority		1 day
Competent authority accepts Application	DEDECT	14 days
EAP to compile a Basic Assessment Report subjected to 30 days Public Participation Process	EAP	90 days
EAP to submit Final Basic Assessment report inclusive of comments to competent authority	EAP	1 day
Competent authority to grant or decline approval for Environmental Authorisation	DEDECT	107 days
Environmental Authorisation subject to 20-day appeal process	EAP	20 days
Final approval of Environmental Authorisation	DEDECT	1 day

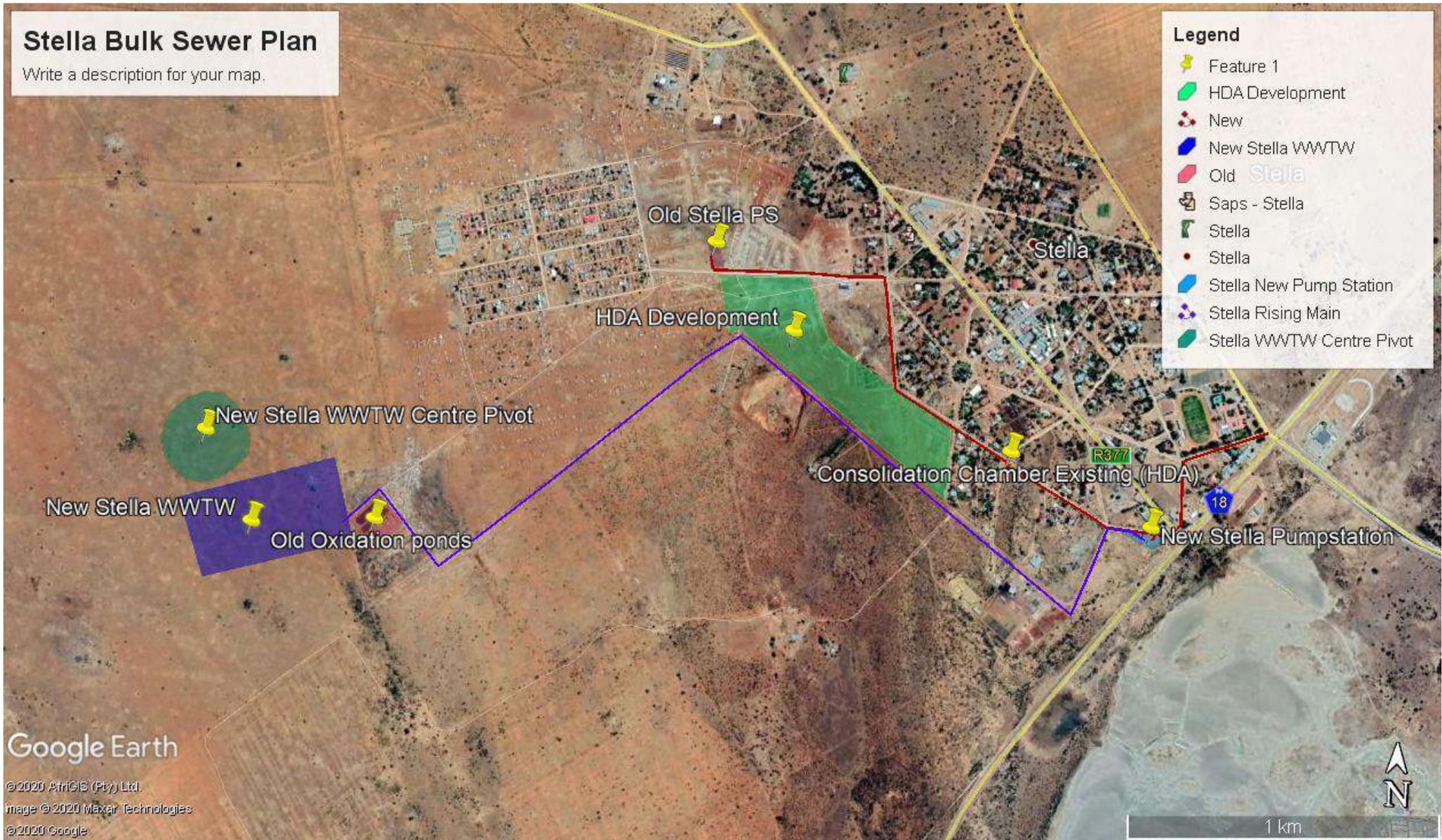
PROCESS STEPS	RESPONSIBLE PARTY	TIMEFRAME (Cumulative)
1. Application submitted	EAP	1 day
2. Responsible authority acknowledges receipt of the application	DWS	11 days
3. Applicant confirms arrangements for site inspection with an allocated case officer	EAP	16 days
4. Site inspection to confirm water uses, determine information requirements and the need for public participation.	DWS	36 days
5. Confirm requirements for water use licence application technical report based on site visit meeting	DWS	41 days
6. Compilation, consultation and submission of water use license application technical report by applicant	EAP	146 days
7. Reject / Accept water use licence application technical report	DWS	156 days
8. Assessment	DWS	295 days
9. Decision and communication to applicant	DWS	300 days

Stella Bulk Sewer Plan

Write a description for your map.

Legend

- Feature 1
- HDA Development
- New
- New Stella WWTW
- Old Stella
- Saps - Stella
- Stella
- Stella
- Stella New Pump Station
- Stella Rising Main
- Stella WWTW Centre Pivot



Google Earth

©2020 ArcGIS (Pty) Ltd.
Image ©2020 Maxar Technologies
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PROJECT DESCRIPTION

Dr Ruth S Mompoti District Municipality is proposing to Develop a Bulk sewer system in Stella located in the North West Province. The site of work is located \pm 50km North East of Vryburg which is within the jurisdiction of the Dr Ruth S Mompoti District Municipality.

The proposed entails a development of Stella bulk sewer system and upgrade of the old dams. The development will include a phase B for the entire internal sewer for Stella. This will improve the health and hygiene of the whole Stella community. The development of Stella Bulk Sewer system will be divided into the following 3 portions:

- ♣ Outfall sewer pipelines and sewer pump pipelines
- ♣ Wastewater Pump station
- ♣ Wastewater treatment works

The pipeline lengths to be utilized entails:

- ♣ Rising Main - 200 \emptyset mm – 3 170m
- ♣ Outfall sewer - 250 \emptyset mm – 1 488m
- ♣ Outfall sewer - 315 \emptyset mm – 552m
- ♣ Manholes – 36

The development of the waste water Pump station will entail:

- ♣ Pre-treatment – Mechanical Grinder
- ♣ Emergency by-pass hand screen
- ♣ Concrete Sump – Surface Area – 48m² – Volume – 181m³
- ♣ Emergency Concrete Sump - Surface Area – 65m² – Volume – 165m³
- ♣ 3 X Self priming pumps
- ♣ Standby Generator
- ♣ Brick Pump station.

The Unit Process at the WWTW will entail:

- ♣ Anaerobic Pond
- ♣ Anaerobic Pond
- ♣ Volume – +- 400m³
- ♣ HDPE Lined earth dam
- ♣ Aeration Basin
 - ♣ Surface area – 1560 m²
 - ♣ Volume – +- 6240m³
 - ♣ HDPE Lined earth dam
- ♣ Clarifier
 - ♣ Surface area – 196 m²
 - ♣ Volume – +- 686m³
 - ♣ HDPE Lined earth dam
- ♣ Maturation / Evaporation ponds
 - ♣ 6 Ponds
 - ♣ Surface area – 5642 m²
 - ♣ Volume – +- 9590m³
 - ♣ HDPE Lined earth dam
- ♣ Sludge Drying Beds
 - ♣ 4 Drying beds
 - ♣ Surface area – 1971 m²
 - ♣ Volume – +- 887m³
 - ♣ Concrete Structure
- ♣ Final water to be irrigated

The proposed WWTW includes an activated sludge process which will be able to produce a final effluent to comply with General Effluent Standard requirements

The Activated Sludge process will allow for the screening and the de-gritting of the raw sewage, before it is discharged to be treated. The screening consists of one mechanical screen, in a duty configuration. The removed screenings will discharge into a screw press for watering/compaction. The de-gritting consists of one mechanical de-gritting channel, in a duty configuration. The settled grit will be conveyed to be discharged together with the dewatering/ compaction screenings.

The Activated Sludge process will lead to the secondary treatment process which is a typical biological nutrient removal process. The Biological process:

- ♣ The WWTW will consist of an Aerobic pond. The pond provides for aerobic zones, with floating fine bubble aeration equipment.
- ♣ The pond will be earthen basins, with high quality HDPE sheet lining.
- ♣ The Waste activated sludge withdrawal will be executed and controlled from the return activated sludge delivery rising main.
- ♣ Process temperature simulation;= 12 to 22 °C
- ♣ General COD inflow concentration;= 864 mg/l
- ♣ General TKN inflow concentration;= 63 mg/l
- ♣ General Tot P inflow concentration;= 14 mg/l
- ♣ General suspended inflow concentration;= 440 mg/l
- ♣ General sludge age;= 18 – 20 days
- ♣ Mixed Liquor Suspended Solids (MLSS) operating concentration;= 4000 mg/l Secondary Settling;
- ♣ The construction will be combinedly HDPE lined, concrete and HDPE baffle walls to ensure, efficient side wall slopes for gravity settlement. The settled sludge will be collected at the bottom with multiple collection hoppers, connected with the suction end of the return activated sludge pump set.
- ♣ Average design flow;= 1,5 Ml/day
- ♣ Maximum design flow;= 2,7 Ml/day
- ♣ Overflow loading at PDWF;= 200 kl/m.day
- ♣ Retention period at PDWF;= 1.5 h
- ♣ Up flow velocity at PDWF;= 1 m/h

The only sludge produced from the treatment process will be the daily waste activated sludge (WAS) from the secondary treatment process. The WAS will be wasted to the sludge drying beds, via the WAS control bypassing from the RAS pumps discharge pipe line. The sludge drying beds will provide adequate draining via the sand bed and sub-soil drain system, and also solar drying capacity through sufficient surface area exposure. The dried sludge will have to be removed manually and transported to adequate disposal facilities/landfill site. The filtrate (or supernatant) will join the final effluent for irrigation purposes.

BASELINE ENVIRONMENT

This section provides a basic description of the existing status of the environment. Please let us know of any additional information that would assist with the understanding of the baseline environment.

Geology:

The local geology of the study area, represented in 1:250 000 scale, is represented in map below. This study area is surrounded by basaltic amygdaloidal lava, agglomerate and tuff of the Allanridge Formation (Ra) that forms part of the Ventersdorp Supergroup. The investigated site is predominantly underlain by quartzite and tuffaceous sediments of the Platberg Group's Rietgat Formation (Rr) also forming part of the Ventersdorp Supergroup Stella's western boundary comprises of mafic metavolcanic rocks, banded ironstone formation (BIF) with phyllitic, chloritic and calcareous schists and clastic sediments of the Gold Ridge Formation (Zgr) that forms the basal Kraaipan Group. Tertiary calcrete (T-Qc) bounds Stella to the east. Calcrete is a secondary mineral that forms when calcium rich water evaporates and when calcareous rocks weathers.

The western boundary of Stella, the Gold Ridge Formation, forms part of the NNW-SSE trending anticlinal Stella Belt. The Gold Ridge Formation of the Kraaipan Group is Swazian aged greenstone belts that forms the lowermost Era of the Archaean Eon. Granitoid rocks, including tonalitic and trondhjemitic gneisses, post-tectonic granodiorites, adamellites and granite, intruded into the greenstones. Hirner (2001), used SHRIMP II zircon to interpret the Kraaipan Group's arc-like volcanic emplacements. The SHRIMP II zircon dating gave an age between 3000 and 3100 Ma ago. Anhaeusser and Walraven (1999) dated the banded iron-formation at 3410 Ma, using a whole-rock Pb-Pb analysis. The Gold Ridge Formation's lithologies are of the oldest found on Earth. Due to the longevity of the Kraaipan Group's lithologies it is expected that the lithologies are weathered. The mafic and ultramafic rocks are unstable at the surface and are highly susceptible to weathering due to their diagenesis at high temperatures and pressures in the mantle. The Kraaipan Group lithologies were also apart of numerous tectonic forces, which resulted in metamorphism and a complex deformational history (Johnson et al., 2006).

It is clear that the geographical relation between the mapped Gold Ridge Formation outcrop, concealed extension and incorporated magnetic lineament, vary over the extent of the formation. This is expected to be due to variation in the formations dip angle beneath the surface. Based on the corresponding geographical relation of all three mapped formation occurrences, the Gold Ridge Formation is expected to vertically intrude the surface, 200 m west of the study area as mapped by the vertical bed symbol.

An onsite geological mapping and geophysical investigation will be required to accurately map site representative geological and magnetic associable structures.

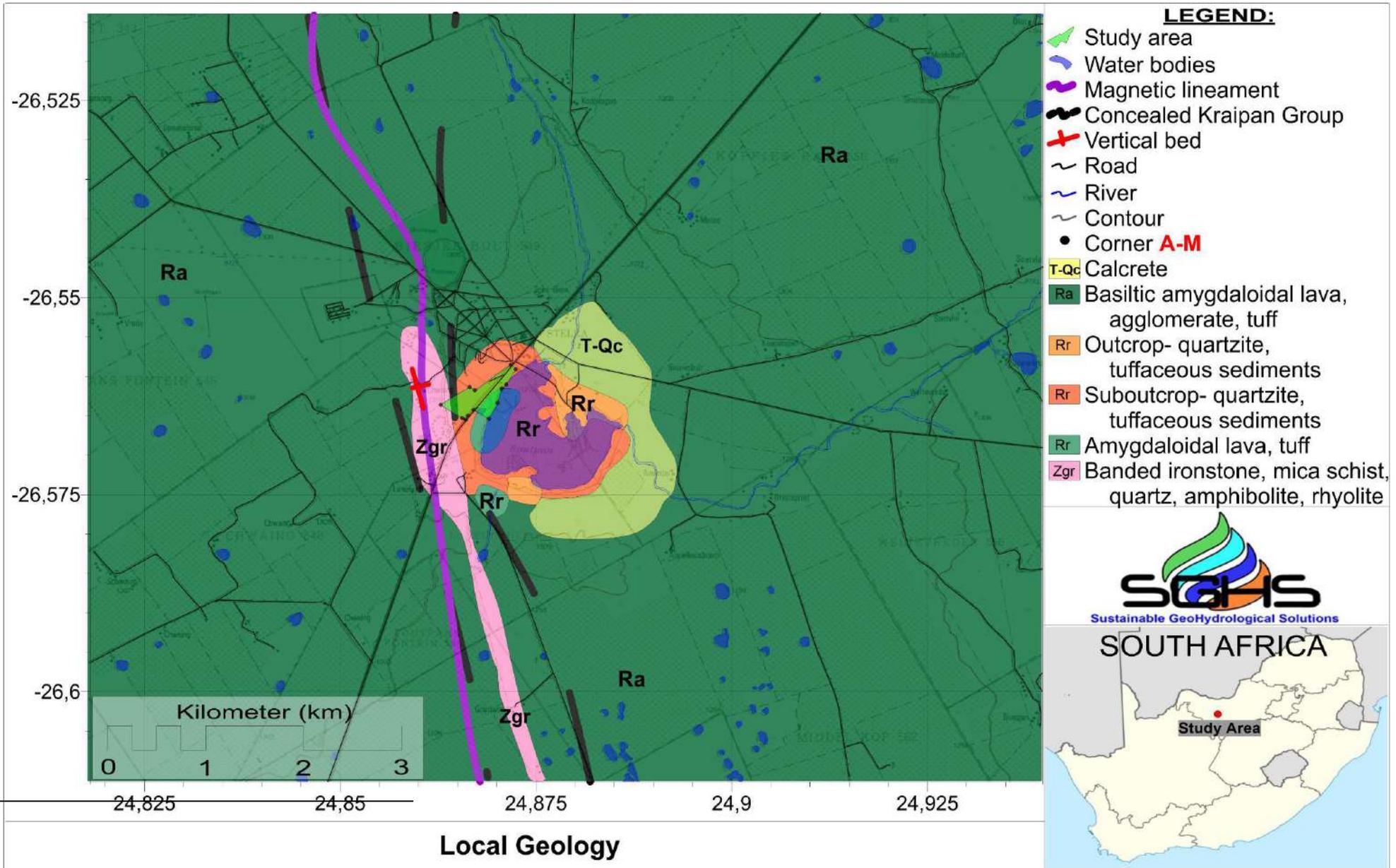
Climate:

