

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

1. INTRODUCTION

The purpose of this Environmental Management Programme (EMPr) is to ensure 'good environmental practice' by taking a holistic approach to the management of environmental impacts during the construction and operation of the proposed clearance of 149,5516 ha of indigenous vegetation, located within a critical biodiversity area (CBA 1) and within 100 meters from a non-perennial stream, in order to establish a Township, located on a portion of the farm Schweizer Reneke Townlands 62 HO known as Ipelegeng Extension 12, Mamusa Local Municipality, North West Province. This EMPr therefore sets out the methods by which proper environmental controls are to be implemented by the applicant and his nominated contractor. However, where necessary, these methods have been expanded upon and additional issues addressed in order to ensure that all environmental aspects are appropriately considered and monitored.

It is important to note that this EMPr is focused primarily on the construction and operational phases of the project. Due to the projected lifespan, a detailed Site Closure and Decommissioning has not been included in this document as it is not intended for a project of this nature. Design specifications from an environmental point of view were taken into consideration, the Environmental Assessment Practitioner (EAP) have provided input with regard to possible mitigation measures for reducing environmental impacts.

This EMPr is also intended to ensure that the principles of sound Environmental Management and the general "Duty of Care" specified in the National Environmental Management Act are promoted on site during all phases of the development

This EMPr has been designed to suit the particular activities and needs of the proposed clearance of 149,5516 ha of indigenous vegetation, located within a critical biodiversity area (CBA 1) and within 100 meters from a non-perennial stream, in order to establish a Township, located on a portion of the farm Schweizer Reneke Townlands 62 HO known as Ipelegeng Extension 12, Mamusa Local Municipality, North West Province, and incorporates specific project mitigation measures. This EMPr therefore identifies the following:

- Construction and operation activities that will impact on the environment;
- Specifications with which the contractor shall comply in order to protect the environment from the identified impacts; and
- Actions that shall be taken in the event of non-compliance.

It is important to note that the EMPr is a dynamic document subject to similar influences and changes as are brought by variations to the provisions of the project specification. Any substantial changes shall be submitted to the contractor, resident engineer and relevant environmental authorities in writing for approval.

A professional team consisting of the following experts have been assembled in order to ensure the success of the proposed development:

- A Geotechnical Engineer
- Civil Engineer
- A Town and Regional Planner
- A SAHRA Specialist.
- A Ecological Fauna and Flora Habitat specialist
- Wetland Specialist
- Registered Environmental Assessment Practitioner (EAP)

They were responsible for the following actions:

- A Geotechnical Engineer was appointed to determine whether the Geology and Soils of the site is suitable for the proposed development
- The Civil Engineer has been appointed to determine the capability of existing infrastructure to be linked to proposed development and readily available bulk services. He will also designed the proposed infrastructure.
- An engineer has determined the flood lines and this delineation has been used by the Town and Regional Planner to design the layout plan.
- The town and regional planner have designed the proposed layout of the development informed by the surveyor's, Geo-Technical Engineer's and flood line engineer's findings.
- A SAHRA Specialist has been appointed to determine the possible impact of the development on Archaeological and Cultural features.
- A Fauna and Flora specialist has been appointed to determine the impact of the proposed development on the Fauna and Flora of the area.
- A Wetland specialist has been appointed to determine the impact of the proposed development on the watercourses of the area.
- An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
- Desktop studies were conducted and alternatives assessed. The EAP must assess all possible environmental issues that may affect the proposed project and ensure that all interested and affected parties are notified in order to assist him in identifying possible impacts. He must also give mitigation measures where applicable.
- It will be essential to plan for the appointment of an Environmental Control Officer (ECO) who will be responsible to ensure that all aspects regarding the environmental issues are implemented and monitored. The ECO will also be responsible for maintaining a database of all records pertaining to the environment for the study area.
- The surveyor ensured that the cadastral information is accurate, up to date and properly mapped. The contours of the area are accurately plotted.

2. Contents of the Environmental Management Programme

The contents of an EMPr, shown below, are contained in Appendix 4 of the NEMA EIA Regulations 982 of 2014 as amended and published in Appendix 4 of Government Notice No. R 326 of 2017.


1. (1) An EMPr must comply with section 24N of the Act and include-
 - (a) details of
 - (i) the EAP who prepared the EMPr; and
 - (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;
 - (b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;
 - (c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;
 - (d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-
 - (i) planning and design;
 - (ii) pre-construction activities;
 - (iii) construction activities;
 - (iv) rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
 - (f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes and outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to –
 - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
 - (ii) comply with any prescribed environmental management standards or practices;
 - (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and
 - (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;
 - (g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
 - (h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);
 - (i) an indication of the persons who will be responsible for the implementation of the impact management actions;
 - (j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
 - (k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);
 - (l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;
 - (m) an environmental awareness plan describing the manner in which-

- | |
|--|
| (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work;
and
(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and

(n) any specific information that may be required by the competent authority. |
|--|

3. Details of Environmental Assessment Practitioner

EAP:	Mr JP de Villiers of AB Enviro Consult		
Professional affiliation/registration:	EAPASA 2019-808		
Contact person (if different from EAP):	Mr JP de Villiers		
Company:	AB Enviro Consult CC		
Physical address:	7 Louis Leipoldt Street, Potchefstroom,		
Postal address:	7 Louis Leipoldt Street, Potchefstroom,		
Postal code:	2531	Cell:	083 548 8105
Telephone:	071 202 4027	Fax:	018 293 0671
E-mail:	hannieduplooy@abenviro.co.za		

Report compiled by: Mr J. P. de Villiers
Signature: 
Report reviewed by: Mrs Hannie du Plooy
Signature: <i>JE du Plooy</i>

4. Expertise of the Environmental Assessment Practitioner

AB Enviro Consult (CC) is a registered consultancy, owned and operated as an independent unit by the registered owner and consultant: **Prof. A.B. de Villiers**

- **Mr J.P. De Villiers** joined the consultancy during 2004
- **Mrs J.E. du Plooy** is a consultant since 2001

Over a period of 25 years (1996-2021) this consultancy has successfully applied for, and obtained positive ROD's and EA's for more than 380 projects. Environmental Control Officer's duties are also performed on various projects.

The company was involved (from 1992-1994) in evaluation of 114 applications for the subdivision of land, 23 applications for resort developments, and 54 applications for business rights for the Department of Agriculture, Conservation and the Environment - North West Province.

The consultancy is qualified to undertake professional studies in waste management and is still involved in the development of waste disposal- (solid and liquid effluent), and emission studies. These studies are conducted both academically and practically. This work relates to mine waste, domestic

waste and effluent as well as to the monitoring of waste disposal. Environmental audits in this respect are undertaken on a regular basis

ACADEMIC AND PROFESSIONAL QUALIFICATIONS OF PROF DE VILLIERS

Post-Matric Qualifications

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1968	B.Sc.	PU FOR CHE	Geography, Geology
1970	HONNS. B.Sc.	PU FOR CHE	Soil Science
1974	M.Sc.	PU FOR CHE	Geography
1981	Ph.D.	UOFS	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

<u>YEAR</u>	<u>Qualification/ Registration</u>	<u>Institution</u>	<u>Field of Study</u>
1986	Professional Natural Scientist	S.A. Council for Natural Scientists	Environmental Science
1994	Quality Auditor	ESKOM	Auditing
1998	Personnel & Verifying Auditor	SAATCA	Environmental Auditing
2006	Environmental Assessment Practitioner	Interim Certification Board EAPSA	Environmental Science

MEMBERSHIP AND PARTICIPATION IN SOCIETIES, COUNCILS, ETC.