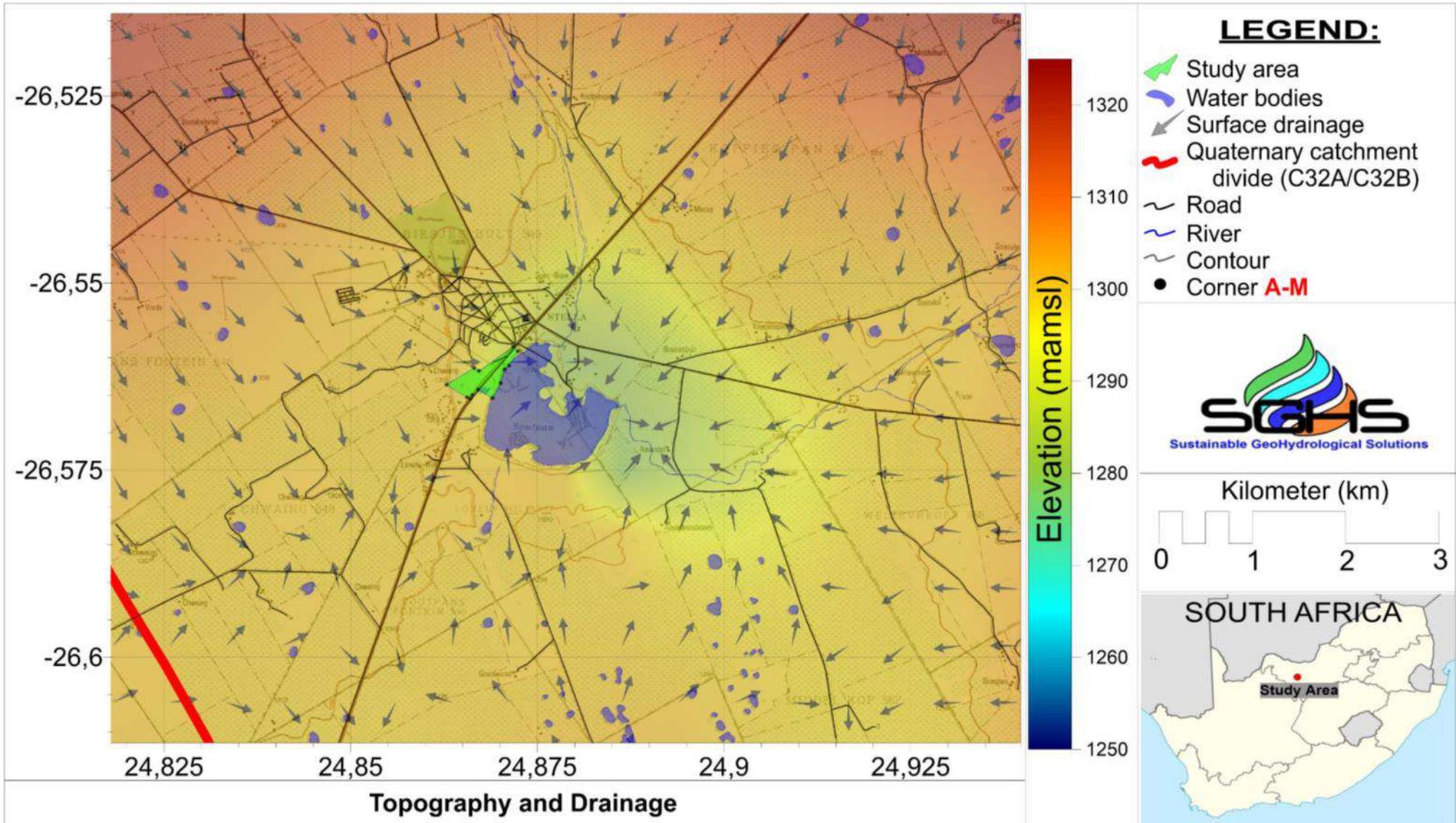
The Stella area normally receives 311 mm of rain per year, with most rainfall only occurring during mid-summer months. Figure 4 shows the average rainfall values for Stella per month. This area receives its lowest rainfall during June (0 mm) and the most rainfall during January (63 mm). The monthly distribution of average daily maximum temperatures (Figure 5) shows that the average midday temperatures range from 18.1°C in June to 32°C in January. The region is the coldest during June when the mercury drops to 0°C on average during the night.

Topography and Drainage

The quaternary catchment of the investigated site (C32A) extends over an approximate area of 1405 km². The study area is shown in the map below in relation to surrounding rivers and surface drainage directions. The quaternary catchment divide between catchments C32A and C32B can be seen 5,5 km west of the study area. In addition, a catchment divide between D42B and C32A is also clear 9,4 km north of the study area (Figure 2). Based on the catchments divide placement and orientation, the Stella town is expected to receive minimal surface and related groundwater flow. An overall north west to south east surface water drain direction across the study area is disrupted by a massive geological Gold Ridge Formation west of the study area, restricting the volume of intersecting surface water flow.

Two non-perennial rivers are visible draining to a conferencing salt pan east of the study area and south east of Stella. Considering the catchment's MAP of 449 mm/a, MAR of 8 mm/a, and associated A-pan evaporation of 2646-2690mm/a, these rivers and linked riverbeds are expected to be dry throughout the year, receiving some surface water flow during increased precipitation (Oct-April). This in turn results in minimal groundwater recharge (8 mm/a). Groundwater levels are expected to become more elevated during rainfall seasons, especially at riverbeds with coarse gravels and sands as well as intrusive geological structures such as dykes which are known to occur in the area.





POTENTIAL ENVIRONMENTAL IMPACTS

Below is a preliminary list of potential impacts identified at this stage of the process and will be investigated as part of the environmental assessment process. The list will be refined during the course of the environmental assessment process.

SPECIALIST ASSESSMENTS

Below is a list of specialist assessments that might be required for the project.

- ♣ Biodiversity
- ♣ Waste
- ♣ Air quality
- ♣ Noise
- ♣ Visual
- ♣ Traffic
- ♣ Paleontological
- ♣ Economic impact
- ♣ Financial provision
- ♣ Safety
- ♣ Surface water
- ♣ Groundwater
- ♣ Heritage/cultural and palaeontological resources
- ♣ Socio-economic
- ♣ Land use
- ♣ Geohydrological Investigations
- ♣ Heritage
- ♣ Ecological

ENVIRONMENTAL AUTHORISATION AND WULA PROCESS

The environmental assessment processes will be conducted to inform the competent authorities in their decision-making. These processes are conducted simultaneously.

STEPS IN THE ENVIRONMENTAL AUTHORISATION PROCESSES

The environmental authorisation processes provides information on the project and environment in which it is being undertaken; identifies, in consultation with registered interested & affected parties (RI&APs), the potential negative as well as positive impacts of the project; and reports on management measures required to mitigate impacts to an acceptable level. The likely process steps and timeframes are provided below. RI&APs and other stakeholders on the project's database will receive notification of public participation opportunities in advance.

PUBLIC PARTICIPATION

Public Participation provides Stakeholders and I&APs the opportunity to raise issues of concern and comment on the proposed activity. Notify other regulatory authorities and I&APs of project and environmental assessment (via newspaper advertisements, site notices and this BID document)

PARTIES INVOLVED IN THE ENVIRONMENTAL APPLICATION PROCESSES

IAPs

- ♣ Surrounding landowners, land users and communities
- ♣ Surrounding industries
- ♣ Non-governmental organisations and associations
- ♣ Parastatals

REGULATORY AUTHORITIES

- ♣ Department of Economic Development, Environment Conservation and Tourism
- ♣ Department Local Government & Human Settlement
- ♣ Department of Water and Sanitation (DWS)
- ♣ Department of Heritage (SAHRA)
- ♣ Department of Rural Development and Land Reform
- ♣ Department Rural, Environment and Agricultural Development
- ♣ Department Public Works and Roads

LOCAL AUTHORITIES

- ♣ Naledi Local Municipality
- ♣ Dr Ruth Segomotsi Mompati District Municipality
- ♣ Ward Councillor

Please let us know if there are any additional parties that should be involved.

3.4 NOTIFICATION TO BE SENT TO LOCAL AUTHORITY AND REGISTERED I&AP'S



ENVIRONMENTAL MANAGEMENT GROUP
Specialists in Environmental Management
Integrating Industry and Infrastructure with the Environment

Tel: +27 51 410 0000
Fax: +27 51 410 0001
Email: dir@emvngp.com
Postal Address:
P.O. Box 31473,
Langenhoven Park 5200

February 2021

At: Mr B Dicks, bdicks@mepg.gov.za - (018) 389 5527/5417
Department Economic Development, Environment, Conservation and Tourism
NWDC Building 1st Floor
Cnr Provident Street & University Drive
Mintabatho
2735

Dear Sir/Madam

Re: Notice is hereby given in terms of regulation 41 of Government Notice No. 9338 under the National Environmental Management Act (Act 107 of 1989 as amended 7 April 2017, National Environmental Management - Waste Act, 2008 (Act 59 of 2008), National Heritage Resources Act (ACT 26 OF 1989) as well as in terms of the National Water Act (Act 36 of 1998) Section 21 of intent to carry out the following project:

STELLA BULK SEWER AND INTERNAL RETICULATION

We have been appointed by Dr Ruth S Mompoti District Municipality regarding the application for Environmental Authorisation, Waste and Water Use Licensing for the proposed Stella Bulk Sewer and Internal Reticulation system, situated on portion 3 of farm Zoutpans Fontein 546, Stella in the North West Province.

The Draft Basic Assessment Report will be available for viewing purposes at Naledi Local Municipality. And can also be downloaded from our Website emvngp.com. Thirty days for comments to reach us are allowed per NEMA (Act 107, 1989, amended 7 April 2017), GN R 308, commencing on the date of circulating of the Draft Basic Assessment Report (BAR).

Public Meeting will be held on: Thursday, the: 11th of February 2021, at: 11:00, where: Stella Hotel

Your comments on the project will be appreciated. Should you have any project related queries, please do not hesitate to contact the undersigned.

Sincerely,



Geremie Van Rooijen
Director Managing & Environmental Assessment Practitioner & Ecologist
(MSc. Cond. Sc. Nat. 118554, IAIA Reg No. 5961)
Cell: 083 678 3032
E-mail: mr@emvngp.com

Environmental Management Group Pty (Ltd) Reg. No. 2017/077869/07 VAT Reg No: 4350270778
Managing Director: S. van Rooijen | 083 678 3032 | svr@emvngp.com
Director: C.W. Vermeulen | 082 524 9308 | cwv@emvngp.com

3.5 LIST OF I&AP's

List of I&AP's				
Department/ Organisation	Contact Person	E-Mail Address	Address	Contact Nr
Department Economic Development Environment, Conservation and Tourism	Mr B Diole	bdiole@nwpg.gov.za	NWDC Building 1st Floor Cnr Provident Street & University Drive Mmabatho 2735	(018) 389 5527/5477
Department Local Government & Human Settlement	Mrs M Maseka Mr P Motoko	marcia@nwpg.gov.za pmotoko@nwpg.gov.za	NWDC Building Cnr. Provident House & University Drive Mmabatho, 2735	081 388 2890
Department of Rural Development and Land Reform	Mr R Keothaile	richard.keothaile@drdlr.gov.za	Agricentre Building, Cnr Dr James Moroka Drive & Stadium Road, Mmabatho, 2735	018 388 7041/2
Department of Heritage	Mrs G Maseng	masengg@nwpg.gov.za	1st Floor Gaabomotho Building 760 Dr. James Moroka Drive Mmabatho 2735	018 388 2753
Department of Water & Sanitation	Phuluwa Fulufhelo	PhuluwaF@dws.gov.za)	28 Central Road Beaconsfield KIMBERLEY 8301	Tel: (053) 830 8800/6 /7600
Department Public Works and Roads	Mrs H Pretorius	hpretorius@nwpg.gov.za	Ngaka Modiri Molema Road, Old Parliament Complex, Mmabatho, 2735	018 388 1254
Department Rural, Environment and Agricultural Development (READ)	Mr T Molema	molemat@nwpg.gov.za	Mini-Garona Complex, Vryburg	0539280631

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**STELLA WASTE WATER TREATMENT WORKS
PUBLIC PARTICIPATION REPORT**

Dr Ruth Segomotsi Mompoti District Municipality	Mrs. O Keoagile	keoagileo@bophirima.co.za	50 Market Street, Vryburg, 8601	053 928 4700 / 053 927 0858
Mayor	Mr NW Skalk	tapb@naledi.local.gov.za	19A Market Street, VRYBURG, 8600	053 928 2300
Naledi Local Municipality	Mr Segapo Tyatya	municipalmanager@naledi.local.gov.za	19A Market Street, VRYBURG, 8600	053 928 2200
Ward Councilor 1	G Gamma		Naledi Local Municipality, Speakers Office, Ward Councilor 1, Mrs G Gamma, 19A Market Street, VRYBURG, 8600	053 928 2300
Stella WUA	Pieter De Villiers & HB De Villiers	devillierse@lantic.net		0829207309 / 0825428842
Stella WUA	Deon Erasmus	deonsv@lantic.net		0823167770
Stella WUA	Ria Mynhardt	nksteenwerke@lantic.net		0823381354
Stella WUA	Jaco Scholtz	morcaboerdery@gmail.com		0846030502
Nep Consulting	Danie Blake	blakedanie@nepconsulting.co.za		0823006853
DWS HO	Gorzin Jaghlassian	jaghlassiang@		0836310198
DWS HO	Mthombeni Ntsako	mthomdenin@dws.gov.za		0781116048
DWS HO	N Sineke	sineken@dws.gov.za		0829089035
DDI - WSDP	Arina De Villiers	arina@cemforce.co.za		
DWS HO	Israel Mashigwana	mashigwanai@dws.gov.za		0735212067
DWS - NW	Tise Onthusitse	tiseo@dws.gov.za		0605603134
DWS – NC - Kby	Refilwe Damane	damaner@dws.gov.za		0843384109
DWS – NC - Kby	Gawie Van Dyk	vandykg@dws.gov.za		0634074356
DWS - NW	M Rakale	rakalem@dws.gov.za		0832338534
DDI - WSDP	Charles Muller	charles@cemforce.co.za		0835850605
Stella WUA – Garage Owner	Conrad Mentz	conradmentz2010@gmail.com		0795012396
Stella WUA	Carlo Peacock	carlop@peabro.co.za		0761259323

EMG CONSULTANTS

3.6 MINUTES OF PUBLIC MEETING HELD AT STELLA HOTEL 12TH MARCH 2020

MEETING: DISCUSSION OF THE PROPOSED STELLA BULK SEWER AND INTERNAL RETICULATION AT STELLA HOTEL, STELLA 11H00 ON THE 12 th March 2020		
Presentation and Discussions		
Item	Discussion	Responsible person
1.	<ul style="list-style-type: none"> • Opening & welcome • Introduction, attendance and apologies 	Chairperson
2.	<p>Purpose of the meeting:</p> <p>~ The meeting was to discuss the proposed local of the Stella bulk sewer and internal reticulation:</p> <ul style="list-style-type: none"> • Proposed Site location <p>~ Mr Danie further highlighted those there aspects that contributed to the positioning of the proposed site selection and discussed the infrastructure found on site.</p> <p>~ Danie discussed that the main reason for the site selection located at the bottom site of town when you drive from Vryburg is to allow waste to gravitationally feed from town, township and the new development to the proposed site where it can be treated and the final effluent will go to the operation pond and can be used for irrigation. Danie discussed In the last meeting it was discussed that an artificial wetland will be constructed that will ensure the final effluent will still go through a natural treatment from the Treatment works which will be off good quality for drinking. This water will then go in the dam.</p>	Chairperson (Danie).

	<p>~ Danie further discussed that they did look into other options like constructing a pump station that will push waste into the current oxidation ponds, refurbish the current oxidation ponds and construct a new Waste water treatment Plant at that location. Danie indicated that if pumping is done it will result in operation and maintenance problems and the waste water won't move back up to the current oxidation ponds.</p> <p>~ Danie indicated that with a pump Station the problem will arise when you have to move the waste up to the plant but with the but with proposed plant at the bottom of the town the waste will gravitationally move to the plant and will be treated therefore for the proposed WWTW will incorporate the existing pump station and connect to it, tie into the existing consolidation chamber and collect all the towns waste in one line and go to the WWTW.</p> <p>~ Danie requested that if there is any other proposed to be evaluated.</p>	
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Comments and Issues raised by I&APs

I&AP Name	Comment or Response	Response
Richard	I just wanted to check and agree with what you are suggesting. Didn't the district have a plan to locate the WWTW before they made the budget?	<p>Danie Response: There is a budget that was proposed from DWS from this financial year. We need to find this location then carry on with the EIA process and Public participation. If can't finalise the location we cannot carry on with the EIA process.</p> <p>Ofentse Masike Response: When the District starts with the project the initial stages is to do a business plan, the business plan has the suggested locations and all the financial figures required for the project then the business is forwarded to DWS. The district has a recommendation from DWS with a certain amount. The business plan was suggesting that we are going to gravitationally feed to the current location close to the pan.</p>

Compiled by: M.O Keikelame

Signature: _____

Date: _____

**STELLA WASTE WATER TREATMENT WORKS
PUBLIC PARTICIPATION REPORT**

<p>Lucas Shubelo</p>	<ul style="list-style-type: none"> ~ Two years back there was another plan in terms of the location. What happened to that location? ~ Isn't the community part and parcel of the project? ~ The suggested location is not going to work because the the local municipality is not going to maintain the WWTW. 	<p>Danie Response: The business plan was submitted in November 2017 so I do not know who suggested another site. We need to agree on the position then will go out on public participation.</p>
<p>Willem</p>	<ul style="list-style-type: none"> ~ Is there an impact study that was made? If not I suggest the suggested location of the system be moved away from the pan. ~ Who is going to maintain and what is the guarantee that the WWTW will be maintained? 	<p>Sampe Response:</p> <ul style="list-style-type: none"> ~ The only assessment that was done by us is the Geohydrological Assessment was done. ~ The problem that we are siting with is that the existing connection points of the sewer are already in the mainstream. The new development of Stella which has over 800 houses is serviced and channelled to one central point which might flow over because there is no sewage treatment what so ever. The idea was for them to take Sewage disposal trucks and empty them at the existing oxidation ponds as they are currently doing. So the problem is every is gravitationally to the lower side of Stella. DWS was also not found of having the new the proposed site as it may pose a risk because of lack of maintains. So we were thinking of a system that does not require maintenance which will entail oxidation ponds and a natural constructed wetland that will be an additional filter system of the waste water before the water enters the pan. If we do not do this it is going to require us the reconstruct the whole sewage system of Stella.
<p>Enka deVilliers</p>	<ul style="list-style-type: none"> ~ It is a very situation and glad sewage spillage has been brought up as maintains is going to be a problem. ~ The pan is the part of management area of water resource association and we do not want the proposed project there. ~ Get Mr van Wyk in to assist in the project. 	

Approved by: M.O Keikelame

Signature: _____

Date: _____

**STELLA WASTE WATER TREATMENT WORKS
PUBLIC PARTICIPATION REPORT**

Leon Erasmus	Scrap the whole project and move to another site as the farmers and the whole community does not agree with the WWTW being there.	
Mangie Rakale	The bottom line of DWS is to see that our water resources are not further contaminated or polluted because the situation of Stella is not good. I suggest we find a workable solution in the interest of the water resources and the community.	
Peter deVilliers	<ul style="list-style-type: none"> ~ Did you calculate how much you will use for the system? ~ Pump the waste water away from pan as it affect the water resource and affect borehole water. 	<p>Danie response:</p> <ul style="list-style-type: none"> ~ The system will use 1.5ML/D
Enka deVilliers	<ul style="list-style-type: none"> ~ Who is going to maintain the WWTW? ~ Who will rehabilitate the WWTW? 	<p>Danie response:</p> <ul style="list-style-type: none"> ~ We will make a contract for two years with an option to continue for more years to assist in maintenance.
Leon Erasmus	My Suggestion is to restart the whole system that is currently being built in Stella and remove from the proposed site.	
Israel	I was the one who built the current existing system around Stella for the new development as I got instructions from the Engineers and I was in disagreement with them as it was too small, however this new proposed system is not going to work here as we also have problems in managing storm water.	<p>Danie response:</p> <ul style="list-style-type: none"> ~ I understand your concerns as it is also the same concerns that we also have. The current internal reticulation is there and it is not ideal. We are appointed by Dr Ruth Segomotsi Mompoti District to handle the current bulk and we have to incorporate everything as well as all the houses and collected to one point and treat it. Either we pump it to a different location or treat at one place. We need to do this so we solve the current problems. The only way to do this is one of two of options which are Collect everything in one or two different places and pump it to one location that can be treated otherwise the effluent is not going to be at standard levels and can pollute your groundwater.

<p>Rachel Mpe</p>	<p>We hear the concerns and they are valid. As a way forward we need to consider at a couple of things:</p> <ol style="list-style-type: none"> 1. The impact assessment that can help with the best location. 2. Do we know the current infrastructure that is on site and the condition it is in? Because we might find that the development of the Department of Human Settle has internal reticulation that might create a gap in between the two projects 3. Consulting the community <p>As the department from the we sitting in terms of water resources the moment where we look at the aquifer classification the first thing we do is to find out where the residence finds its water from. So if we find out that the pan is the sole aquifer by default we need to look at other alternatives in locating the WWTW as maintenance of the pumpstaions is a problem is Local Municipalities.</p>	
<p>Gaogakwe Tselane</p>	<p>Throughout the plants in the district maintenance is a problem and spillage has been occurring and things are dysfunctional. So When Danie was indicating that the pump stations are going to be a problem we are going to need to have backup storage for if the pumps fail so spillage can go into for a day or two.</p>	
		<p>Danie Resonse:</p> <p>The Town’s waste water is collected with sewage disposal trucks and the townships waste is pumped up to the existing oxidation ponds. The Human Settlement new development is below the township’s pump station so every waste water flow is designed to the consolidation chamber. We need to incorporate this to one system.</p>

**STELLA WASTE WATER TREATMENT WORKS
PUBLIC PARTICIPATION REPORT**

Ofentse Masike	We can't comment about the project from the Department of Human Settlement as we are directly involved with it however as the District Municipalities we hear the concerns raised in this meeting. What I want out of this meeting is the solution for the current situation that we have.	The solution might be upgrade the current oxidation ponds and build the WWTW up next to the ponds and build 3 pumps station that will pump the water up to the plant.
Enka deVilliers	We have an abattoir and we raised that the last time	<p>Danie Resonse:</p> <ul style="list-style-type: none"> ~ With the abattoir effluent in question we have to change plan and the plan needs to be totally different. The abattoir also needs to adhere to national standards on DWS ~ This plant is not designed abattoir waste water. <p>Rachel Resonse:</p> <ul style="list-style-type: none"> ~ There are municipal by-laws that needs to be adhered to by the abattoir regarding the waste water
Rachel	What we need to focus on is what we currently have and what the Department of human settlement has done. We agree that Human Settlement development is small and is not working. Therefore I think Danie we need a detailed report that shows how the town and community is serviced and the risk the shacks have on the project.	<p>Danie Resonse:</p> <ul style="list-style-type: none"> ~ We wanted to decommission everything located there and incorporate everything including the existing pump station in the gravitational system and collect from the new development from human settlement, Stella town and the Township at one central area to cater the entire place and then treat it.
Rachel Mpe	Let's find a way of how do we best work around even if we may encounter problems with the Operation and Maintenance of the pump stations if they are somewhere and what will be the risks.	
Mangie Rakale	I also want to say we want to look best possible solutions but the department is engaging the district and the local municipality. We trying to strengthen the SLA's even if it means charging someone but once we find the workable solution looking at the SLAs can we work on something that	

**STELLA WASTE WATER TREATMENT WORKS
PUBLIC PARTICIPATION REPORT**

	we can put on the ground so that the time the pump stations has to be operated the SLAs can be put in place. Let's not focus on the Operation and maintenance now because NEP Consulting will do the maintenance for two years during operation then the SLAs will be implemented thereafter. Maybe we can look at two projects that run concurrently where refurbish the existing to a point is functional which makes it the short-term solution and the long-term solution would be for Danie to present to us and the District the new possible solution that after drawing a new solution.	
Peter deVilliers	The problem is not the sewage system. The sewage systems of work but if work if maintained. We cannot trust Naledi Local Municipality because they are capable to maintain it because the proposed process of the natural gravitational flow makes sense.	
Enka deVilliers	I agree with Mangie that it's not going to be at the current proposed and that Danie go look for another possible solution and location. However I want to find out if the equitable share be enough to service maintain it.	Danie response: We made an agreement that NEP Consulting will do maintenance for two years. After two year SLAs will be implemented.
Enka deVilliers	Where will the money come from for this two years	Mangie Rakale Response: ~ It will be part of the budget of the whole project
Enka deVilliers	Who will be responsible for the new business plan for the refurbishment?	Mangie Rakale Response: ~ The District Municipality
		Danie Resonse: Nothing has been said about the storm water of Stella and it is also contributing to the spillage. There is no road and no proper Storm Water Management plan.
Enka deVilliers	We need a solution right now with the current situation that we are experiencing now with the pump station.	Ofentse Masike Response:

**STELLA WASTE WATER TREATMENT WORKS
PUBLIC PARTICIPATION REPORT**

		~ I was hoping the representative from the Local Municipality will be here but after this meeting I will escalate this to the senior managers at the District who works with operation and maintenance and he will engage with Local Municipality to enforce the maintenance of the pump station.
Leon Erasmus	We need to know who is going to maintain the plant and whether are going to get training?	Danie Resonse: NEP Consulting will do the maintenance and will give accredited training as part of the operation.
		Danie Resonse: Can we agree that we carry on with building two or three pump stations in suitable locations and utilise the current existing ponds? Then we can start with EIA and Finalize the scope of works?
Enka deVilliers	I am worried about the new development and the availability of water for this project. You need to state in the scope of works what is the availability of water.	
Ofentse Masike	We need to revise the technical report with new locations of the of the treatment plant and submit to DWS for approval. We also need to do the public participation that forms part of the EIA process to further engage with the community.	Danie Resonse: We will hold a public meeting with the stakeholders as part of the Public participation to get everyone's comments with regards to it.
	We have not solved the current issue with the current oxidation ponds	

3.7 ATTENDANCE REGISTER OF PUBLIC MEETINGS

STELLA WWTW / STELLA WUA - MEETING				
ATTENDANCE REGISTER				
DATE 2018/05/29				
SURNAME & NAME	REPRESENTATION	CELL	E-MAIL	SIGNATURE
DE VILLIERS PIETSK	Stella WUA	0829207309	devilliers@lantic.net	
DEON ERASMUS	Stella WUA	0823167770	deonsv@lantic.net	
Ria Nykhaet	Stella WUA	0823381354	rikstermynke@lantic.net	
JACO SCHOLTZ	Stella WUA	0846030502	marceboerdery@gmail.com	
Danie Blake	NEP Consulting Eng	0823006853	blakedanie@nepconsulting.co.za	
Gorsin Jaghlassian	DWS - HO	0836910798	jaghlassiang@dws.gov.za	
Mthombeni Ntsako	DWS - HO	0781116048	MthombeniN@dws.gov.za	
Ncwabe Sibusiso	DWS - HO	0829084035	siwachen@dws.gov.za	
Anina de Villiers	DPI - WSDP	08245114894	avina@cemforce.co.za	
HB de Villiers	Stella WUA	0825428842	devillierse@lantic.net	
Mashigwana Israel	DWS - HO - Scitiffon	0735212067	Mashigwana@dws.gov.za	
TISE ONTHUSITSE	DWS - NW	0605603134	tiseo@dws.gov.za	
Replwe Domane	DWS - NC - RBY	0843384109	domaner@dws.gov.za	
GANIE VAN DYK	DWS NC - RBY	0634074356	vandykg@dws.gov.za	
Mangie Rakale	DWS NW	0832338534	rakalew@dws.gov.za	

SURNAME & NAME	REPRESENTATION	CELL	E-MAIL	SIGNATURE
Charles Muller	DDI - WSDP	083 585 0605	charles@cemforce.co.za	
<u>Appologies</u>				
Conrad Mentz	Stella WUA - Garage Owner.	0795012396	conradmentz2010@gmail.	
Carlo Peacock	Stella WUA.	0761259323	carlo.p@peabro.co.za.	

NEP CONSULTING ENGINEERS

CLIENT: DR RUTH SEGOMOTSI MOMPATI DISTRICT MUNICIPALITY

CONTRACT: STELLA BULK SEWER PHASE A

PROJECT NO :

COMMUNITY MEETING

ATTENDANCE LIST

DATE: THURSDAY, 12 MARCH 2020 AT 11:00 AT STELLA HOTEL

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NEP CONSULTING ENGINEERS (Pty) Ltd. shall not hold themselves responsible for any omissions or errors.

3.8 COMMENTS RECEIVED & RESPONSE

No comments were received during the Public Participation Process.

4. CONCLUSION

It is concluded that the methods incorporated in the public participation process to inform the surrounding landowners, users, organs of state and identified government authorities was adequate. All the identified I&APs were given with an opportunity to give input regarding the proposed construction and no objections were received.

Appendix F: Impact Assessment







ENVIRONMENTAL MANAGEMENT GROUP

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IMPACT ASSESSMENT

STELLA BULK SEWER AND INTERNAL RETICULATION

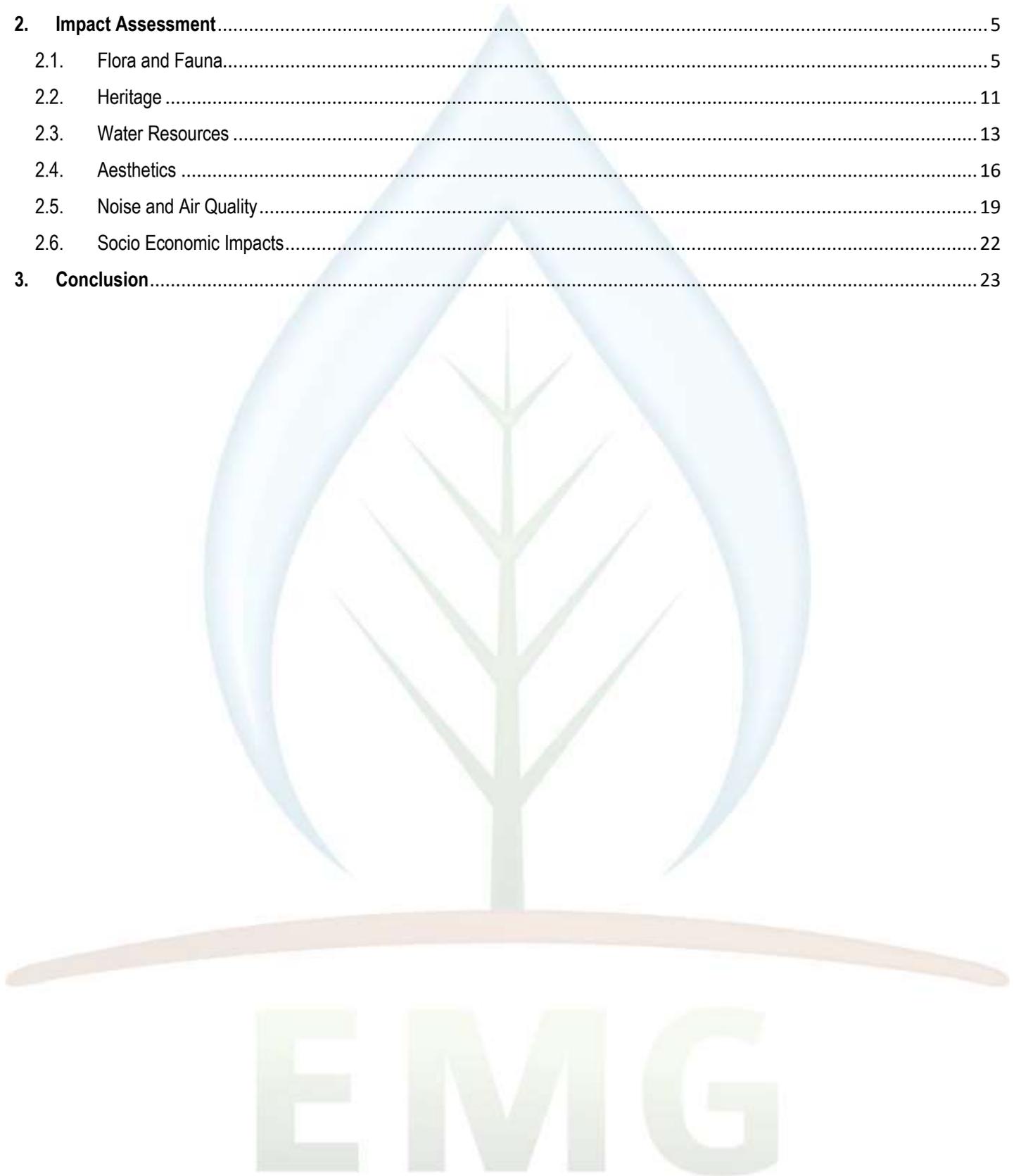


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Contents

1. Assessment Methodology	1
1.1. Determination of Consequence	1
1.2. Determination of Likelihood	2
1.3. Determination of Overall Environmental Significance	3
2. Impact Assessment	5
2.1. Flora and Fauna.....	5
2.2. Heritage.....	11
2.3. Water Resources.....	13
2.4. Aesthetics.....	16
2.5. Noise and Air Quality.....	19
2.6. Socio Economic Impacts.....	22
3. Conclusion	23



1. Assessment Methodology

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood.

1.1. Determination of Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: Severity/Intensity, Duration and Extent/Spatial Scale. Each factor is assigned a rating of 1 to 5, as described in the tables below.

Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment (Table 1).

Table 1: Rating of severity

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant / Harmful	Great / Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible	Low cost to mitigate	Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate / Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Medium change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place (Table 2).

Table 2: Rating of Duration

Rating	Description
1: Low	1 Month
2: Low-Medium	1 – 3 Months
3: Medium	More than 3 Months
4: Medium-High	5 – 10 Years
5: High	More than 10 Years

Determination of Extent/Spatial Scale

Extent refers to the spatial influence of an impact, be it contained to the immediate surroundings (site), extending to the surrounding area, regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders) (Table 3).

Table 3: Rating of Extent / Spatial Scale

Rating	Description
1: Low	Immediate, fully contained area (site)
2: Low-Medium	Surrounding Area
3: Medium	Regional
4: Medium-High	National
5: High	International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 3 (Table 4).

Table 4: Example of calculating Overall Consequence

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	Example 10
TOTAL CONSEQUENCE:(Subtotal divided by 3(Severity, Duration, Extent))	Example 3.3

1.2. Determination of Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5 (Tables 5 and 6).

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken (Table 5).

Table 5: Rating of frequency

Rating	Description
1: Low	Once a year / once during construction
2: Low-Medium	Once / more in 6 Months
3: Medium	Once / more a Month
4: Medium-High	Once / more a Week
5: High	Daily

Determination of Probability

Probability refers to how often the activity/event or aspect has an impact on the environment (Table 6).

Table 6: Rating of probability

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2 (Table 7).