<u>Name of professional societies</u>	<u>YEAR</u>	<u>Capacity</u>
S.A. Geographical Society.	1967-1996	Board Member
Society for Geography	1968-2004	Member
SAGS Western Transvaal	1985-1989 1987-1989 1996	Chairman
Africa Geographical Association	1993-1995	Vice-President.
Society for the Vaal River Catchment	1980-1999	Member
S.A. Society for Photogrammetry, Remote Sensing and Cartography	1984-1996	Member
Dendrological Society	1986-2005	Member
Birdlife South Africa	2003-present	Member
British Geomorphological Research Group	1985-1997	Member
Int Com on Water Resource Systems	1985-1997	Member
Int Com on Continental Erosion	1986-1990	Member
Int Com on Remote Sensing and Data Transmission	1986-1991	Member
Society for S.A. Geographers	1995-2005	Member
SA Photogrammetrical and Geo. Info.	1995-2003	Member
S.A. Association of Geomorphologists	1994-1999	Board Member and member
SADC Mine Dump Study Group	1996-2005	Member

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MR J.P. DE VILLIERS

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1993	BA	PU FOR CHE	Geography, Economics
1994	HED	PU FOR CHE	Geography Economics

2006	B.Sc.(Honns) Cum Laude	North-West University	Environmental Management
2007	M.Sc.	North-West University	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

<u>YEAR</u>	<u>Qualification/ Registration</u>	<u>Institution</u>	<u>Field of Study</u>
2008	Basic Principles of Ecological Rehabilitation and Mine Closure	Centre for Environmental Management (North West University)	Ecological Rehabilitation
2019	Registered Environmental Assessment Practitioner 2019/808	Environmental Assessment Practitioners of South Africa	

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MRS J.E. DU PLOOY

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1999	BA	PU FOR CHE	Geography, Tourism
2000	BA (Honns) Cum Laude	PU FOR CHE	Geography
2003	Masters degree in Environmental Management	PU FOR CHE	Environmental Management
2001	Aquabase Intro	AQUABASE	Hydrology
2001	Geomedia Professional	INTERTECH	GIS
2001	Map Info	SPATIAL TECHNOLOGY	GIS

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

<u>YEAR</u>	<u>Qualification/ Registration</u>	<u>Institution</u>
2020	Registered Environmental Assessment Practitioner 2019/1573	Environmental Assessment Practitioners of South Africa

5. DESCRIPTION OF THE ACTIVITY

The land owner, Mamusa Local Municipality, has appointed AB Enviro Consult CC, an independent environmental consultancy, to undertake an Environmental Impact Assessment for the proposed clearance of 149,5516 ha of indigenous vegetation, located within a critical biodiversity area (CBA 1) and within 100 meters from a non-perennial stream, in order to establish a Township, located on a portion of the farm Schweizer Reneke Townlands 62 HO known as Ipelegeng Extension 12, Mamusa Local Municipality, North West Province.

The site is influenced by a number of design factors that were considered for the proposed layout plan to be acceptable. These factors include the slope of the site, environmental sensitivity, service provision, erf size, access, road layout, as well as the geotechnical features and flood lines. To ensure that the proposed development do not infringe on any design principles and the environmental sensitive areas, development will only be allowed to take place according to the prescribed methods. The total area of the Township is 274,3495 ha in extent. The total area of indigenous vegetation that will be removed is 149,5516 hectares. This was calculated as follows:

Description of area	Land use	Area in Ha	Total Area in Ha
Total Area of Township	All Proposed Land uses	274,3495 Ha	274,3495 Ha
Areas that will not involve the removal of indigenous vegetation:	Municipal (Erf 1346 and Erf 1347)	113,3122 Ha (113,7941 Ha (Total area of all three Municipal Erven) – 0,4819 Ha (Area of Municipal Erf 326))	124,7979 Ha
	Public Open Spaces	11,4857 Ha	
Total area of indigenous vegetation that will be removed	All Proposed Land uses less Land uses that will not involve the clearance of indigenous vegetation	149,5516 Ha	149,5516 Ha

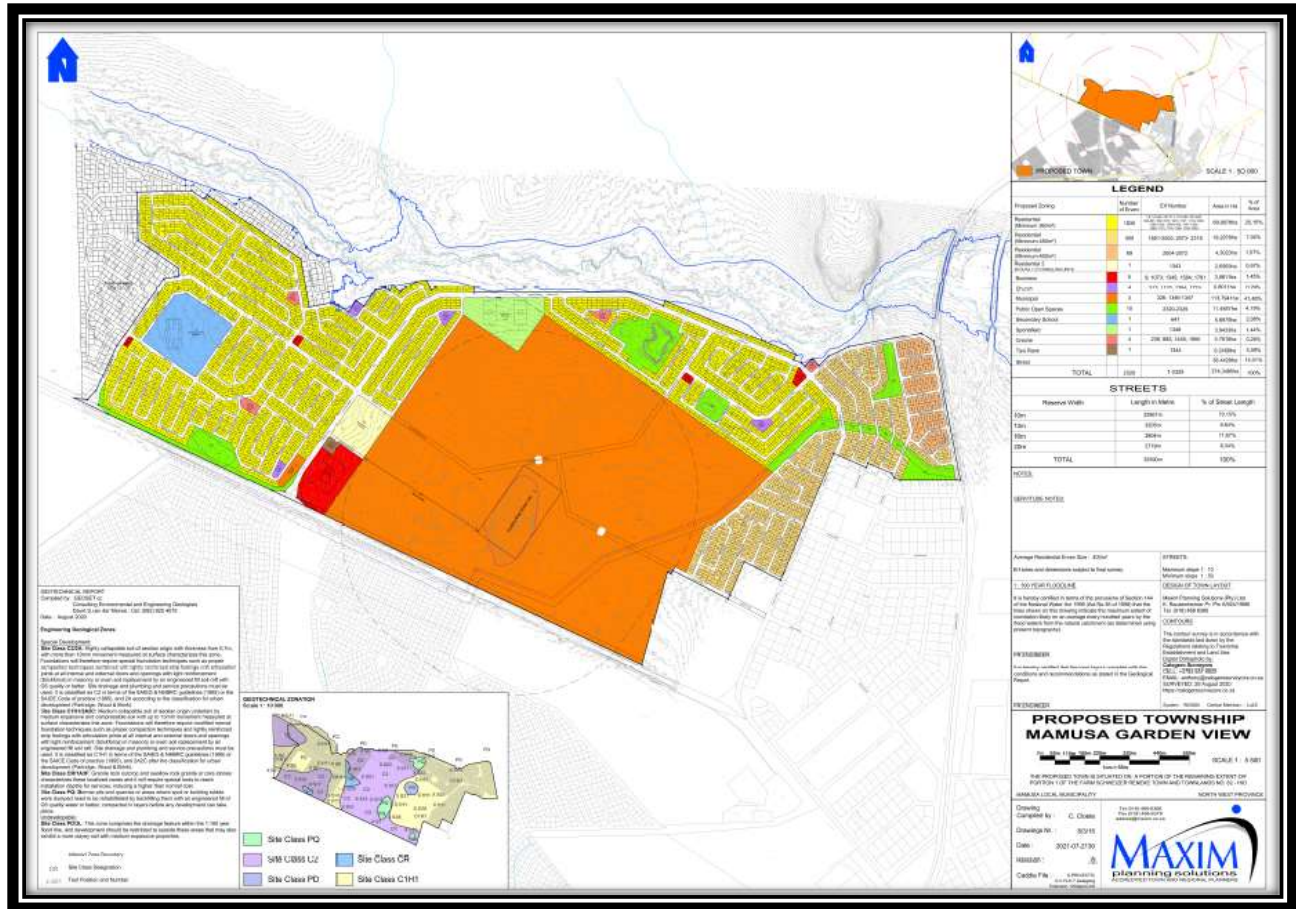


FIGURE 1. Proposed layout plan.