Table 7: Example of calculating the overall likelihood

Likelihood	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	Example 6
TOTAL LIKELIHOOD (Subtotal divided by 2 (Frequency, Probability))	Example 3

1.3. Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH (Table 8).

Table 8: Determination of overall environmental significance

Significance or Risk	Low	Low-	Medium	Medium-High	High
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		Medium			
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision-making process associated with this event, aspect or impact (Table 9).

Table 9: Description of the environmental significance and the related action required.

Significance	Low	Low-Medium	Medium	Medium-High	High
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company	Impact is real and substantial in relation to other impacts. Pose a risk to the company and environment. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.



2. Impact Assessment

2.1. Flora and Fauna

Flora refers to the vegetation found in and around the area that will be assessed. This includes all species of vegetation from protected and indigenous species to alien and exotic plant life. Fauna refers to the animal life, inclusive of birds, mammals, invertebrates and reptiles found in or around the site being assessed. The fauna assessment also includes locating preferred habitats of protected/Endangered fauna species.

1. Clearance of Vegetation								
Impact	Clearance of vegetation							
Description of impact	Vegetation will be cleared in the existing road reserve and on the proposed area for the development.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	2	1	2	5	4	4,5	9,0
Mitigation	<ul style="list-style-type: none"> Only vegetation within the existing road and proposed area for development can be removed. Keep vegetation removal to a minimum and only what is required. Construction footprint to be demarcated as per the construction phase conditions outlined Construction vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1,3	4	2	3	4,0
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	2	2	2,3	2	2	2	4,7
Mitigation	<ul style="list-style-type: none"> Keep to designated gravel roads or already created pathways.. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1,3	2	2	2	2,7
Cumulative Impact	Clearance of vegetation has already occurred in some areas of Stella particularly in the road reserves with the Stella town.							
Additional Notes:	Although the area over which clearance of vegetation will take place is extensive, construction activities will also take place within existing roads. Thus some areas are already devoid of indigenous vegetation and areas that contain vegetation will be either crops or vegetation of secondary nature.							

The impact on clearance of vegetation will be **LOW-MODERATE** without mitigation and **LOW** when mitigation measures are applied. This risk assessment applies for both construction and operational phases and is described as having a low order impact likely to have little to real effect. It is however necessary to implement monitoring and evaluation procedures to determine the potential of increase in risk.

2. Land transformation – Veldfire								
Impact	Accidental or intentional causing of veld fires.							
Description of impact	Machinery and human activity may increase veldfire risk levels causing dry vegetation to catch fire and burn a substantial piece of vegetation.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	5	1	2	2.666666667	1	1	1	2.66666667
Mitigation	<ul style="list-style-type: none"> The Developer will ensure that firefighting equipment is available onsite in the event that an accidental fire should break out. Construction workers will not be allowed to make fires on the site. Construction activities that generate heat or an open flame should be monitored and appropriate measure taken to prevent run away veld fires. A Fire Management Plan must be present on site The local fire station, landowner and neighbouring landowners must be alerted about potential of causing a fire. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	1	3	2	1	1	1	2,0
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
Mitigation	NO IMPACT							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Cumulative Impact	Fire will cause the loss of veld used for grazing purposes by the surrounding community. Loss of lives and infrastructure.							

Veld fires will only have an impact during the constructional phase and is rated according to the risk matrix of having a LOW impact. Although the assessed risk is low the threat or severity of the impact is very high and can cause large scale destruction if this risk is not managed and monitored regularly.

3. Unauthorised vehicle movement								
Impact	Trampling of pristine or undisturbed grassland- and vegetation.							
Description of impact	If construction or maintenance vehicles move outside the demarcated construction area, potential significant vegetation can be destroyed. This impact will be more significant in sensitive areas such as the existing concrete irrigation canal, and pristine grasslands.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	2	1	2	5	4	4,5	9,0
Mitigation	<ul style="list-style-type: none"> Vehicles must remain within demarcated construction footprint. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1,3	4	2	3	4,0
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	2	2	2,3	2	2	2	4,7
Mitigation	<ul style="list-style-type: none"> Vehicles must stay to existing gravel roads during any maintenance activities. Vehicle drives must be informed where it is safe to drive. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1,3	2	2	2	2,7
Cumulative Impact	A cumulative impact has already occurred and on private land were small single gravel pathways have been made to access the boundaries of the private land.							
Additional Notes:	This activity is not expected to have a great influence on vegetation as most will occur within existing degraded areas. Special attention should be given to areas that are not disturbed.							

Unauthorised vehicle movements and the subsequent damaging of vegetation outside the construction boundaries is rated to have a LOW-MODERATE impact during the construction phase and a LOW impact during the operational phase. Damaging of vegetation is rated higher during the construction phase as most of the heavy vehicles will be involved during this phase and it is of utmost importance that workers and contractors be made aware of operational boundaries. This impact should be monitored and mitigation measures applied when the impact realises.

4. Hunting and gathering of Fauna								
Impact	Actively removing animal life through destructive measures.							
Description of impact	During the construction or maintenance of the proposed development it is possible that certain species of animals may occupy the designated areas. To save time it may be decided by the workers on site that killing the animal would be the most convenient way to move forward.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	2	2	2.33	4	1	2.5	5.8
Mitigation	<ul style="list-style-type: none"> No animal life should be killed and measure should be implemented to inform workers thereof. A specialist should be informed immediately if the animal does not willingly move from site or has a nesting ground on the designated area. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	2	2	2	1	1	1	2.0
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	1	1	1.333333333	2	2	2	2.666666667
Mitigation	<ul style="list-style-type: none"> Any animals found onsite should be relocated During maintenance special care should be given to any animals that re-occupied the site after construction has been completed. Accidental killing of animals with vehicles should be kept to a minimum. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1.33	2	1	1.5	2.0
Cumulative Impact	If extensive destruction of animal life occurs within the proposed area a cumulative impact of loss of fauna is foreseen.							

It is not foreseen that any animals might be hunted or intentionally destroyed. It is also important to keep in mind that most of the areas are in degraded areas devoid of animal life. Being said it is important to inform workers and contractors of the reality of encountering multiple species near and around the proposed development area. The above-mentioned factors rate this impact as being a LOW to LOW-MEDIUM impact with the risk having a high severity and a low probability of occurring.

5. Permanent loss of animal life								
Impact	Loss of habitat and species diversity.							
Description of impact	Due to constant construction activities that will take place and constant human presence during maintenance, it is possible that animal life never returns.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	4	2	3	3	2	2,5	7.5
Mitigation	<ul style="list-style-type: none"> • Construction footprint to be demarcated as per the construction phase conditions outlined • Construction vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development • The development area is defined as remaining in its natural state, contain natural habitats for fauna and flora species, therefore: Ensure the Environmental Management Plan includes localities of these animals, and measures to rescue, protect/remove them • Limit the amount of construction sites that are worked on simultaneously. Reduce the amount of noise generated by vehicles 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	2	3	2.3	2	1	1,5	3.5
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
Mitigation	NO IMPACT							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	NO IMPACT							
Cumulative Impact								
Cumulative Impact	A cumulative impact has already occurred with most of the area already transformed into agricultural fields.							
Additional Notes								
Additional Notes:	Although construction activities are rated a having a medium impact on animal life, it is not expected that it will have a high significance on a large scale. This is due to the area already being significantly degraded and any animal life that still remains are scares. As with vegetation special care should be given around significant areas.							

The risk of permanent loss of animal life is rated to be MODERATE without mitigation and LOW with mitigation only during the construction phase. Activities during the operational phase are minor and will cause no impact to the loss of animal life. The risk matrix describes this impact as being real and substantial in relation to other impacts. It is crucial that all mitigation measures be implemented to counter act the effects of the construction phase and the impact it will have on animal life.

Flora and Fauna Impacts						
Impacts	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Clearance of Vegetation	9,0	4,0	4,7	2,7	6.85	3,35
2. Veld fires	2.67	2.0	NO IMPACT	NO IMPACT	2.67	2.0
3. Unauthorised vehicle movement	9,0	4,0	4,7	2,7	6,8	3,3
4. Hunting of Animal Life	5.8	2.0	2.67	2,0	6.85	3,35
5. Permanent loss of animal life	7.5	3,5	NO IMPACT	NO IMPACT	7.5	3,5
					4.8	3,1

Although there are potentially significant individual impacts that can occur, it is foreseen that no real damage will occur during the construction of the bulk sewer. For the impacts that the construction of the bulk sewer will have on the fauna and flora, the risk matrix rates the impact at a LOW-MODERATE score before mitigation and a LOW after mitigation has been implemented. Special attention should be given when working in areas such these to protect the remaining animal and plant life.

2.2. Heritage

Heritage involves culturally significant finds including, but not limited to fossils, artefacts and certain culturally relevant infrastructure. These items will be identified by a Heritage Specialist throughout the construction phase of this project.

1. Archaeological and/or historical features or artifacts								
Impact	During construction of the proposed WWTW, it is possible that archaeological features or artefacts could be found							
Description of Impact								
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probalitiy	Likelihood	Significance
	4	1	1	2	5	1	3	6
Mitigation	<ul style="list-style-type: none"> • Upon finding any archaeological or historical material all work at the affected area must cease • The area will be demarcated in order to prevent any further work there until an investigation has been completed • An archaeologist will be contacted immediately to provide advice on the matter • Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit • SAHRA's APM Unit will be notified • If needed the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist • Work on site will only continue after removal of the archaeological/ historical material was done • Operating controls and monitoring will be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probalitiy	Likelihood	Significance
	3	1	1	1.666667	3	1	2	3.333333
Operational Phase								
Mitigation								
After Mitigation	NO IMPACT							
Cumulative Impacts	No cumulative impacts are foreseen							
Additional Notes:	Although most of the impact will occur during the construction phase, artefacts and fossils can be discovered throughout the lifetime of the project and special care needs to be taken to ensure the identification of such artefacts and the immediate contacting of a specialist							

The heritage specialist identified that the WWTW may encounter significant finds. As a result the severity and frequency is high resulting in MODERATE score before mitigation and a LOW score after mitigation. Note that the risk to artefacts and fossils are only applicable to the construction phase where excavation will take place. If no fossils or artefacts are found during the construction, it is unlikely that any will be found during the operational phase. Note that any significant finds must be treated as important and all works stops until a specialist has been out to assess the finds.

Heritage Impacts

	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
Impacts						
1. Archaeological and/or historical features or artifacts	6	3.333333	0	0	3	1.666667
Total:					3	1.666667

2.3. Water Resources

Water resources includes every aspect of water including surface and ground water, as well as assessments on their quality and quantity. The Geohydrological Assessment-, as well as Hydrological Assessment reports includes all risks associated with water bodies present on site.

1. Surface and ground water Quality								
Impact	Deterioration of surface water (ponds, rivers and dams) quality.							
Description of impact	During the construction phase, surface water resources may become contaminated as a result of constructing the WWTW and using hazardous material. It is also very likely that heavy construction vehicles may leak oil and other petroleum products which can end up in surface water resources. The operational phase during maintenance, also has the possibility to contaminate water resources, by using hazardous substances carelessly.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	1	1	1,67	2	3	2.5	4.2
Mitigation	<ul style="list-style-type: none"> • Surface contamination of the soil through hazardous materials should be cleaned up immediately and disposed of properly. • All vehicles must be fitted with a drip tray and leaking vehicles must be repaired off site at a designated construction area. • It is recommended to use alternative substances to those that are hazardous especially near sensitive areas such as the existing irrigation concrete canal within close proximity of the area • . 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	1	1	1	1	2	1.5	1.5
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	2	3	2.6	2	2	2	5.3
Mitigation	<ul style="list-style-type: none"> • Any maintenance taking place in the WWTW should have a spillage treatment kit with them at all times. • All spillages must be cleaned before leaving a site. • HTP liner is to be used to ensure no seepage of waste water into groundwater resources 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1,3	1	1	1	1,3
Cumulative Impact	Cumulative impacts can manifest during the construction phase if spillages increase and aren't removed whereby surface runoff will carry the pollutants to surface water resources.							

.The major risk to groundwater quality will be associated with activities on the surface such as spillages of hazardous substance, which will infiltrate over a period of time into the aquifer, which, depending on the size of the spill, can contaminate the whole aquifer. It is thus crucial to exercise mitigation measures during such incidents to avoid other groundwater users in the area being negatively affected by poor quality water. Both of the construction and operational phases show high severity if the aquifer is contaminated and low probability of occurring during this project. This equates to a construction phase score of LOW-MEDIUM before mitigation and LOW score after mitigation. The operational phase follows the same trend. If mitigation measures are applied it can be foreseen that this risk will have no impact on the aquifer's quality

2. Hydrological – Storm water System and water supply								
Impact	Over abstraction of groundwater							
Description of impact	Storm water runoff will be as per natural state and due to clearing of vegetation.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	1	1	1,3	2	1	1.5	1,95
Mitigation	<ul style="list-style-type: none"> Storm water run-off generated within the development should be accommodated through formal system Proper stormwater control must be practised on all areas within the site to avoid contamination of surrounding areas. Drainage shall be controlled to ensure that runoff from the site will not culminate in offsite pollution or result in damage to properties downstream of any stormwater discharge 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	1	1	1	1	2	1.5	1.5
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	2	1.6	1	2	1.5	2.6
Mitigation	<ul style="list-style-type: none"> If groundwater resources are to be abstracted in the future water meters will be installed at every abstraction point and will be sent to DWS on a monthly basis. Storm water system should be implemented Drainage shall be controlled to ensure that runoff from the site will not culminate in offsite pollution or result in damage to properties downstream of any stormwater discharge 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1,3	1	1	1	1,3
Cumulative Impact	A cumulative impact can be foreseen for the surrounding environment and its aquifer as farmers frequently use boreholes to abstract water for domestic and agricultural use							
Additional Notes:	Note that no impacts are discussed for the abstraction of groundwater during this project as up until the assessment no such activities are being implemented. It is however planned in the future to augment the water supply from groundwater.							

This risk has not yet been incorporated into the project as abstracting borehole water will only be considered further down the line. If it is decided to augment the water supply further with borehole water a separate impact assessment will be done during a full geohydrological study.

Water Resources						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Surface and ground water Quality	4.2	1.5	5.3	1.3	4.75	1.4
2. Hydrological – Storm water System and water supply	1.95	1.5	2.6	1.3	1.63	1.4
					3.19	1.4

The impact on surface water will be low as no abstractions are anticipated. Groundwater resources will stay unaffected as long as proper mitigation measures are followed. In total, the risk to Surface and Groundwater resources are rated to be LOW before mitigation and LOW after mitigation. The risk matrix however still advises that constant monitoring be applied and to improve where possible.

2.4. Aesthetics

This risk to the visual character of the environment will be based on a cumulative contribution of all the specialists and physical site visits done by the Environmental Assessment Practitioner.

1. Course of Pipeline								
Impact	Lowering aesthetic value of the surrounding environment, where the pipeline surfaces and where pump stations will be built.							
Description of impact	During the construction works and maintenance during the operational phase the aesthetic value of the surrounding environment will be lowered due to open trenches and construction works. This impact will be the highest at wetlands and watercourses.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	5	2	3,3	5	2	3,5	11,7
Mitigation	<ul style="list-style-type: none"> It is recommended that the number of construction sites be kept to a minimum to lower the overall aesthetic impact. Once an area is completed it is recommended that the area be rehabilitated before moving on to the next section through levelling off the ground and re-vegetating the excavated areas. Trenches may not be kept open and unattended for longer than 30 days. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	4	1	2,3	4	2	3	7,0
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	3	2	2,7	2	2	2	5,3
Mitigation	Maintenance of the pipeline should occur as quickly as possible to minimize the overall aesthetics value created by open trenches, soil heaps, construction signs and still standing vehicles.							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	3	1	2	2	2	2	4,0
Cumulative Impact	A cumulative impact has already occurred through the main gravel road and private access roads on private land and excavating along the already disturbed areas will have a very small cumulative impact.							
Additional Notes	The pipeline route was chosen in such a manner as to minimize the impact on the environment by laying the pipeline alongside and beneath already disturbed areas (gravel roads). There are however sensitive areas where the pipeline will cross including wetlands and watercourses. These areas must be treated with utmost care in order not to lower the aesthetic value of the surrounding environment.							

Due to the extent over which the pipeline will be constructed the aesthetic risk will be increased during the construction phase. In the operational phase factors such as the visibility of the pipeline that will be above ground will increase aesthetic risk. Factors lowering the risk is that the majority of the pipeline will be underground and incorporating native plant species during rehabilitation around the affected area. Considering the factors above the risk to aesthetics during the construction phase is rated to be MODERATE before mitigation and LOW-MODERATE after mitigation. The operational phase will be less intrusive and will only be seen by a handful of people, scoring a LOW-MODERATE score before mitigation and LOW scores after mitigation.

2. Location WWTW/Oxidation ponds and pump stations								
Impact	Construction and permanent fixture of the WWTW close to a watercourse and lowering aesthetic value.							
Description of impact	Since the WWTW will be located close to the seasonal wetland across the road, some vegetation will have to be removed during construction and will be seen from the road by passing persons during the operational phase. These factors will all impact negatively on the aesthetic value.							
Constructional Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	4	2	3	4	2	3	9,0
Mitigation	<ul style="list-style-type: none"> Avoid excessive clearance of vegetation and disturbance to the area. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	3	1	2	2	2	2	4,0
Operational Phase								
Before Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	3	2	2,3	4	1	2,5	5,8
Mitigation	<ul style="list-style-type: none"> It is recommended that after the construction phase and before the operational phase, that indigenous trees be planted around the disturbed and cleared area to recover some aesthetic value for the area as well as blending the pump house into the environment. 							
After Mitigation:	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	1	1,3	3	1	2	2,7
Cumulative Impact	A cumulative impact can occur if more infrastructure is built near the watercourse as well as the removal of indigenous vegetation.							