The proposed land use composition of the development (excluding public open space & streets) are as follows:

Proposed Zoning	Number of Erven	Erf Number	Area in Ha	% of Area
Residential (Minimum 360m²)	1830	1-8; 10-200; 237-311; 313-326; 327-640; 642-89; 899-1072; 1074-1121; 1123-1268; 1269-1342; 1349-1442; 1447-1593; 1595-1773; 1775-1790; 1792-1848	69,0078ha	25,15%
Residential (Minimum 450m²)	400	1851-2003; 2073- 2319	19,2078ha	7,00%
Residential (Minimum 600m²)	69	2004-2072	4,3023ha	1,57%
Residential 2 80 DU/ha = 213 DWELLING UNITS	1	1343	2,6563ha	0,97%
Business	5	9; 1073; 1345; 1584; 1791	3,9811ha	1,45%
Church	4	312; 1132; 1294; 1774	0,8011ha	0,29%
Municipal	3	326; 1346-1347	113,7941ha	41,48%
Public Open Spaces	10	2320-2329	11,4857ha	4,19%
Secondary School	1	641	5,6975ha	2,08%
Sportsfield	1	1348	3,9433ha	1,44%
Creche	4	236; 892; 1446; 1850	0,7810ha	0,28%
Taxi Rank	1	1344	0,2488ha	0,09%
Street			38,4428ha	14,01%
TOTAL	2329	1-2329	274,3495ha	100%

STREETS		
Reserve Width	Length in Metre	% of Street Length
10m	22861m	70,15%
13m	3205m	9,84%
16m	3804m	11,67%
20m	2719m	8,34%
TOTAL	32590m	100%

Services are proposed to connect to municipal infrastructure and have been designed as follows:

Bulk Water

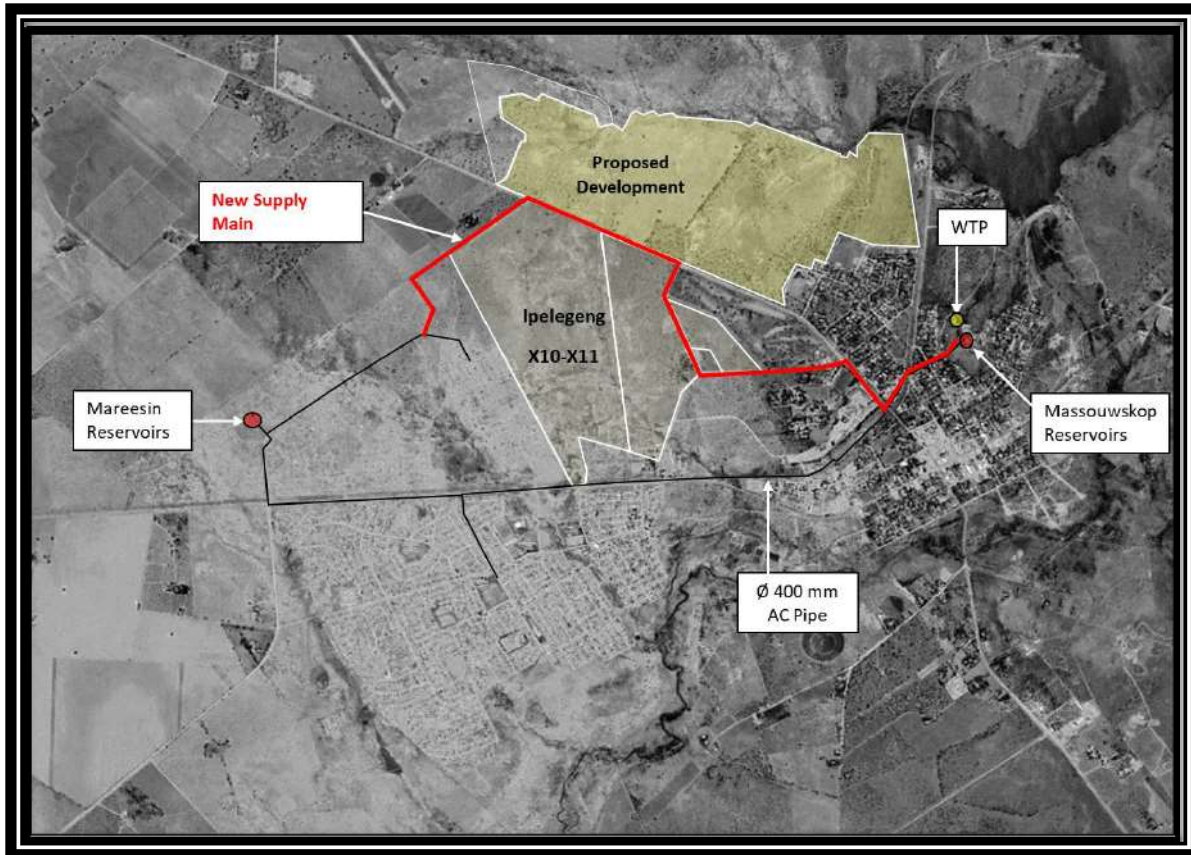
The estimated current Average Annual Daily Demand (water) equates to 5.9 Mℓ / day. The Proposed Development could increase the water demand to 8.8 Mℓ/day. The existing 6 Mℓ/day WTP will not be able to meet the future water demand. However, the capacity shortfall of the WTP can be mitigated by augmenting the supply volume of the Mamusa bulk water pipeline. The current bulk water storage reservoirs do not have sufficient capacity to accommodate the development. It is proposed that the storage capacity be increased to compensate for the storage shortfalls in future.

In addition, it is proposed that a new bulk supply main be constructed to provide potable water to the development from the Massouwskop reservoirs. Please see Figure below.

Please note that these proposed upgrading of the Bulk Infrastructure does not form part of this application.

The design of internal services will be dependent on the final proposed development layout. The following design guidelines will be followed:

- The internal water supply network will consist of uPVC and/or HDPE pipes of varying diameter according to designs of the Civil Engineer.
- Sufficient storage capacity for water demand and fire water supply.
- Provision of isolating valves, air release valves and fire hydrants to comply with the requirements of the Local Authority and Building Regulations.
- Cognisance will be taken of pipe diameters and water pressure for firefighting purposes



Proposed Bulk Water Infrastructure Augmentation

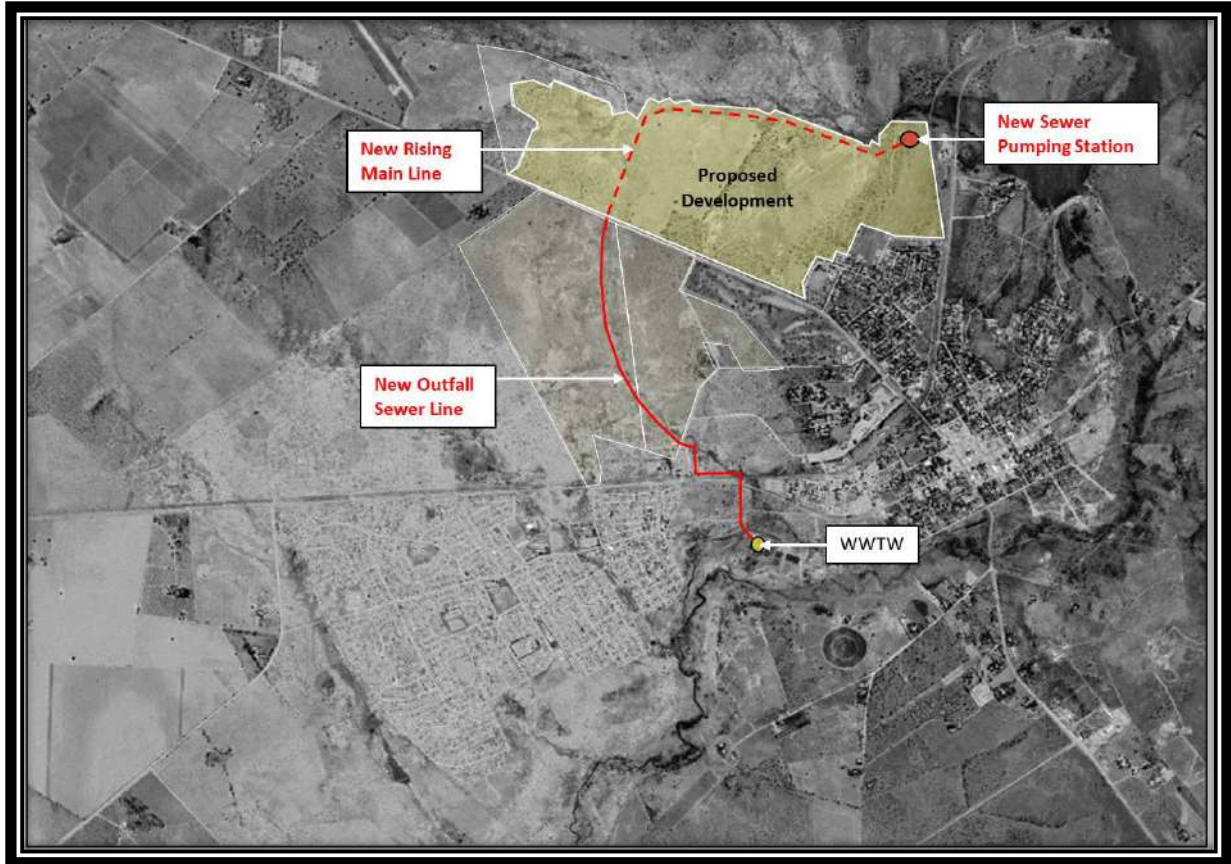
Wastewater

The estimated current wastewater generation equates to 5.7 Mℓ / day. The Proposed Development could increase the wastewater generation to 8.6 Mℓ / day. The existing WWTW will have capacity to accommodate the increased wastewater loading. In order to convey wastewater generated by the development to the WWTW, it is proposed that a new sewer pumping station be constructed as well as a new rising main and bulk outfall sewer line. Please see Figure below.

Please note that these proposed upgrading of the Bulk Infrastructure does not form part of this application.

Depending on the future development layout, an internal sewer network of Ø 110mm and Ø 160mm pipes with related Y-junction connections and inspection eyes will be installed to comply with the minimum specifications stipulated in the SANS 10400 Building Regulations. Manholes and rodding eyes will be constructed at necessary positions to allow for effective maintenance.

The internal sewer network will be connected to the new gravity outfall sewer as explained above



Proposed New Wastewater Infrastructure

Access

The Proposed Development is located north of the R34 road (Vryburg - Schweizer-Reneke). Primary access to the Proposed Development will be from the R34 road which was recently reconstructed where provision was made for an intersection as indicated in the figure below.

The design of the internal access roads shall provide for an appropriate road surface with cross sections designed to accommodate the channelling of storm water generated on the development area.

Where storm intensity calculations dictate, sufficiently designed concrete channels will be constructed as part of the road cross section to channel storm water as described in the relevant section above.

Roads and storm water infrastructure will generally be designed to follow the natural runoff patterns to avoid ponding and flooding of properties with associated damage

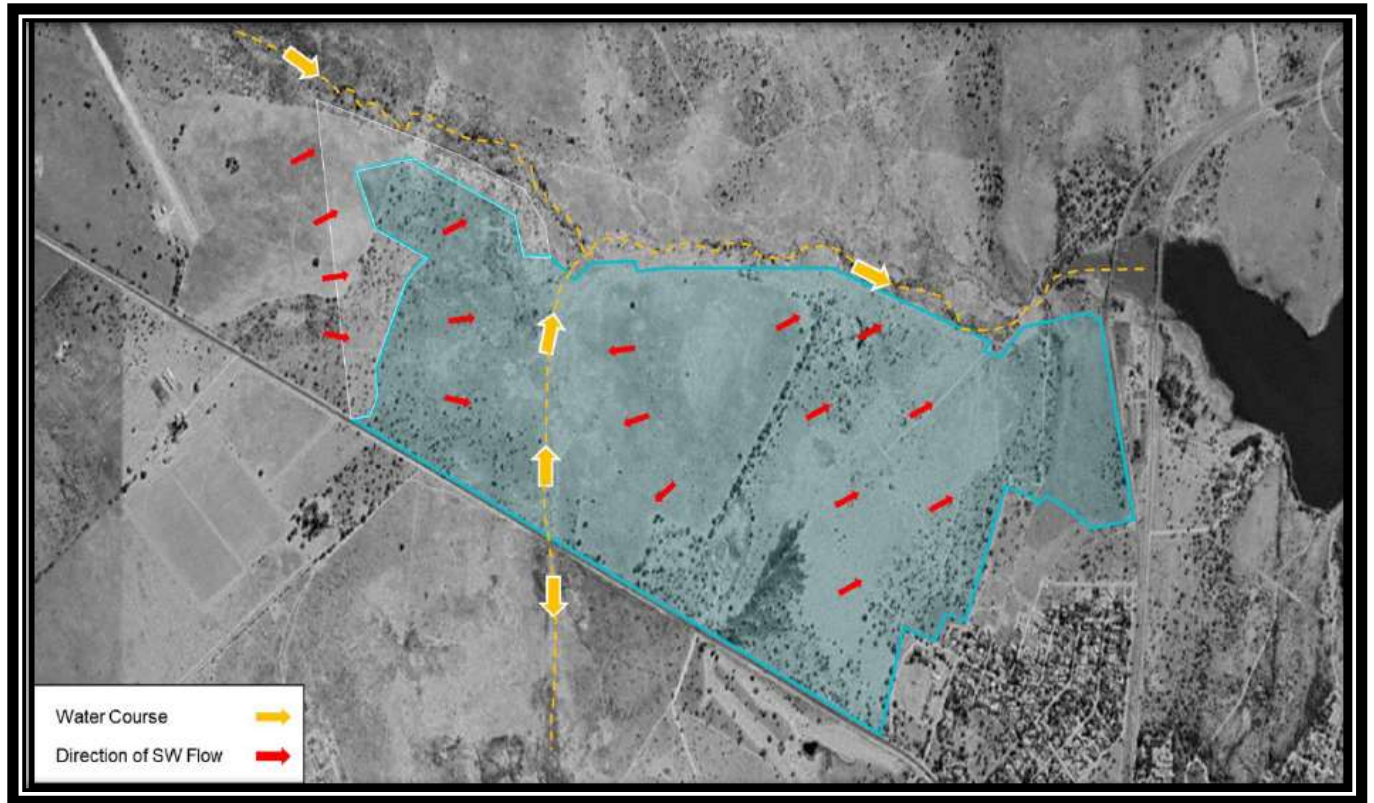


Access to Proposed Development

Storm Water

The Proposed Development is located in a valley with a natural stormwater low-point dividing the eastern and western portions of the development. The natural topography of the area slopes towards the storm water low-point and a watercourse to the north. Due to the natural topography, the area may be prone to stormwater erosion. Urbanisation of the demarcated area will increase the peak storm-water runoff (1-in-2 years recurrence interval) from 4.8 m³/s to 11.3 m³/s. The following figure indicates the direction of stormwater flow.

Stormwater infrastructure will be designed to accommodate runoff as surface flow in an open system. This will be achieved by designing internal roadways to disperse stormwater towards the watercourses. Comprehensive information on stormwater attenuation should be presented in the detailed design report of internal services for approval by the municipality.