The risk to the aesthetic value of the surrounding environment during the construction and operational phase of the pump house are both rated to be LOW-MEDIUM before mitigation and LOW after mitigation. This impact is rated insignificant as the area that will be affected is small and with the proper mitigation measures applied will be insignificant to the aesthetic value of the surrounding environment.

Aesthetic Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Course of Pipeline	11,7	7,0	5.3	4.0	8.5	5.5
2. Location WWTW/Oxidation ponds and pump stations	9,0	4,0	5.8	2.7	7.4	6.7
					7.95	6.1

It is foreseen that the aesthetic value of the area will only be affected on a small scale and for a short period of time; and considered a low risk as construction of the pipeline will occur within already disturbed gravel road areas. It must be mentioned that areas in and around wetlands and watercourse are sensitive, which indicates that utmost care should be taken when building the pipeline through these areas. The same principle applies to the pump house and abstraction point which is located within these sensitive areas. The scale of the pump house and abstraction point is very small and thus will have a low impact on aesthetics. The total rating given to the risk to aesthetic value will be MODERATE before mitigation and LOW-MODERATE after mitigation has occurred.

2.5. Noise and Air Quality

Noise and air quality assessments are based upon what equipment will be used during a specific activity and the type of disturbance that will occur.

1. Generation of noise								
Impact	Increasing noise levels during the construction phase and operational phase.							
Description of impact	Noise levels will increase during construction (excavation) The operational phase will also create noise as a result of agricultural activities that will take place.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	4	2	2,7	4	3	3,5	9,3
Mitigation	<ul style="list-style-type: none"> No loud music at any construction sites. Vehicles must be maintained in such a manner as to not cause excessive noise when operating them. Construction should take place between 8:00 and 17:00. The speed limit will be 40km/h on all roads running through and accessing the study area Equipment/ machinery to be used must comply with manufacturers specifications acceptable noise levels Maintain a complaints and grievance register and act promptly to complaints regarding noise 							
	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	3	2	2,3	2	2	2	4,7
Operational Phase								
	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	5	2	3	3	3	3	9,0
Mitigation	<ul style="list-style-type: none"> Ensure that the WWTW is adequately constructed to buffer noise coming from the facility. Also, maintain the WWTW in such a manner that it does not cause excessive noise. 							
	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	2	3	1	2	2	2	2	4,0
Cumulative Impact	No cumulative impact can be foreseen.							

Ambient noise will temporarily be impacted upon due to the movement and activities of construction vehicles. Due to the temporary nature of these activities, it is not foreseen that these impacts will significantly alter the ambient noise of the overall environment. The risk is rated LOW-MEDIUM for both the constructional and operational phase before mitigation and LOW after mitigation. It is foreseen that this risk will not have a significant effect on the environment if mitigation measures are applied.

2. Air quality								
Impact	Dust and noxious fumes can be generated during the construction and operational phases.							
Description of impact	During the construction phase dust can be generated through heavy vehicles travelling regularly on gravel roads, and excavation for trenches. Petrochemical and exhaust emission from construction vehicle may also add to lowering of air quality. During the operational phase attention should be given to the generated odour through the treatment plant.							
Constructional Phase								
	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	3	3	3	3	2	2,5	7,5
Mitigation	<ul style="list-style-type: none"> • Confine vehicle movements on unpaved roads to demarcated areas only • Ensure that site drainage carries spillage of clay or coal fines away from traffic movement zones • Spraying of clay or coal stockpiles if wind erosion is observed. • Set up water sprayers along haul roads to dampen dust and minimise dust loading to surrounding vegetation. • Speed control for all roads to limit dust generation. 							
	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	2	1,7	3	2	2,5	4,2
Operational Phase								
	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	3	3	2	2,7	2	2	2	5,3
Mitigation	<ul style="list-style-type: none"> • The handling removal and disposal for animal waste products must be in terms of legal requirements and as per guidance through an approved operational Environmental Management Plan 							
	Severity	Duration	Extent	Consequence	Frequency	Probability	Likelihood	Significance
	1	2	2	1,7	2	2	2	3,3
Cumulative Impact	Cumulative impacts can be foreseen when construction of the WWTW coincidence with the harvesting and ploughing seasons, with will contribute to the amount of dust in the air.							

Air quality will temporarily be impacted upon due to the movement and activities of construction vehicles. Due to the temporary nature of these activities, it is not foreseen that these impacts will significantly alter the air quality of the overall environment. Air quality and the risks involved will have a small to insignificant effect on the environment and people nearby. The only risk to air quality will be the cumulative impacts of excavating during windy conditions in combination with the harvesting and ploughing season on surrounding farms. The impacts for both the construction and operational phases score a LOW-MEDIUM rating before mitigation and LOW after mitigation measures have been implemented.

Noise and Air Quality Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Generation of noise	9,3	4,7	9,0	4,0	9,2	4,3
2. Air quality	7,5	4,2	5,3	3,3	6,4	3,8
					7,8	4,0

The impacts the project development will have on the noise and air quality will be minimal and insignificant if mitigation measures are implemented. Taking all factors into consideration the risk for noise and air quality scores a LOW-MODERATE value before mitigation and LOW after mitigation.

2.6. Socio Economic Impacts

It is expected that the proposed development will result in the creation of new employment opportunities. There will be the creation of permanent jobs associated directly with the operation of the various development components

1. Employment opportunities								
Impact	Job creation							
Description of Impact	Local labour from the community will be employed by the developer. This will have a positive impact on the wellbeing of employees with a multiplier effect on households of the employed							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	2	1	1.333333	1	2	1.5	2
Mitigation	<ul style="list-style-type: none"> No mitigation required 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	2	1	1.333333	1	2	1.5	2
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	2	1	1.333333	1	2	1.5	2
Mitigation	<ul style="list-style-type: none"> NEP consulting will be contracted for two years to do the maintenance of the WWT plant for a period of two (2) years during the operation phase. NEP consulting is to provide training to the local community 							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	2	1	1.333333	1	2	1.5	2
Cumulative Impacts	No cumulative impact can be foreseen							

Socio-Economic Impacts						
Impacts	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Generation of noise	2	2	2	2	2	2
					2	2

3. Conclusion

Total Combined Impacts		
Factors	Impact before Mitigation	Impact after Mitigation
2.1 Fauna and Flora	4.8	3.1
2.2 Heritage	3	1.67
2.3 Water Resources	3.19	1.4
2.4 Aesthetics	7.95	6.1
2.5 Noise and Air Quality	7,8	4,0
2.6 Employment oppotunities	2	2
Overall Impact	4.79	4,2

In conclusion it is foreseen that the project will not have a significant effect on the environment as a whole and scores an impact rating of **LOW-MODERATE (4.79)** before mitigation and **LOW (4.2)** after mitigation measures. Although the general impact ratings are low, certain individual risks need to be monitored constantly as it involves the greatest risk to the project and environment. These include the risks to Water Resources under surface water quantity [**3.19** (before mitigation) and **1.4** (after mitigation)] and to Aesthetic Value when constructing the pipeline [**7.95** (before mitigation) and **6.1** (after mitigation)]. Other than the above-mentioned individual risk, this project has no fatal flaws and considered to be of minimal impact to the environment.

Appendix G: Environmental Management Programme (EMPr)





Environmental Management Programme (EMPr)

STELLA BULK SEWER AND INTERNAL RETICULATION

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Completion Date: November 2020

Contents

1 INTRODUCTION.....	6
1.1 TERMS OF REFERENCE	7
1.2 PURPOSE OF THE EMP	7
1.3 SCOPE.....	8
2 PROJECT LOCATION AND DESCRIPTION	8
3 Applicable legislation.....	11
4 Recommendations	12
4.1 Specialist's Recommendations on impact minimisation	12
4.2 Environmental Authorisation	13
5 Construction Phase EMP	13
5.1 Structure and Responsibility	13
5.2 Lines of Communication	15
5.3 Commencement of works	15
5.4 Method Statements.....	15
5.5 Record Keeping.....	16
5.6 Environmental Mitigation Specifications for Impacts.....	16
5.6.1 Social and Environmental Issues	16
5.6.2 Establishing Office / Camp Sites	16
5.6.3 Air Quality.....	17
5.6.4 Noise and Vibrations	17
5.6.5 Erosion Control.....	17
5.6.6 Contamination of Land	18
5.6.7 Use of cement or concrete	18
5.6.8 Surface Water and groundwater Quality	19
5.6.9 Water Usage	19
5.6.10 Fauna and Flora.....	20
5.6.11 Safety.....	20
5.6.12 Historical, Archaeological and Heritage Impacts	20
5.6.13 Solid waste Management	20
5.6.14 Rehabilitation.....	21
6 Operational Phase EMP.....	22
6.1 Traffic access routes.....	22
6.2 Water Management.....	22
6.3 Waste Management.....	22
6.4 Recycling.....	22
6.5 Pollution Management.....	23
6.6 Sewerage Management.....	23

6.7 Chemical management (if required)	23
6.8 Waste/Effluent Management	24
6.9 Emergency/contingency	25

TERMS AND ABBREVIATIONS

Audit - regular inspection and verification of construction activities for implementation of the EMP

Bund - enclosure under / around a storage facility to contain any spillage.

Batch plant - a concrete or plaster mixing facility and associated equipment and materials.

Contractor - the principal persons / company undertaking the construction of the development

Developer - The developer is the same person as the applicant or the client.

Development site - boundary and extent of development works and infrastructure.

Engineer - A person who represents the client and is responsible for enforcing the technical and contractual requirements of the project.

ECO - Environmental Site Agent: - Person responsible to applicant tasked with implementing and controlling the environmental requirements during construction.

RE – Resident Engineer: - Represents the Engineer on site

DEFINITIONS

Emergency situation – An incident, which potentially has the ability to significantly impact on the environment, and which, could cause irreparable damage to sensitive environmental features. Typical situations entails amongst others the:

- Spill of petroleum products and lubricants onto eco systems;
- Potential event of impeding the continuous flow of water to downstream water users dependant on the flow; and
- Dangerous situation where livestock and small children can be injured by any activity emanating from the construction or rehabilitation of the project implementation.

Alien Vegetation: alien vegetation is defined as undesirable plant growth which shall include, but not be limited to; all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.

Aspect: Element of an organisation's activities, products or services that can interact with the environment.

Auditing: A systematic, documented, periodic and objective evaluation of how well the environmental management plan is being implemented and is performing with the aim of helping to safeguard the environment by: facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.

Built Environment: Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours

Contamination: Polluting or making something impure.

Corrective (or remedial) action: Response required addressing an environmental problem that is in conflict with the requirements of the EMP. The need for corrective action may be determined through monitoring, audits or management review.

Degradation: The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Ecology: The scientific study of the relationship between living things (animals, plants and humans) and their environment.

Ecosystem: The relationship and interaction between plants, animals and the non-living environment.

Environment: environment means the surroundings within which humans exist and that could be made up of –

- The land, water and atmosphere of the earth;
- micro-organisms, plant and animal life;
- any part or combination of (i) and (ii) and the interrelationships among and between them; and
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental aspect: an environmental aspect is any component of a contractor's construction activity that is likely to interact with the environment.

Environmental impact: an impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

Environmental Authorisation: an environmental authorisation is a written statement from the Department of Economic, Development, Environment, Conservation and Tourism (DEDECT) that records its approval of a planned undertaking to improve, upgrade or rehabilitate and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

Hazardous waste: Waste, even in small amounts that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.

Land use: The use of land for human activities, e.g. residential, commercial, industrial use.

Mitigation: Measures designed to avoid, reduce or remedy adverse impacts

1 INTRODUCTION

The main purpose of this Environmental Management Plan or Programme (EMPr) is to prevent avoidable damage and/or minimise or mitigate unavoidable environmental damage associated with any construction, maintenance, or demolition work where there is a risk of environmental damage and to enhance positive benefits of the project. The EMP constitutes one of the contractual obligations which must be committed to by all contractors/employees involved with construction maintenance or renovation operations. This document is compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development. IEM is a key instrument of the National Environmental Management Act [NEMA] (Act No. 107 of 1998). NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an EMP. The IEM guidelines encourage a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are taken;
- accountability for decisions taken;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, Social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;
- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the developers) be outweighed by the 'social benefits' (benefits to society as a result of the actions of the developers);
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from 'cradle to grave'); and.

The Environmental Impact Assessment Regulations that took effect in December 2014 regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

The general principles contained within this document apply to all PLANNING PHASE, CONSTRUCTION PHASE, and OPERATIONAL PHASE activities with regard to the road maintenance.

1.1 TERMS OF REFERENCE

Environmental Management Group was appointed by the NEP Consulting on behalf of Dr Ruth S Mompoti District Municipality as the independent Environmental Assessment Practitioner (EAP) to draft the EMP. In terms of the special conditions of the contract (specifications) the EMP must include the following:

- Details of the EAP (Refer to Page ii of this document)
- Purpose of the EMP
- Legal requirements
- Management of possible impacts
- Institutional arrangements
- EMP operational & implementation procedures

1.2 PURPOSE OF THE EMP

The purpose of this Environmental Management Programme (EMP) is to give direction and guidance to all responsible parties, and binds all contractors, sub-contractors and other persons working on the site to adhere to the terms and conditions of the EMP during the construction and operational phase of the project. The implementation of the EMP is not an additional or “add on” requirement.

The overall aim of the EMP is to prevent avoidable damage and/or minimise or mitigate unavoidable environmental damage associated with the construction, and to a lesser degree the operational, phases of the proposed project.

The EMP is legally binding through NEMA. The proponent is to ensure that through the project tender process the EMP forms part of the Project Contract Document for the proposed construction to be incorporated in line with:

- a. General project specifications; and
- b. SANS 1200 A or SANS 1200 AA, as applicable

This EMP:

- identifies project activities that could cause environmental damage (risks) and provides a summary of actions required;
- identifies persons responsible for ensuring compliance with the EMP;
- provides standard procedures to avoid and/or minimise the identified negative environmental impacts and to enhance the positive impact of the project on the environment;

- provides site and project specific rules and actions required, through the start-up report;
- forms a written record of procedures, responsibilities, requirements and rules for Contractor(s), their staff and any other person who must comply with the EMP;
- provides for monitoring of compliance and record keeping.

The EMP is partly prescriptive (identifying specific people or organisations to undertake specific tasks, in order to ensure that impacts on the environment are minimised), but it is also an open-ended document in that information gained during the construction activities and/or monitoring of procedures on site could lead to changes in the EMP.

1.3 SCOPE

This EMP addresses the construction- and operational phases and all activities associated with this project. Compliance to the EMP shall be monitored by an independent Environmental Control Officer (ECO) who will visit the site on a regular basis during the construction phase (at least twice monthly). The Client or the Construction Engineer or Project Manager, on behalf of the Client, will be responsible to ensure the implementation of the requirements of this EMP by all contractors and sub-contractors

2 PROJECT LOCATION AND DESCRIPTION

Dr Ruth S Mompati District Municipality is proposing to Develop a Bulk sewer system in Stella located in the North West Province. The site of work is located \pm 50km North East of Vryburg which is within the jurisdiction of the Dr Ruth S Mompati District Municipality.

The proposed entails a development of Stella bulk sewer system. The development will include a phase B for the entire internal sewer for Stella. This will improve the health and hygiene of the whole Stella community. The development of Stella Bulk Sewer system will be divided into the following 3 portions:

1. Outfall sewer pipelines and sewer pump pipelines
2. Wastewater Pump station
3. Wastewater treatment works

The pipeline lengths to be utilized entails:

- Rising Main - 200Ø mm – 3 170 m
- Outfall sewer - 250Ø mm – 1 488m
- Outfall sewer - 315Ø mm – 552m
- Manholes – 36

The development of the waste water Pump station will entail:

- Pre-treatment – Mechanical Grinder
- Emergency by-pass hand screen
- Concrete Sump – Surface Area – 48m² – Volume – 181m³
- Emergency Concrete Sump - Surface Area – 65m² – Volume – 165m³
- 3 X Self priming pumps
- Standby Generator
- Brick Pump station.

The Unit Process at the WWTW will entail:

- Anaerobic Pond
 - ❖ Anaerobic Pond
 - ❖ Volume – +- 400m³
 - ❖ HDPE Lined earth dam
- Aeration Basin
 - ❖ Surface area – 1560 m²
 - ❖ Volume – +- 6240m³
 - ❖ HDPE Lined earth dam
- Clarifier
 - ❖ Surface area – 196 m²
 - ❖ Volume – +- 686m³
 - ❖ HDPE Lined earth dam
- Maturation / Evaporation ponds
 - ❖ 6 Ponds
 - ❖ Surface area – 5642 m²
 - ❖ Volume – +- 9590m³
 - ❖ HDPE Lined earth dam
- Sludge Drying Beds
 - ❖ 4 Drying beds
 - ❖ Surface area – 1971 m²
 - ❖ Volume – +- 887m³
 - ❖ Concrete Structure
- Final water to be irrigated

The proposed WWTW includes an activated sludge process which will be able to produce a final effluent to comply with General Effluent Standard requirements

The Activated Sludge process will allow for the screening and the de-gritting of the raw sewage, before it is discharged to be treated. The screening consists of one mechanical screen, in a duty configuration. The

removed screenings will discharge into a screw press for watering/compaction. The de-gritting consists of one mechanical de-gritting channel, in a duty configuration. The settled grit will be conveyed to be discharged together with the dewatering/ compaction screenings.