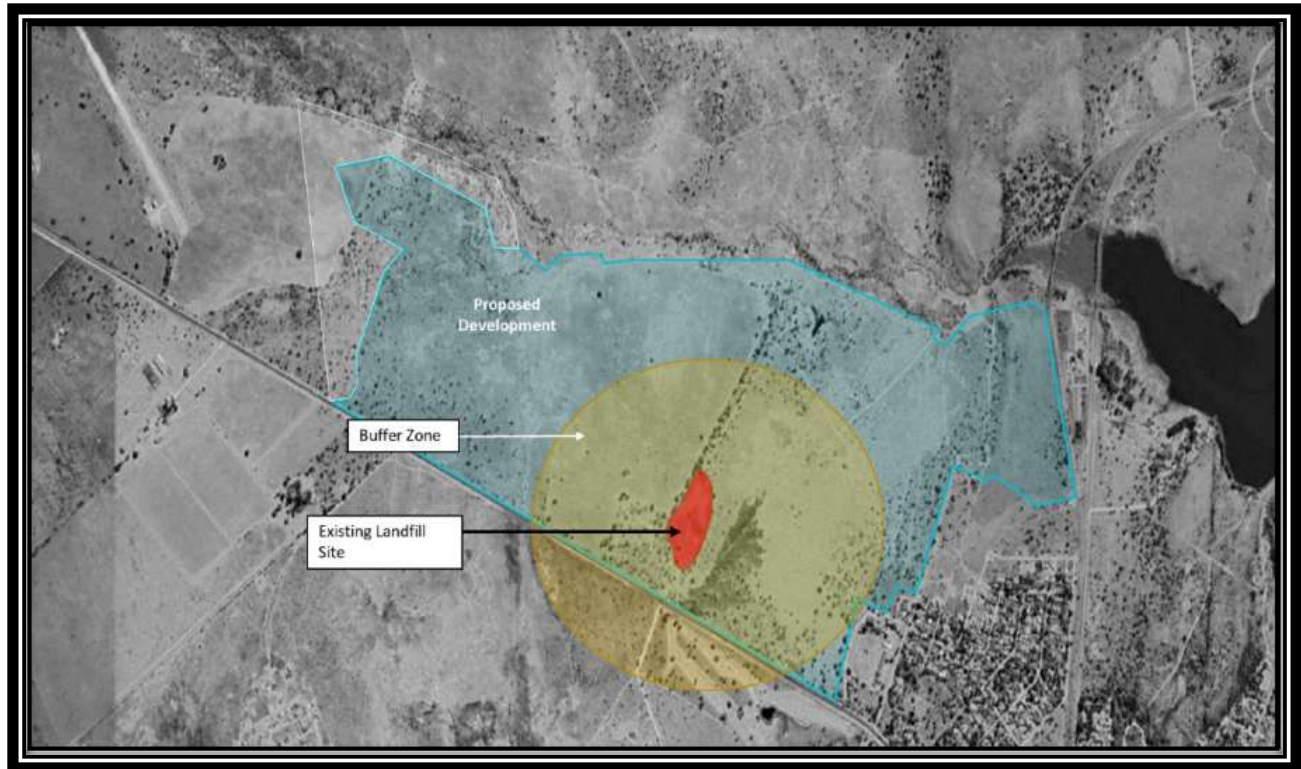
Direction of Storm-water Flow

Solid Waste

Municipal Solid Waste (MSW) removal is a function of the Waste & Environmental Management Division of the MLM. According to the SDF: *“a black bag system is used and a special refuse truck. Large containers are also used in the industrial and business areas”* to facilitate MSW removal.

The community currently theoretically generates an estimated MSW volume of 89.9 tons per day. The Proposed Development will theoretically increase the estimated total MSW to 97.7 tons per day. The estimated increase in MSW will amount to 10.2m³ per day. The encouragement of an integrated waste management system will dramatically reduce MSW and promote Reduce, Reuse and Recycle practices.

As previously mentioned, the existing landfill site is located within the Proposed Development and operate as a G:S:B - municipal landfill site. According to the permit conditions the Schweizer-Reneke landfill site requires a 500 m buffer zone. It is proposed that the capacity of the current landfill site must be established and evaluated. The following figure graphically illustrates the landfill site and buffer zone:



Landfill

6. DESCRIPTION OF THE PROPERTY

The proposed development is situated on a portion of the farm Schweizer Reneke Townlands 62 HO known as Ipelegeng Extension 12, Mamusa Local Municipality, North West Province. Schweizer-Reneke and Ipelegeng form part of the Mamusa Local Municipality which falls under the jurisdiction of Dr Ruth Segomotsi Mompoti District Municipality (DRSM).

On a district level, the Dr Ruth Segomotsi Mompoti District Municipality is one of the 4 districts in the North West province of South Africa. This vast district has a very scattered rural settlement pattern. The district is located in the barren north-western side of the country, far away from the large towns and cities in the North West Province. It shares its borders with the Free State province to the South, the Northern Cape Province to the West and the Republic of Botswana to the North. The Dr Ruth Segomotsi Mompoti District Municipality [DC 39] is approximately 43 700 km² in size (41.67% of the total area of the North West province) and has an estimated population of 480 456 people (13.97% of the total population of the North West province). DRSM has the smallest population of all the district municipalities of the North West province.

The Mamusa Local Municipality is a Category B municipality and spans over an approximate area of 3 681 km² which equates to 7.8 % of the DRSM region. The town of Schweizer-Reneke is located 66 km south-east of Vryburg and 71 km west of Wolmaransstad. Schweizer-Reneke/ Ipelegeng is situated in the Harts River Valley. The Mamusa Local Municipality district is considered rural in nature with agriculture scattered all over the region. The municipal structure consists of five distinct nodes situated on prominent trade routes. The respective urban nodes are:

- Schweizer-Reneke / Ipelegeng / Charon
- Amalia / Molatswanene
- Glodina
- Migdol
- Avonster

The township of Ipelegeng is located on the western outskirts of Schweizer-Reneke.

The site extends from the R32 to the south, a narrow non-perennial river, with its active channel and riparian zone, is present to the north of the site (Photo 1). An in-channel dam, the Wentzeldam is located to the northeast of the site. The site is bounded by residential erven and a railway line to the east and open undeveloped land to the west with landing strip beyond. The Existing Solid Waste Site forms part of the site with a 500m buffer zone incorporated into the proposed layout and zoned a municipal 2 stand to be retained (Photo 2).

The entire site is located in a Critical Biodiversity Area (CBA) as defined in the 2015 North West Biodiversity Sector Plan (SANBI). Vegetation at most of the site is visibly degraded and cover of vegetation in many areas is conspicuously poor (Photo 3). Vegetation at an informal rubbish dump site is transformed. Some areas have been cleared, exposing soil. Low rocky ridges are present at the northeastern part of the site (Photo 4). Indigenous trees at the site include *Vachellia erioloba* (Camel Thorn), *Vachellia hebeclada* subsp. *hebeclada* (Candlepod Thorn; shrub-height at site), *Vachellia karroo* (Sweet Thorn), *Tarchonanthus camphoratus* (Camphor Bush) and *Grewia flava* (Velvet Raisin; shrub-height at site), some Savanna remains in parts of the site.



Photograph 1. Narrow and defined active channel at northern parts of the site.

Photo: R.F. Terblanche.



Photograph 2. Existing Solid Waste Site



Photograph 3. Degraded area at the site.

Photo: R.F. Terblanche



Photograph 4. Low Rocky Ridge at the site.

Photo: R.F. Terblanche

Landowner:
 Contact person:
 Postal address:
 Postal code:
 Telephone:
 E-mail:

Mamusa Local Municipality		
Mr. Ruben Gincane		
PO Box 5, SCHWEIZER-RENEKE		
2780	Cell:	N/A
053 963 1331	Fax:	053 963 2474
gincaner@mamusalm.gov.za		

In instances where there is more than one landowner, please attach a list of landowners with their contact details to this application.

Local authority in whose jurisdiction the proposed activity will fall:

Mamusa Local Municipality

Municipal Ward No:

9

Nearest town or districts:
 Contact person:
 Postal address:
 Postal code:
 Telephone:
 E-mail:

SCHWEIZER-RENEKE		
Mr. Ruben Gincane		
PO Box 5, SCHWEIZER-RENEKE		
2780	Cell:	N/A
053 963 1331	Fax:	053 963 2474
gincaner@mamusalm.gov.za		

Site Co-ordinates

Latitude (S):

Longitude (E):

Alternative S1 (preferred or only site alternative)

27°	10'	17.03"	25°	18'	34.63"
-----	-----	--------	-----	-----	--------

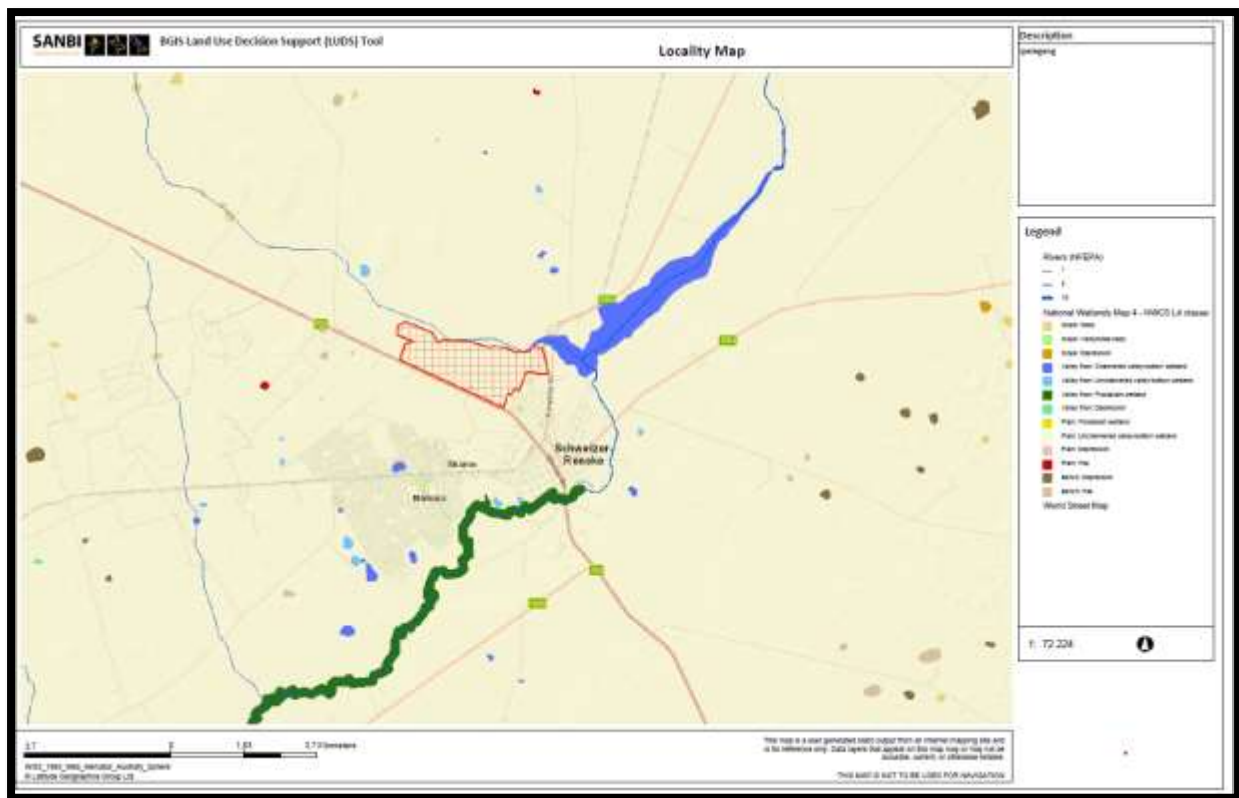


FIGURE 2. LOCALITY MAP

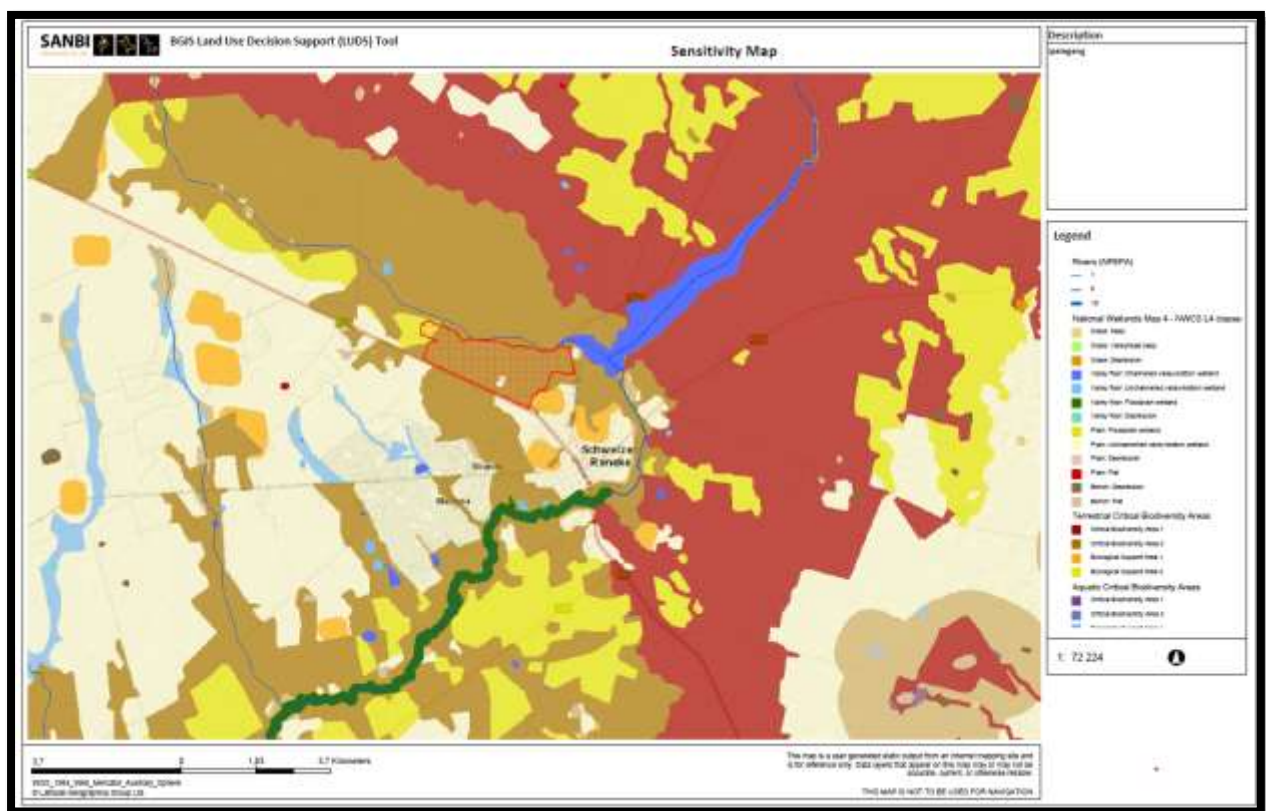


FIGURE 3: SENSITIVITY MAP

7. DESCRIPTION OF THE ENVIRONMENT THAT MAY BE AFFECTED BY THE PROJECT

7.1 BIO-PHYSICAL ASPECTS

7.1.1 GEOLOGY AND SOIL

The site is underlain by Archean granite and gneiss of the Archean Basement Complex, from the oldest time span in the Randian Erathem. Surficial deposits include the colluvium and Aeolian sand covering the lithology. Locally a transported

layer of diamondiferous river terrace gravel was encountered on the centre portion of the site, which was possibly economically mined in the past. No dolomite occurs in the area and no stability investigation is required.