The Activated Sludge process will lead to the secondary treatment process which is a typical biological nutrient removal process. The Biological process:

The WWTW will consist of an Aerobic pond. The pond provides for aerobic zones, with floating fine bubble aeration equipment.

The pond will be earthen basins, with high quality HDPE sheet lining.

Floating Fine Bubble Aeration (FFBA) equipment will be utilized for aeration in the aerobic dam. The FFBA equipment will also ensure proper mixing in the tank. The Waste activated sludge withdrawal will be executed and controlled from the return activated sludge delivery rising main.

- Process temperature simulation;= 12 to 22 °C
- General COD inflow concentration;= 864 mg/l
- General TKN inflow concentration;= 63 mg/l
- General Tot P inflow concentration;= 14 mg/l
- General suspended inflow concentration;= 440 mg/l
- General sludge age;= 18 – 20 days
- Mixed Liquor Suspended Solids (MLSS) operating concentration;= 4000 mg/l Secondary Settling;

The construction will be combinedly earth, HDPE lined, concrete and HDPE baffle walls to ensure, efficient side wall slopes for gravity settlement. The overflow will be done by means of v-notch overflow weirs to regulate proper flow conditions inside the tank. The settled sludge will be collected at the bottom with multiple collection hoppers, connected with the suction end of the return activated sludge pump set.

- Average design flow;= 1,5 Ml/day
- Maximum design flow;= 2,7 Ml/day
- Overflow loading at PDWF;= 200 kl/m.day
- Retention period at PDWF;= 1.5 h
- Up flow velocity at PDWF;= 1 m/h

The only sludge produced from the treatment process will be the daily waste activated sludge (WAS) from the secondary treatment process. The WAS will be wasted to the sludge drying beds, via the WAS control bypassing from the RAS pumps discharge pipe line. The sludge drying beds will provide adequate draining via the sand bed and sub-soil drain system, and also solar drying capacity through sufficient surface area exposure. The dried sludge will have to be removed manually and transported to adequate disposal facilities/landfill site. The filtrate (or supernatant) will join the final effluent for irrigation purposes.

Government Notice R327 (Listing Notice 1):

- **Activity 27:** The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation
- **Activity 25:** The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.

3 Applicable legislation

Constitution of the Republic of South Africa (1996): of special relevance in terms of environment is section 24

Conservation of Agricultural Resources Act 43 of 1983 (CARA): supports conservation of natural agricultural resources (soil, water, plant biodiversity) by maintaining the production potential of the land and combating/preventing erosion; for example, by controlling or eradicating declared weeds and invader plants.

Hazardous Substances Act 15 of 1973: to control substances that may cause injury, ill-health, or death through their toxic, corrosive, irritant, strongly sensitizing or flammable nature, or by the generation of pressure.

National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA): replaces the Atmospheric Pollution Prevention Act (No. 45 of 1965).

National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA): supports conservation of plant and animal biodiversity, including the soil and water upon which it depends.

- **National list of ecosystems that are threatened and in need of protection** (GN 1002 of 9 December 2011).

National Environmental Management: Protected Areas Act 57 of 2003 (as amended Act 31 of 2004) (NEMPAA): To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.

National Environmental Management: Waste Act 59 of 2008 (NEMWA): To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

- **List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment:** Identifies activities in respect of which a waste management license is required.

National Heritage Resources Act 25 of 1999: supports an integrated and interactive system for the management of national heritage resources, including supports soil, water and animal and plant biodiversity.

National Veld and Forest Fire Act 101 of 1998 (NVFFA): protects soil, water and plant life through the prevention and combating of veld, forest, and mountain fires

National Water Act 36 of 1998 (NWA): promotes the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner.

4 Recommendations

The following are site specific recommendations, as per the various specialist assessments of the project. Please note that if there is any contradiction between the following specialists recommendations and/or the conditions of the Environmental Authorisation, and the recommendations in Section 7 and 8 below, the Environmental Authorisation and specialist recommendations take precedent.

4.1 Specialist's Recommendations on impact minimisation

- The construction and operational phase of the project must be done in accordance with this environmental management programme, the aim of which is, to minimise environmental impact during the construction and operational phases.
- A suitable qualified ECO must be appointed to oversee the construction phase

Heritage

The proposed development footprints are located on palaeontological insignificant basalts, capped by unconsolidated, Quaternary wind-blown sand. The study area is considered to be of low archaeological significance and is assigned a site rating of Generally Protected C

Ecology

- Two protected species were recorded on the site and the applicable mitigation will have to be implemented to decrease the impact on them (Appendix C):
 - ❖ A few small specimens of Camel Thorn (*Vachellia erioloba*) occur on the site. Transplanting will not be feasible and permits should be obtained to remove them.
 - ❖ A population of the small geophyte, *Babiana hypogea*, transplants easily and affected specimens should be transplanted to adjacent areas where they will remain unaffected.
 - ❖ This should be done by conducting a search-and-rescue operation which should be overseen by a suitably qualified botanist or ecologist. Monitoring of the success of establishment should also be undertaken.
- The hunting, capturing or trapping of fauna, including mammals, reptiles, birds and amphibians, on the site should be strictly prohibited during construction and operation.
- Adequate monitoring of weed establishment and their continued eradication must be maintained (Appendix B). Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.

- After construction has ceased all construction waste should be removed from the area.
- Monitoring of construction including weed establishment and erosion should take place

Hydrology

- New monitoring boreholes be drilled around the new proposed facility during the constructional phase to gauge the current water quality in the area as well as to monitor future water quality.
- It is recommended that no activities occur there as these faults act as preferential pathways for water and potentially any contaminants. As it currently stands the new facility will not be built on the fault.
- The adjacent area next to the new proposed area be fully rehabilitated. This will be done to distinguish between the contamination from the old oxidation dams and the new facility. If the adjacent area is left as is there will be no way to determine which facility is causing the majority of nitrate contamination emanating for the aquifer

4.2 Environmental Authorisation

Please ensure that READ confirms their approval of this project in writing.

5 Construction Phase EMP

5.1 Structure and Responsibility

In order for the EMP to be successfully implemented, all the role players involved in the project need to cooperate. For this to happen, role players must clearly understand their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication.

Table 1: Functions and Responsibilities of Project Team

KEY	FUNCTION	RESPONSIBILITY
P	Proponent/Developer	Proponent is ultimately accountable for ensuring compliance to the EMP. The ECO must be contracted by the Proponent (full time or part time depending on the size of the project) as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of the EMP for the project. The Proponent is further responsible for providing and giving mandate to enable the ECO to perform responsibilities. The developer must ensure that the ECO is integrated as part of the project team.
PM	Project Manager	The Project Manager has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any

		decommissioning activity in contravention of the EMP in accordance with an agreed warning procedure.
ECO	Environmental Control Officer	<p>An independent Environmental Control Officer (ECO) shall be appointed, for the duration of the pre-construction and construction phase of the services and bulk Infrastructure, by the developer to ensure compliance with the requirements of this EMP. Thereafter, the individual property owners will be responsible for the further appointment of the ECO).</p> <p>The Environmental Control Officer shall ensure that the contractor is aware of all the specifications pertaining to the project.</p> <p>Any damage to the environment must be repaired as soon as possible after consultation between the Environmental Control Officer, Consulting Engineer and Contractor.</p> <p>The Environmental Control Officer shall ensure that the developer staff and/or contractor are adhering to all stipulations of the EMP.</p> <p>The Environmental Control Officer shall be responsible for monitoring the EMP throughout the project by means of site visits and meetings. This should be documented as part of the site meeting minutes.</p> <p>The Environmental Control Officer shall be responsible for the environmental training program.</p> <p>The Environmental Control Officer shall ensure that all clean up and rehabilitation or any remedial action required, are completed prior to transfer of properties.</p> <p>A post construction environmental audit is to be conducted to ensure that all conditions in the EMP have been adhered to</p>
C	Contractor	<p>The contractors shall be responsible for ensuring that all activities on site are undertaken in accordance with the environmental provisions detailed in this document and that sub-contractor and labourers are duly informed of their roles and responsibilities in this regard.</p> <p>The contractor will be required, where specified to provide Method Statements setting out in detail how the management actions contained in the EMP will be implemented.</p> <p>The contractors will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the environmental regulations</p>
ESO	Environmental Site Officer	<p>The ESO is employed by the Contractor as his/her environmental representative to monitor, review and verify compliance with the EMP by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the contractor's management team.</p> <p>Dependent on the size of the development the ESO must be on site one week prior to the commencement of construction. The ESO must ensure that he/she is involved at all phases of the construction (from site clearance to rehabilitation).</p>
A	Lead Authority	<p>The authorities are the relevant environmental department that has issued the Environmental Authorisation. The authorities are responsible for ensuring that the monitoring of the EMP and other authorisation documentation is carried out, this will be achieved by reviewing audit reports submitted by the ECO and conducting regular site visits.</p>
OA	Other Authorities	<p>Other authorities are those that may be involved in the approval process of an EMP. Their involvement may include reviewing EMP's to ensure the accuracy of the information relevant to their specific mandate.</p> <p>Other authorities may be involved in the development, review or implementation of an EMP.</p> <p>For example if a specific development requires a water use licence for the relevant national authority then that authority should review and comment on the content of the particular section pertaining to that mandate.</p>
EAP	Environmental Assessment Practitioner	<p>The definition of an environmental assessment practitioner in Section 1 of NEMA is <i>"the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through regulations"</i>.</p>

5.2 Lines of Communication

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

5.3 Commencement of works

The site project contractors must timeously receive a copy of the construction phase EMP (CEMP) and any other further additional information that pertains to site conditions/amendments or deviations from original site plan.

- This EMP must be included to form part of the Contractors site specification documentation.
- A copy of the EMP must be on site at all times and available for presentation to any authority requesting to see such document

5.4 Method Statements

The Contractor shall submit written Method Statements for all environmentally sensitive aspects of the work. It should be noted that Method Statements must contain sufficient information and detail to mitigate the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him / her in order to undertake the works. Work shall not commence until Method Statements have been put in place.

The method statement defines the nature of the planned work with a step-by-step outline such that the ECO and the applicant may understand the intentions of the contractor. It would enable them to assist in the implementation of any mitigating steps that will mitigate the environmental effects across such tasks. Until any particular construction activity is scheduled to start, the contractor must submit the method document. Work may not begin until the method statement has been accepted by the ECO and the applicant.

The method statement must cover the relevant information concerning:

- Location & development of concrete batching plant facilities
- Location and timing of activities
- How to store material
- How to get equipment to and from site
- Procedures for the construction
- Compliance/ non-compliance with the Specifications, and
- Any other information which the applicant and ECO find appropriate

The contractor must comply with these approved method statements and any operation covered by a method statement must not begin until the applicant and the ECO have approved this method statement

5.5 Record Keeping

All records relating to the implementation of this Environmental Management Plan must be kept together, be readily retrievable and available for scrutiny by any relevant authority. Records include the following:

- Declarations of understanding;
- ECO Checklist, audits and/or diary;
- Method statements
- Photographs (must be taken before, during and immediately after construction as a visual reference);
- The Environmental completion statement.
- These records must be available for scrutiny by any relevant authorities

5.6 Environmental Mitigation Specifications for Impacts

5.6.1 Social and Environmental Issues

It is important to minimize any negative perception, by taking proactive measures to prevent any social conflicts or social gaps and to develop a positive attitude within the community of the project. The following management strategies are to be implemented:

- Transparent fair recruitment and procurement practices. The contractor chosen should maximize the involvement of local communities in construction and support activities, to the extent possible, based on available skill levels. Whenever possible, training programmes that will benefit both construction stage skills requirements and long-term employment demand should be developed.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- Priority should be given to the local suppliers of goods and services, which meet requirements of project procurement as far as is possible. In order to optimize the opportunities for local businesses to supply goods and services to the project, the contractor will do a survey of the capabilities of the goods and services that are locally available that are of an acceptable standard and quality and a survey of the capabilities of local construction companies and identify opportunities for local suppliers.
- A public complaint register and system to ensure that community complaints clearly investigated and adequate remedial taken should be instituted.
- Adequate notification should be done to people residing close to where construction activities are taking place especially if they are to be affected by them. In addition, there should be a system of compensation for any damages to infrastructure that may occur.
- Each worker should be required to abide by a Code of Conduct which will limit unsavoury activities in local towns and communities and restrict certain behaviours in the work sites and accommodation

5.6.2 Establishing Office / Camp Sites

- The area chosen for these purposes shall be the minimum reasonably required and which will involve the least disturbance to vegetation. No trees or shrubs will be felled or damaged for the purpose of obtaining firewood, unless agreed to by the landowner/tenant.
- Fires will only be allowed in facilities or equipment specially constructed for this purpose. If required by applicable legislation, a fire-break shall be cleared around the perimeter of the camp and office sites.

- Lighting and noise disturbance or any other form of disturbance that may have an effect on the landowner/tenant/persons lawfully living in the vicinity shall be kept to a minimum.
- Chemical toilet facilities or other approved toilet facilities should be sited in such a way that they do not cause water or other pollution. The use of existing facilities (if any) must take place in consultation with the landowner/tenant.
- In cases where facilities are linked to existing sewerage structures, all necessary regulatory requirements concerning construction and maintenance should be adhered to. The facilities must comply with water act requirements.
- Adequate signage must be provided and the area must be appropriated secured.
- Adequate parking and security should be provided at the campsites

5.6.3 Air Quality

The main sources of impact on air quality are mobilization of equipment, and earthworks. To ensure air quality characteristics of the project area are maintained near the baseline conditions during of the construction stage, the following measures shall be done:

- Regular inspection and scheduled maintenance of all equipment to ensure that construction vehicles are in good condition, are utilising fuel efficiently and do not smoke.
- Periodically watering the bare surfaces and excavations during construction to keep the dust level down.
- Slowing down the vehicles carrying the construction materials to reduce dust generation.
- Properly wrapping the material truck containers with cover to avoid dust spreads on windy days and prohibiting transport of over loaded trucks.
- Providing and using the safety equipment such as dust mask, noise cover for employees who work near the dusty location such as the heavy equipment operators
- Optimization of working schedule and work to help to minimize several material vehicle mobilization trips

5.6.4 Noise and Vibrations

The primary noise sources will be vehicles and equipment utilized during the construction stage including graders, bulldozers, general purpose vehicles, etc. To manage the impact the following will be done:

- Working schedule for the activities with high noise level will be arranged between 08:00 AM to 17:00 PM.
- Only well-maintained vehicles and equipment should be operated onsite and all machinery should be serviced regularly during the construction stage.
- Avoiding unnecessary simultaneous noisy activities.
- No amplified music shall be allowed at the site.
- Selecting 'quiet' construction equipment and working method and avoiding unnecessary revving and hooting.
- Providing ear protection for activities that are likely to create noise in order to protect worker's health and safety.

5.6.5 Erosion Control

Construction activities will require the removal of vegetation cover, potentially resulting in soil erosion and subsequent impacts on surface water quality due to uncontrolled rainwater run-off or mechanical/wind action.

The following measures are necessary to minimise impacts.

- Clearance of vegetation should be restricted to the absolute minimum required to facilitate construction activities to proceed. No protected plant species shall be removed without a permit. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible.
- Appropriate drainage systems will be built to accommodate the surface water movement from the rain and wind.
- Construction activities shall take place only within the approved demarcated area. Appropriate drainage facilities must be constructed to make sure water runs smoothly downstream.
- Top soil layer will be kept to rehabilitate and will be adequately stored to protect it from erosion.
- Areas where construction has been finished should immediately be re-vegetated

5.6.6 Contamination of Land

Land contamination may occur as a result of fuel and oil leaks or spills and/or poor fuel, chemical and waste storage.

- The storage areas shall be securely fenced and secured and appropriately marked to indicate the goods in the storage. Material Safety Data Sheets should be kept for all hazardous materials on site.
- All hazardous substances and stocks such as diesel, oils, detergents, etc., shall be stored in areas with impervious flooring such as concrete and properly bunded. Drip pans, other impervious surface, shall be installed in such storage areas with a view to prevent soil and water pollution.
- Dedicated impervious areas should be designated for concrete mixing and the spillage from concrete mixed should be cleaned immediately.
- The waste management strategy on the construction site should be hinged on the waste hierarchy model of 'reduce, reuse and recycle' waste in order to reduce the ultimate impact on the environment.
- All used oils, grease or hydraulic fluids shall be placed in appropriate impervious containers and these receptacles will be removed from the site on a regular basis for disposal at a licensed disposal facility or sent for recycling/reuse with a registered facility.
- Residues from machinery maintenance and other sources contaminated with hazardous waste should be stored in proper containers that avoid seepage to ground.
- Spills should be cleaned up immediately by removing the spillage together with the polluted soil and by disposing of them at a recognised facility. In areas where the spills are some, an absorbent agent can be used and the area treated in situ
- Adequate waste receptacles shall be made available and all waste shall be adequately stored so that it does not pose a pollution risk. General waste is to be disposed of through the municipal service. Any other waste will be disposed of through only licensed waste disposal facilities.