Some minor problems regarding excavatability to 1,5m can be expected on site, but a competent TLB may be required to reach installation depths for services in some places. To ensure the stability of excavations, it will need standard sidewall protection in excavations exceeding 1,5m.

Zoning of the site revealed a zone with constraints regarding the different soil types.

The engineering geological zonation:

Special Development:

Site Class C2/2A:

Highly collapsible soil of aeolian origin with thickness in excess of 0,75m, with more than 10mm movement measured at surface characterizes this zone. Foundations will therefore require special foundation techniques such as proper compaction

techniques combined with lightly reinforced strip footings with articulation joints at all internal and external doors and openings with light reinforcement (brickforce) in masonry or even soil replacement by an engineered fill soil raft with G5 quality or better. Site drainage and plumbing and service precautions must be used. It is classified as C2 in terms of the SAIEG & NHBRC guidelines (1995) or the SAICE Code of practice (1995), and 2A according to the classification for urban development (Partridge, Wood & Brink).

Site Class C1H1/2A2C:

Medium collapsible soil of aeolian origin underlain by medium expansive and compressible soil with up to 15mm movement measured at surface characterizes this zone. Foundations will therefore require modified normal foundation techniques

such as proper compaction techniques and lightly reinforced strip footings with articulation joints at all internal and external doors and openings with light reinforcement (brickforce) in masonry or even soil replacement by an engineered fill soil raft. Site drainage and plumbing and service precautions must be used. It is classified as C1H1 in terms of the SAIEG & NHBRC guidelines (1995) or the SAICE Code of practice (1995), and 2A2C after the classification for urban development (Partridge, Wood & Brink).

Special Development with Risk

Site Class CR/1A3F:

Granite rock outcrop and shallow rock granite or core stones characterize these localized zones and it will require special tools to reach installation depths for services, inducing a higher than normal cost.

Site Class PQ:

Borrow pits and quarries or areas where spoil or building rubble were dumped need to be rehabilitated by backfilling them with an engineered fill of G5 quality or better, compacted in layers before any development can take place.

Undevelopable:

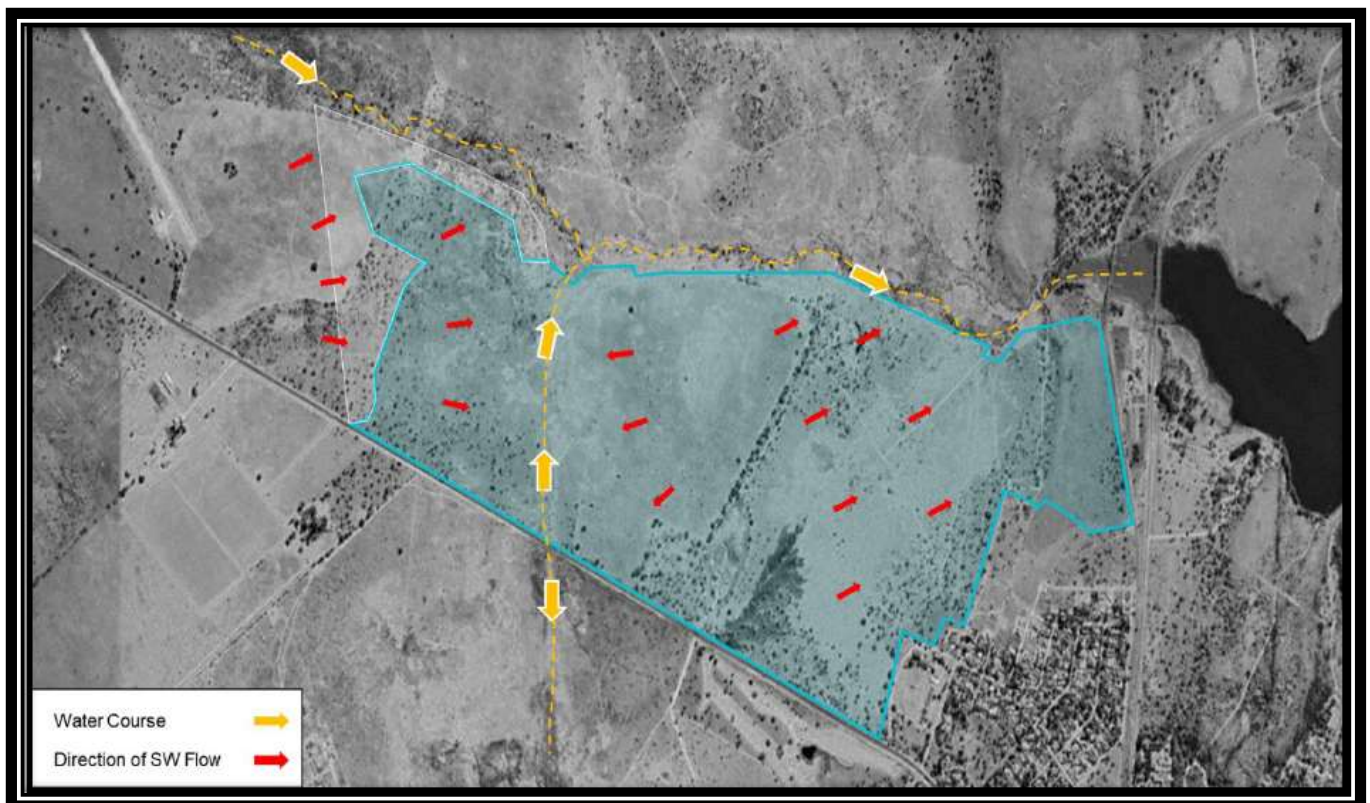
Site Class PD/3L:

This zone comprises the drainage feature within the 1:100 year flood line, and development should be restricted to outside these areas that may also exhibit a more clayey soil with medium expansive properties. The geotechnical problems encountered will require modified normal to special foundation techniques and construction, and proper standard compaction techniques and drainage is required.

7.1.2 TOPOGRAPHY

The site is located on a shallow slope towards the northeast. It is situated at between 1302 (at the dam) and 1320 metres above mean sea level. The Proposed Development is located in a valley with a natural stormwater low-point dividing the eastern and western portions of the development. The natural topography of the area slopes towards the storm water low-point and a watercourse to the north. Due to the natural topography, the area may be prone to stormwater erosion. Urbanisation of the demarcated area will increase the peak storm-water runoff (1-in-2 years recurrence interval) from 4.8 m³/s to 11.3 m³/s. The following figure indicates the direction of stormwater flow.

Stormwater infrastructure will be designed to accommodate runoff as surface flow in an open system. This will be achieved by designing internal roadways to disperse stormwater towards the watercourses. Comprehensive information on stormwater attenuation should be presented in the detailed design report of internal services for approval by the municipality.