5.6.7 Use of cement or concrete

Concrete and cement may only be mixed on existing hard surfaced areas, or edged mortar boards or a suitable container. Concrete may not be mixed or stored directly on the ground under any circumstances;

- The visible remains of the batch and concrete, either solid, or from washings, must be physically removed immediately and disposed of as hazardous waste.
- Washing of equipment shall be done in a container to prevent any runoff of contaminated washing water.
- Extreme care must be taken to limit the amount of water contaminated by washing equipment. Water from concrete washing can be re-used in concrete mixes or must be stored in drums, then removed from the site and disposed of at a licensed municipal dump site.

Concrete batching plants

The following procedures must be implemented to control waste water run-off from concrete batching plant locations:

- The location of concrete batching areas must be approved by the ECO (if possible/appropriate, the use of ready-mix concrete is preferred).
- Concrete batching facilities must have suitable bunding methods in place to ensure minimal waste water run-off occurs during batching operations.
- Contaminated water may not enter a natural or man-made (e.g. trench / sloop or dam) water system. Preventative measures include establishing sumps from where contaminated water can be either treated in situ or removed to an appropriate waste site.
- Dry mixing batching areas to be carefully placed in consultation with the ECO.
- Cement bags are to be stored securely out of harm's way from the elements (wind and rain). Bags have to be covered and placed on plastic sheeting. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose.
- Sand and stone used for cement or concrete batching must be stored on plastic layers (or on ECO approved disturbed areas) in order to prevent contamination of the natural environment.
- Cleaning of equipment and flushing of mixers must not result in pollution of the surrounding environment. All wastewater resulting from batching of concrete must be disposed of *via* the contaminated water management procedure.
- Excess or spilled concrete must be confined within the works area and all visible remains of excess concrete must be physically removed and disposed of on completion of cement work. Washing the remains into the ground is not acceptable. All excess aggregate must also be removed.
- Wash-down areas must be confined to within the concrete batching areas only

5.6.8 Surface Water and groundwater Quality

Poor chemical storage and poor waste management practices may lead to the contamination of water sources. Sewage and sanitary effluent has the potential to adversely affect the quality of receiving water bodies unless properly managed. To eliminate the risk of contamination, the following measures have to be instituted.

- Chemical toilets shall be used during the construction stage and a registered service provider shall be contracted to service the toilets regularly.
- Suitable covered receptacles for waste shall be available at all times and conveniently placed for the disposal of waste.
- Warehouse floors and workshop areas should be of concrete. Drainage from warehouse is collected separately with trap for oil or fuels oil. Trap containers when full will be removed, properly stored and sent out to oil waste management company.
- Refuelling, fuel loading/unloading, oil change-outs, waste storage and disposal activities must be carefully managed to prevent spillages.
- Adequate toilets must be available on site for use by construction staff at all times. The digging of pit latrines for this purpose is not allowed under any circumstances. Should chemical toilets be used, an appropriate contractor must be employed to service these facilities on an ongoing basis.
- Spills or overflows from chemical or other toilets used by construction staff must be dealt with by a sanitation expert immediately.
- Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and treated prior to discharge or removed from the site for appropriate disposal at a recognised facility.
- Two monitoring boreholes be drilled north east and north west of the study area.
- Responsible management of the site will be required to reduce risks/threats to groundwater and surface water

5.6.9 Water Usage

- Any water that is used which does not emanate from Municipality supplies must be registered and authorised by the Department of Water Affairs prior to usage commencement.
- The contractor shall promote responsible water use by all personnel.

5.6.10 Fauna and Flora

Fauna and flora are negatively impacted by noise from construction activities (disturbance) and gathering/hunting of flora and fauna by workers. The following measures are necessary to mitigate impacts.

- Topsoil shall be removed and kept for use during rehabilitation.
- The Contractor shall be responsible for the removal of alien vegetation within areas affected by the construction activities including cleared ground and topsoil stockpiles. Equipment used should be regularly washed down to avoid transporting seeds (invasive species) or plant diseases.
- No protected or endangered plant species shall be removed without a permit or license.
- No trees or shrubs will be felled or damaged for the purpose of obtaining firewood, unless agreed to by the landowner/tenant.
- The rehabilitation activities require the re-planting of vegetation in any areas cleared for the construction activities. This will promote soil stability, improve the visual environment and provide faunal habitat.
- Hunting/gathering by construction workers must not be permitted.
- Localized habitat features such as nests, dens or burrow sites should be avoided as much as possible. In addition, care should be taken in working in areas of active nesting, spawning, and feeding areas.

5.6.11 Safety

- The Contractor shall be responsible for the protection of the public and public property from any dangers associated with the construction and operation activities,
- All work should be handled in accordance with the Occupational Health and Safety Act and adequate safety precautions taken and suitable sanitation facilities provided in line with the requirements of the act. It is the duty of the contractor to ensure that the all protective measures against accidents are done.
- Any works/activities which may pose a hazard to humans and/or domestic animals are to be protected or cordoned off and, if appropriate, warning signage erected
- Appropriate security is to be provided at the site to protect equipment and provide for a safe construction site and works areas.
- Any damage caused as a result of the construction activities shall be repaired to the satisfaction of the project manager and owner.

5.6.12 Historical, Archaeological and Heritage Impacts

- Should any cultural or archaeological artefacts be found during operational activities, operations must cease immediately and the area secured and SAPS, and the South African Heritage Resources Agency and other relevant authorities informed immediately.
- No site of archaeological or historical significance maybe moved without a permit from the SAHRA. Any permitted removal of any archaeological or historical matter must be done under the strict supervision of a qualified registered archaeologist.

5.6.13 Solid waste Management

Waste refers to all solid waste, including domestic waste, hazardous waste and construction debris. The Contractor are responsible for the establishment of a refuse control system (which must consider recycling wherever possible) that is acceptable to the ECO. Disposal arrangements must be made in advance and cleared with the ECO before construction starts.

- No littering or on-site burying or dumping of any waste materials, vegetation, litter or refuse may occur.
- All solid waste must be disposed of offsite at an approved landfill site in terms of section 20 of the Environment Conservation Act (Act No. 73 of 1989). The Contractor must supply the ECO with a certificate of disposal.

- The Contractor must provide problem animal- and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids must be kept firmly on the bins at all times. Bins must not be allowed to become overfull and must be emptied regularly.
- Waste from bins may be temporarily stored on Site in a central waste area that is weatherproof and scavenger proof and which the Engineer and the ECO has approved.
- All hazardous waste must be disposed of at a registered hazardous waste disposal site and certificates of safe disposal must be obtained.
- All waste generated during the decommissioning and reconstruction activities must be removed by the Contractor as soon as possible, and within the period specified in the EMP and disposed of at a registered landfill site.
- The Contractor must make provision for workers to clean up the Contractor's camp and working areas on a daily basis so that no litter is left lying around and so that the site is in a neat and tidy state. The Contractor must remove from site the refuse collected at least once a week.
- All sewage as well as any waste generated during the construction phase, should be collected, contained and disposed of at the permitted and/or licensed facilities of the Local Authority. Please note that proof of the agreement between the Applicant and the concerned Local Authority must be submitted to the Department of Water and Sanitation (Tel: 054 338 5800).
- No waste from the facility should be released to the environment during operation. Wastewater should be contained within the evaporation ponds.
- The disposal of general waste and that of hazardous waste must be carried out in an environmentally safe way as to prevent and/or minimise the potential for pollution of water resources and collection of which should be done by an accredited waste collector. All applicable Sections of the National Environmental Management: Waste Act (Act 59 of 2008) should be strictly adhered to;

5.6.14 Rehabilitation

- On completion of operations, all buildings, structures or objects on the camp/office site shall be demolished and removed.
- Where office/camp sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.
- On completion of operations, the areas shall be cleared of any contaminated soil, which must be dumped as per the waste management plan.
- All the infrastructure, equipment, plant, temporary housing and roads and other items used during the construction period will be removed from the site.
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the area and disposed of at a registered waste disposal facility. It will not be permitted to be buried or burned on the site.
- Disturbed areas should be left in a safe and stable manner. Preventative measures may be necessary to construct adequate drainage structures including ditches and other structures to facilitate the movement of surface water.
- Photographs of the camp and office sites, before and during the construction and after rehabilitation, shall be taken at selected fixed points and kept on record.
- The disturbed surfaces shall then be ripped or ploughed and the topsoil previously stored shall be spread evenly to its original depth over the whole area. The area shall then be fertilised if necessary (based on a soil analysis).
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, there might be need that the soil be analysed and any deleterious effects on the soil arising from the construction operation be corrected and the area be seeded with a seed mix to his or her specification

6 Operational Phase EMP

6.1 Traffic access routes

Operator of the site must control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes. In addition such vehicles and plant must be so routed and operated as to minimise disruption to regular users of the routes not on the Site.

- On public roads adjacent to the Site vehicles/ delivery trucks/ tankers will adhere to municipal and provincial traffic regulations.
- Only approved access roads may be used.
- All measures must be implemented to minimize impacts on local commuters e.g. limiting tanker vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

6.2 Water Management

- Ensure that all additional water uses are correctly registered with the Department of Water and Sanitation (e.g. Agri-industrial use).
- Water conservation measures such as low flow taps, high pressure hoses, dual flush toilets, water wise gardens, rainwater tanks etc. must be encouraged and implemented where possible if required.
- Every reasonable effort must be made to reduce the long term water demand.
- Environmental training of personnel must include water conservation awareness.
- A monthly water monitor program with the aim of ever reducing the water usage must be implemented (records must be kept).

6.3 Waste Management

- An integrated waste management approach based on waste minimisation (e.g. reduction, recycling, re-use and disposal) must be encouraged. Poor waste management can lead to adverse environmental impacts (e.g. odours, pollution and visual impact) as well as health risks. Sound waste management is thus non-negotiable.
- No on-site burying or dumping of any waste materials, vegetation, litter or refuse may be allowed.
- Domestic waste must be stored in approved containers (e.g. bins with removable lids).
- All solid waste will be disposed of at a landfill licensed in terms of section 20 of the Environment Conservation Act (Act No. 73 of 1989).
- If required, any future industries on site requiring additional waste and/or emissions permits or licences in terms of the applicable legislation, the owner/tenants must obtain these permits/licences before the specific operations can commence.

6.4 Recycling

Whenever possible, a suitable recycle arrangement must be negotiated with a local recycle agent to ensure the re-use of recyclable material. Recycling should aim at sorting as much of the following materials as practical:

- Paper and cardboard
- Aluminium
- Copper
- Metals (other than aluminium and copper)
- Glass

- Organic waste
- Batteries
- Electronic equipment

6.5 Pollution Management

All possible pollution sources must be identified and all reasonable steps taken to prevent pollution or accidental spillages.

- Ensure that all concentrated potential sources of pollution are protected (bunded) in order to minimise the risk of accidental spillage or pollution. Storage tanks should be bunded in such a way to contain at least 120% of the storage tank's capacity.
- Vehicles and other machinery must be serviced well above the 1:100 year flood line or within a horizontal distance of 100m from any watercourse or 500m of a wetland/pan. Oils and other potential pollutants must be disposed at an appropriate licensed site, with the necessary agreement from the owner of such a site;

6.6 Sewerage Management

If applicable sewerage must be installed in accordance with the Municipal regulations and Department of Water and Sanitation (DWS) requirements.

- Sewerage management must aim at the prevention of pollution and must be maintained on a regular basis.
- Maintenance records must be kept

6.7 Chemical management (if required)

Proper chemical management is required to minimize or eliminate the risk of environmental damage, as well as the risk of fatalities, illnesses, injuries and incidents arising from the storage, handling, transport and disposal of hazardous material.

- Compliance with the Occupational Health and Safety Act of 1983
- An emergency plan must be made to comply with section 30 (Control of emergency incidents) of the National Environmental Management Act (NEMA), No. 107 of 1997.
- In case of a spill or leak of product, such incident must be reported to all relevant authorities and the Directorate: Pollution Management in accordance with Section 30 (10) of NEMA, No. 107 of 1997.
- All staff on the site should be well trained and have the appropriate PPE in all aspects of the Occupational Health and Safety procedures pertaining to activities of the filling station.
- Access to chemical storage areas must be strictly restricted authorised personnel.
- Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs should additionally include

information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.

- A system shall be in place to ensure that MSDS are available to all personnel (including first-aiders and medical personnel) involved in the transportation, storage, handling, use and disposal of hazardous materials on site.
- Labelling shall be in place on all storage vessels, containers and tanks, where significant risks exist (based on a risk assessment). Labelling shall clearly identify the stored material.
- Personnel using and handling chemicals shall have received proper training for this purpose, using information available from the MSDS.
- For each site establishment, yard or other temporary chemicals storage area, a map indicating the potential sources of pollution and corresponding location of spill kits will be prepared. Spill kits will be placed at sufficient proximity in accordance with the degree of risk for spillage, and a responsible person designated for each.
- Emergency response equipment for spillage containment, fires, explosions, burns, etc. must be made available.
- Visible safety signs should be placed in areas of potential hazard, e.g. where tap water is not to be used for drinking purposes, indicating the dangers of chlorine or informing of the safety equipment to be worn when entering a certain area, etc.
- Where chemicals such as chlorine are being dosed self-contained breathing apparatus (SCBA) must be available and the expiry date is relevant. This apparatus must be kept out of the chlorine room.
- Appropriate response arrangements with external medical providers e.g. ambulance, hospitals, fire brigade etc. must be made and emergency numbers must be easily available and prominently displayed.
- Emergency response procedures appropriate to the hazardous materials and the disposal of the hazardous material must be drafted.
- All emergency equipment to be checked at least every 6 months and serviced as required. A record of all checks must be kept.
- All associated records, documentation and registers, reports, monitoring data relating to the chemical management plan must be stored on file and available for audit purposes

6.8 Waste/Effluent Management

- The oxidation ponds must be lined with an appropriate HDPE lining to prevent leakage from the ponds
- The Operational Manager will ensure that the linings be regularly inspected to ensure there are no holes, cuts, tears etc.
- Any installed leak detection systems must be regularly checked.
- Appropriate overflow measures must be included, with the overflow held in similar lined ponds

- If necessary, the solid waste from the evaporation ponds must be removed when necessary, and appropriately handled and disposed of. Any permits, authorisations etc. that may need to be obtained for the removal and disposal of the waste must be obtained before.
- Records must be kept of waste removal from site. These should indicate who is removing this waste and to where.
- The Operational Manager is to ensure visual monitoring of all other waste handling on site on a regular basis.
- The de-sludging of anaerobic ponds poses special challenges. A new pond should be ready for use prior to the de-sludging operation. The pond in need of maintenance should be allowed to properly dry out before the sludge is removed. Sludge should preferably not be disposed of in the direct catchment area, but should be moved elsewhere so that there is no chance left for any of it to move into nearby watercourse during floods.
- Given the ecological realities, treated sewage effluent should preferably be used for irrigation of crops in the area. The effluent should also be allowed to evaporate from a pond designed for this purpose. The very high evaporation rate of the area would aid the process.

6.9 Emergency/contingency

Responsible management and operation of the facility and the adoption of best practice during the operation of the plant must take place.

- Downstream users are to be notified immediately by the site supervisor if a total system failure takes place.
- A list of contact details of suitably qualified technicians (fitters, electricians etc.) must be on site.
- The installed leak detection systems must be regularly checked.
- All relevant municipal and provincial water authorities are to be immediately notified in case of flooding, accidental overflow or leakage from the facility.
- A safety representative must be allocated, and all personnel on the site must know who the safety representative is and safety meetings should take place regularly.
- Maintenance and management roles should be clearly defined.
- All new operational staff and maintenance contractors to undergo general environmental awareness training before working on site, as well as health and safety induction. All staff to be suitably qualified and have the necessary training.
- Suitable response protocols implemented to ensure optimum and safe operation of the facility and corrective actions must be implemented in the event of any wastewater/effluent leaks or spills.

Appendix H: Details of EAP and expertise







ENVIRONMENTAL MANAGEMENT GROUP

Specialists in Environmental Management
Integrating Industry and Infrastructure with the Environment

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Postal Address:
P.O.Box 37473,
Langenhoven Park 9330

CURRICULUM VITAE

Salmon E. van Rooyen (Sampie)

*Director Managing & Environmental Assessment Practitioner & Ecologist
(MSc. Cand.Sci.Nat.116554; IAIA Reg No. 5901)*

Personal Information

ID: 9205095047086
Nationality: South African
Gender: Male
Health: Excellent
Vehicle License: Code A&B
Language: English/Afrikaans
Contact number: 083 678 3032
Email: svr@envmgrp.com

Skills and Responsibilities

- Use of Geographical Information Systems;
- Conduct Environmental Impact Assessments and other Environmental Technical Investigations;
- Apply and obtain, water licenses, mining permits and environmental authorisations for clients;
- Use different GIS datasets in order to create new information or investigate patterns for projects;
- Conduct environmental compliance and other environmental audits;
- Microsoft Office and Planet GIS;
- Project Management;
- Biodiversity Assessments;
- Agricultural advisory.

Professional Experience

Date	5/2017 - Present
Organisation	Environmental Management Group
Position	Director; EAP; Ecologist

Date	8/ 2016 - 5/2017
Organisation	Terra Works Environmental
Position	Environmental scientist/ Office Manager

Date	1/2016 - 8/2016
Organisation	Bokamoso Environmental
Position	Environmental Specialist (Fauna and Flora), Water Use License Application Consultant, General Environmental Consultant.
Responsibilities	Conducting specialist Faunal and Flora assessments. Applying for Water Use Licenses. GIS Mapping. Environmental Impact Assessments.



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Date	1/2015 – 6/2015
Organisation	Agreenco
Position	Flora and Fauna Specialist
Responsibilities	Rehabilitation and Alien eradication on game farm in the Magaliesburg region, Rustenburg.

Date	2014 - 2015
Organisation	NWU Potchefstroom
Position	Practical demonstrator
Responsibilities	Responsible for laboratory preparation for NWU and UNISA Botany practical sessions, assistant facilitator of the practical syllabus, invigilating practical exams.

Date	1/2015 – 11/2015
Organisation	NWU Potchefstroom
Position	Practical Post-Graduate Student Assistant
Responsibilities	Assisting Post-Graduate students in veld surveying methods and technologies.

Date	1/2014 – 6/2014
Organisation	E-Tek Consultants
Position	Contract, Monitoring specialist on De Beers Mining, Kimberley.
Responsibilities	Monitoring rehabilitated tailings on De Beers mines.

Date	2008 - 2016
Organisation	Monswario Boerdery
Position	Assistant Farm Manager
Responsibilities	Farming experience of Bonsmara cattle and Meat-master sheep, as well as veld management practices.

Education

Institution	Degree(s) or Diploma(s) obtained
North West University Potchefstroom 2011 – 2013	BSc. Environmental and Biological Sciences and Tourism
North West University Potchefstroom 2014 – 2015	Hons BSc. Environmental Sciences (<i>Ecology: Ecological Remediation & Sustainable development</i>)
North West University Potchefstroom 2015 – 2016	MSc BSc. Environmental Sciences (<i>Ecological Remediation & Sustainable Management</i>)
North West University Potchefstroom 2015	Short Course at CEM (Centre for Environmental Management) in Basic Principles of Ecological Rehabilitation and Mine closure.



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Research and Conferences

Masters degree research project (2015 January-2016 November)

Ecological Remediation and Sustainable Management

Supervisors: Prof. Klaus Kellner and Dr. Niels Dreber

Title: Composition and structure of woody vegetation in thickened and controlled bushveld savanna in the Molopo, South Africa

Honours degree research project (2014 January-2014 November)

Ecological Remediation and Sustainable Management

Supervisors: Prof. Klaus Kellner and Dr. Niels Dreber

Title: Comparison of plant diversity of shrub thickened and chemically controlled savannas in the Molopo district, North-West Province, South Africa

Conference presentations (2014-2015)

- Comparison of plant diversity of shrub thickened and chemically controlled savannas in the Molopo district, North-West Province, South Africa. Biological Sciences Symposium, Potchefstroom, 2014. Presentation.
- Comparison of plant diversity of shrub thickened and chemically controlled savannas in the Molopo district, North-West Province, South Africa. Poster presentation: Arid-Zone Ecology and Thicket Fusion Form in 2014.
- Attending the Third Annual LaRSSA Conference (Land Rehabilitation Society of Southern Africa) (2015).

Experience of Academic Introductory Modules

Introduction to Environmental Management

Introduction to Landscape Ecology

Conservation Ecology

Introduction to GIS Applications

Restoration of degraded ecosystems

Microbial Ecology

Short Course at CEM (Centre for Environmental Management) in Basic Principles of Ecological Rehabilitation and Mine closure 28 September – 2 October 2015

EMG

Environmental Management Group Pty (Ltd) Reg. No. 2017/077689/07 VAT Reg No: 4350278778

Managing Director: S. van Rooyen | 083 678 3032 | svr@envmgrp.com

Director: C.W. Vermeulen | 082 824 9308 | cwv@envmgrp.com



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Environmental Impact Assessment Projects

Type	Client	Project
Waste	Metsimaholo Local Municipality	Scoping/EIA; WULA application for the development of a new landfill site in Sasolburg
	Joe Morolong Local Municipality	Scoping/EIA application for the development of a new landfill site in Hotazel
Mining Permits or Rights	Danoher Contracting (PTY) Ltd	Mining Right application for a gravel BP in Bloemfontein
	Michael Gutter	Mining Permit in Theunissen, Free State Province
	Department of Rural Development and Land Reform	Mining Permit application for a sandstone Quarry in Zastron
Road Construction	Free State Department of Police, Roads and Transport	BAR/IWUL/Mining Permit applications/ECO for the Deneysville - Jim Fouché road rehabilitation
	Free State Department of Police, Roads and Transport	BAR/IWUL/Mining Permit applications/ECO for the Deneysville - Heilbron road upgrading
	Free State Department of Police, Roads and Transport	BAR/IWUL applications/ECO for the Schonkenville - Koppies road upgrading
	SANRAL	BAR/IWUL/ECO applications for the N1 Section 16 road upgrade
	SANRAL	ECO Periodic Maintenance on National Route N6 Sec 8 from Reddersburg (km 0.00) to Rustfontein (km37.8)
	Department of Roads and Public Works, Northern Cape	BAR/IWUL/Mining Permit applications for the MR 938 Mamatwan road upgrade
	Free State Department of Police, Roads and Transport	ECO for the internal road upgrades in Thumahole, Free State Province.



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	Department of Roads and Public Works, Northern Cape	Environmental Screening/BAR/IWUL/ DAFF Permit applications/ECO for the BK126 Magobing to Bathlaros road upgrade.
	Department of Roads and Public Works, Northern Cape	Environmental Screening/BAR/IWUL/ DAFF Permit applications/ECO for the Tsineng to Washington road upgrade.
	Department of Roads and Public Works, Northern Cape	BAR/IWUL/ DAFF Permit applications/ECO for the Hotazel to Maipeng road upgrade.
Infrastructure Developments	Amatola Water	IWUL application/ECO for the installation of a bulk water pipeline, Herschel
	Maluti A Phofung Local Municipality	IWUL application/ECO for the installation of a bulk water pipeline, Kestell to Qwa Qwa
	Dr. Ruth Segomotsi Mompoti District Municipality	BAR and IWUL applications for the upgrading of the Waste Water Treatment Works in Stella
	Dr. Ruth Segomotsi Mompoti District Municipality	Environmental Screening/EMP/IWULA/ECO for the construction of a water provision project for the village of Reivilo, Shaleng, Madipelesa, Karelstad, Mothlako, Molelema, Lykso, Pitsong and Kameelputs, North-West Province.
	Dr. Ruth Segomotsi Mompoti District Municipality	Environmental Screening/ EMP/IWULA/ECO for the construction of a water provision project for the village of Schweizer-reneke, Piet Plessis, Konke, Broedersput, Geduldspan, Louwna, Mabone and Maeng, North-West Province.
	Department of Rural Development and Land Reform	Scoping EIA, WULA and Air Emission License for the development of a Brick factory in Thaba-Nchu
	Dr. Ruth Segomotsi Mompoti District Municipality	Section 24G for the development of a pump station in the Wentzel Dam, Schweizer-reneke, North-West Province.
	AURECON	ECO for the upgrading of 12 Bridges in the De Aar and Upington Areas,
	EUROMID AFRICA Development	EIA/Scoping/IWULA and ECO for MATJHABENG PRECINCT IDP PROJECT 201621, Free State Province.
Umfundu Professional Services CC.	IWULA and EIA/Scoping for the Mmamahabane cemetery establishment, Free State	



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	LMV (PTY) LTD.	Environmental Screening for the school development in Maokeng (Kroonstad) - Erwe 1500 & 24628, Free State Province
	AURECON	Environmental Screening/BAR/WULA/ECO for Lindley Water Treatment Works and Pipeline route, Free State Province
Residential Developments	Greater Taung Local Municipality	BAR application for Boipela Residential Development Extension in Reivilo
Agriculture	VS Kunsmis	Scoping/EIA application for expansion of storage of a dangerous good at Vrede
	Linheim	BAR/ECO for the expansion of the Linheim Sheep Feedlot, Free State Province
	Wildeklaar	BAR application for the expansion of pivot systems near Barkley West
	Department of Rural Development and Land Reform	Environmental Screening/BAR and WULA application for the development of an Agri-Park in Parys, Free State
	Department of Rural Development and Land Reform	Environmental Screening/S24G and WULA application for the development of an Agri-Park in Springfontein, Free State
	Department of Rural Development and Land Reform	S24G and WULA application for the development of an Agri-Park in Thaba-Nchu, Free State
	Department of Rural Development and Land Reform	Environmental Screening for the development of an Agri-Park in Tsiamé, Free State
	Department of Rural Development and Land Reform	Environmental Screening/BAR and WULA application for the development of an Agri-Park in Wesselsbron, Free State
	Department of Rural Development and Land Reform	Environmental Screening/BAR and WULA application for the development of a Farmer Production Support Unit in Koffiefontein, Free State
	Department of Rural Development and Land Reform	Environmental Screening/BAR and WULA application for the development of a Farmer Production Support Unit in Odendalsrus, Free State



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	Department of Rural Development and Land Reform	Environmental Screening for the development of a Farmer Production Support Unit in Sediba, Free State
	Department of Rural Development and Land Reform	Environmental Screening/BAR application for the development of a Farmer Production Support Unit in Kroonstad, Free State

- *EIA *Environmental Impact Assessment*
- *BAR *Basic Assessment Report*
- *EMP *Environmental Management Plan*
- *S24G *Section 24G (Application for rectification)*
- *IWULA *Integrated Water Use License Application*
- *ECO *Environmental Control Officer*

Ecological Specialist Reports

Fauna Habitat Assessment Specialist Reports:

- **Johannesburg**
 - Clubview extension 95 & 91: Mixed use Development
 - Fairlands: Road Interchange
- **Pretoria**
 - Knoppieslaagte: Industrial Development
 - Lanseria: Mixed Use Development
 - Lanseria extension 56: Mixed Use Development
 - Pretoria Gardens: Residential Development
 - Wattle Springs: Residential Development
 - PWV 17: Proposed Road Construction
 - Sunderland Ridge extension 24: Industrial Development
- **Boksburg**
 - Leeuwoort: Residential Development
- **Randburg**
 - Land Parcel 9: Mixed Use Development
 - Land Parcel 10: Mixed Use Development
 - Waterfall Kikuyu: Mixed Use Development
- **Brits**
 - Winterveld: Residential Development

Flora Habitat Assessment Specialist Reports:

- **Johannesburg**
 - Clubview extension 95 & 91: Mixed use Development
 - Fairlands: Road Interchange



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P.O.Box 37473,

Langenhoven Park 9330

• Pretoria

- Knoppieslaagte: Industrial Development
- Lanseria extension 51 & 53: Mixed Use Development
- Mogale extension 5: Mixed Use Development
- Lanseria extension 56: Mixed Use Development
- Pretoria Gardens: Residential Development
- Wattle Springs: Residential Development
- PWV 17: Proposed Road Development
- Sunderland Ridge extension 24: Industrial Development
- Randjiesfontein: Residential Development
- Rooihuiskraal: Mixed Use Development
- Garsfontein: Residential Development
- Knoppieslaagte extension 73: Industrial Development
- Knoppieslaagte extension 95: Industrial Development
- Swartkoppies: Mixed Use Development
- Waterfall fields: Residential Development
- Waterfall Ridge: Mixed Use Development

• Boksburg

- Leeuwpoot: Residential Development

• Randburg

- Land Parcel 9: Mixed Use Development
- Land Parcel 10: Mixed Use Development
- Waterfall Kikuyu: Mixed Use Development
- Greystone: Mixed Use Development

• Brits

- Winterveld: Residential Development

• Vereeniging

- K 47: Proposed Road Development
- K 77: Proposed Road Development

• Limpopo

- Steelpoort: Industrial Development

• Bloemfontein

- Section 16 N1 Road: Road Development

• Kimberley

- Erf 11920: Residential Development
- Wildeklover: Agricultural Development

EMG

Appendix I: Specialist's declaration of interest





DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) amended and the Environmental Impact Assessment Regulations, 2014

PROJECT TITLE

Stella Bulk Sewer and Internal Reticulation

Specialist:	Lloyd Rossouw		
Company Name:	Palaeo Field Services		
Contact person:	Lloyd Rossouw		
Postal address:	PO Box 38806 Langenhoven Park		
Postal code:	9330	Cell:	0842505992
Telephone:	-	Fax:	0864010679
E-mail:	lloyd.rossouw@gmail.com		
Professional affiliation(s) (if any)	Archaeology and Cultural Anthropology Specialist		

Project Consultant:	Environmental Management Group (PTY) LTD		
Contact person:	Sampie van Rooyen		
Postal address:	P.O Box 37473 Langenhoven Park		
Postal code:	37473	Fax:	051 412 6351
Telephone:	051 412 6350	Cell:	083 678 3032
E-mail:	svr@envmgrp.com		

The specialist appointed in terms of the Regulations.

I, Lloyd Rossouw, declare that:

General declaration:

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



Signature of the specialist:

Paleo Field Services

Name of company (if applicable):

26/01/2021

Date:

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) amended and the Environmental Impact Assessment Regulations, 2014

PROJECT TITLE

Stella Bulk Sewer and Internal Reticulation

Specialist:	Darius van Rensburg		
Company Name:	DPR Ecologists & Environmental Services		
Contact person:	Darius van Rensburg		
Postal address:	PO Box 112726 Brandhof		
Postal code:	9324	Cell:	0834100770
Telephone:		Fax:	
E-mail:	darius@dprecologists.co.za		
Professional affiliation(s) (if any)	Wetland Ecologist		

Project Consultant:	Environmental Management Group (PTY) LTD		
Contact person:	Sampie van Rooyen		
Postal address:	P.O Box 37473 Langenhoven Park		
Postal code:	37473	Fax:	051 412 6351
Telephone:	051 412 6350	Cell:	083 678 3032
E-mail:	svr@envmgrp.com		

The specialist appointed in terms of the Regulations.

I, Darius van Rensburg, declare that:

General declaration:

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



Signature of the specialist:

DPR Ecologists

Name of company (if applicable):

26/01/2021

Date:

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) amended and the Environmental Impact Assessment Regulations, 2014

PROJECT TITLE

Stella Bulk Sewer and Internal Reticulation

Specialist:	Morné van Wyk		
Company Name:	Environmental Management Group		
Contact person:	Morné van Wyk		
Postal address:	P.O Box 37473, Langenhoven Park		
Postal code:	9330	Cell:	084 205 5769
Telephone:		Fax:	
E-mail:	morne@envmgrp.com		
Professional affiliation(s) (if any)	Geohydrologist and Environmental Assessment Practitioner		

Project Consultant:	Environmental Management Group (PTY) LTD		
Contact person:	Sampie van Rooyen		
Postal address:	P.O Box 37473 Langenhoven Park		
Postal code:	37473	Fax:	051 412 6351
Telephone:	051 412 6350	Cell:	083 678 3032
E-mail:	svr@envmgrp.com		

The specialist appointed in terms of the Regulations.

I, Morné van Wyk, declare that:

General declaration:

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



Signature of the specialist:

Environmental Management Group

Name of company (if applicable):

26/01/2021

Date:

Appendix J: Title Deeds





SEARCH INFORMATION

Summary

Search Type	DEEDS OFFICE PROPERTY FARM
Search Description	TOIN00000000054600003
Reference	CHRISTIEN
Date	04/05/2020

FARM INFORMATION

Summary

Deeds Office	VRYBURG
Property Type	FARM
Farm Name	ZOUTPANS FONTEIN
Farm Number	546
Portion Number	3
Previous Description	PTN OF PTN 1-546,VRYBURG RD
Registration Division	IN
Municipality	RATLOU LOCAL MUNICIPALITY
Province	NORTH WEST
Diagram Deed	T352/1963
Size	428.2674 H
LPI Code	TOIN00000000054600003

OWNER SUMMARY

Owner Name	ID / Reg. Number	Purchase Price	Purchase Date
NALEDI MUNICIPALITY	-	-	UNKNOWN

OWNER INFORMATION

Owner 1 of 1

Owner Name	NALEDI MUNICIPALITY
ID / Reg. Number	-
Owner Type	COMPANY
Title Deed	T352/1963
Purchase Date	UNKNOWN
Registration Date	09/05/1963
Purchase Price	-
Multiple Owners	NO
Multiple Properties	NO
Share	-
Microfilm Reference No.	-

ENDORSEMENT(S)

Document Number	Microfilm Reference Number	Institution	Value
K114/2017S	-	-	UNKNOWN
VA125/2008	-	NALEDI MUNICIPALITY	UNKNOWN
VA189/2018	-	NALEDI MUNICIPALITY	UNKNOWN

HISTORY INFORMATION

Document Number	Microfilm Reference Number	Owner	Value
No information available.			

INTERNAL ENQUIRY HISTORY

Company Name	Contact Person	Contact Number	E-mail Address	Enquiry Date
No information available.				

REPORT INFORMATION

Date of Information	04/05/2020 10:42	
Print Date	04-05-2020 10:43	
Generated By	CHRISTIEN KRUGER	
Reference	CHRISTIEN	
Report Type	DEEDS OFFICE PROPERTY FARM	

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