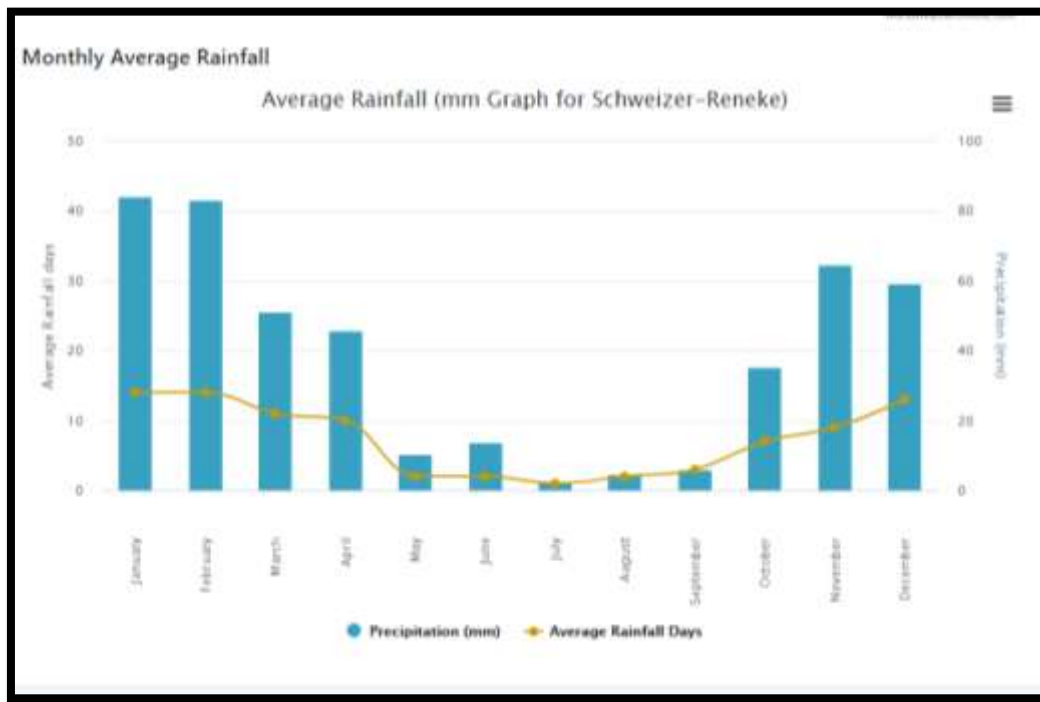
Direction of Storm-water Flow

A detailed site survey have been carried out to establish levels. The Engineering report and the Layout plan will address issues regarding drainage of the site.

7.1.3 CLIMATE

The climate of the area is typical of the South African interior. In the discussion of this variable, certain aspects of rainfall, temperature and wind that can influence the project will be highlighted.

7.1.3.1. Rainfall



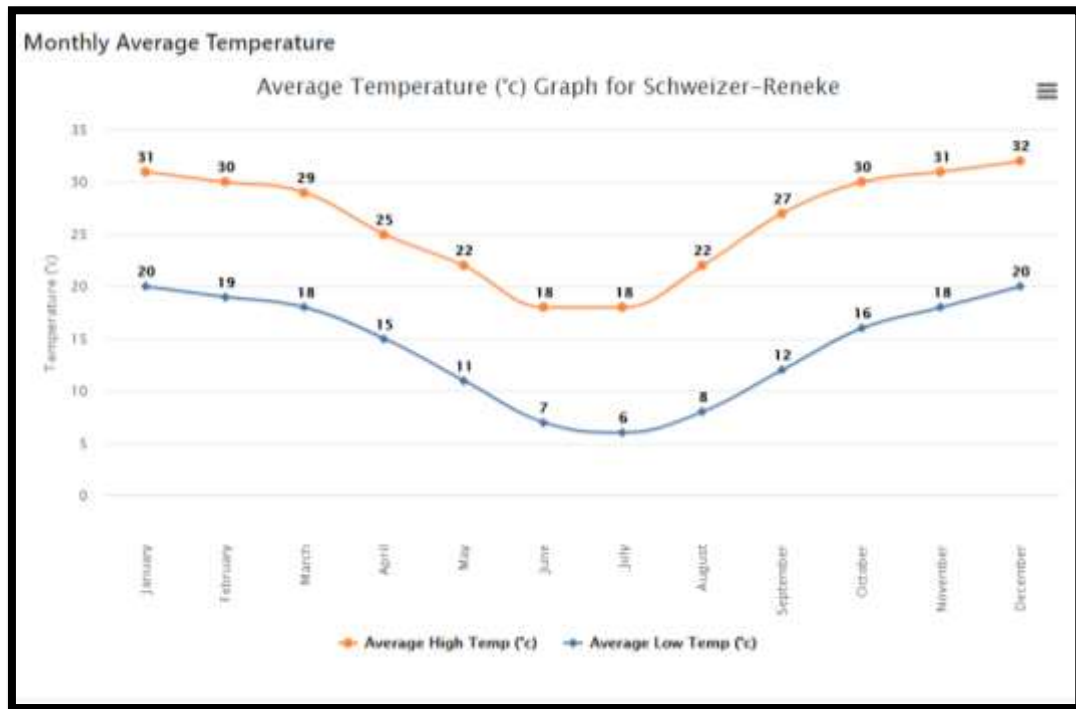
Source: <https://www.worldweatheronline.com/schweizer-reneke-weather-averages/north-west/za.aspx>
(Visited: 23/06/2021)

The variability of rainfall as well as the high intensity events will definitely influence the project. On average however, the impact of rainfall can be considered as positive, as sufficient water is generally available for sustaining vegetation. Extreme dry conditions during dry spells will negatively affect the project due to the secondary effects on vegetation as well as the possibility of fire hazards. Extreme maximum events can also have a negative effect on the project during all its phases.

The overall impact can therefore be considered to be “variable” during the construction and operational phases (local in extent and long term in duration). The likelihood that these impacts may occur is probable, medium in intensity and significance. Steps to mitigate negative effects will be described in various sections of the Management Plan.

Due to the scale of the operation, the rainfall of the area cannot be affected by the project and is therefore “Not Applicable”.

7.1.3.2. Temperature



Source: <https://www.worldweatheronline.com/schweizer-reneke-weather-averages/north-west/za.aspx>
(Visited: 23/06/2021)

In combination with a dry spell, such hot temperatures may be favourable for the spreading of veldfires.

The general impact of this variable on the project can be considered as positive during the construction and operational phases. The impacts can however be considered as having low intensity impacts of low significance. The extent is local and short term in duration.

Due to the scale of the project, it is clear that it will have no impact on the environment”.

7.1.3.3. Wind

The average wind direction for the area during the summer months is from the north-to-north easterly quadrant, while during the early spring the direction is more north westerly. Southerly winds generally occur during the winter, but are not frequent. Normally very little wind is experienced during the winter due to the presence of the high-pressure cell situated over the country during that time of the year.

The wind speeds are normally fairly low, but high wind speeds may occur during early spring and during of thundershowers.

Wind can be considered as having a low intensity, and a low significance negative impact on the construction and operational phases of the project. The probability is probable and the impacts are local but short in duration. The project can have no influence on the wind and is therefore “not applicable.

Climate Change

According to: WIREs Climate Change 2014, 5605-620. Doi:10.1002/wcc.295: "Climate change is a key concern within South Africa. Mean annual temperatures have increased by at least 1.5 times the observed global average of 0.65°C over the past five decades and extreme rainfall events have increased in frequency. These changes are likely to continue. Climate change poses a significant threat to South Africa's water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity. Considering South Africa's high levels of poverty and inequality, these impacts pose critical challenges for national development. In relation to water, impact studies for the water resources sector have begun to look beyond changes in streamflow to changes in the timing of flows and the partitioning of streamflow into base flows and stormflows, reservoir yields, and extreme hydrological events. Spatially the eastern seaboard and central interior of the country are likely to experience increases in water runoff. Higher frequencies of flooding and drought events are projected for the future. Complexities of the hydrological cycle, influences of land use and management and the linkages to society, health, and the economy indicate far higher levels of complexity in the water resources sector than in other sectors. What has emerged is that land uses that currently have significant impacts on catchment water resources will place proportionally greater demands on the catchment's water resources if the climate were to become drier. The influence of climate change on water quality is an emerging research field in South Africa, with assessments limited to water temperature and non-point source nitrogen and phosphorus movement. A critical interaction that has not been explored is between changes in water quality and quantity and the combined impacts, such changes might have impact on various types of water use, e.g., irrigation, domestic consumption, or aquatic ecosystems support".

Water availability and demand has been calculated by the consulting Civil Engineers, to enable a sustainable waterborne sewage system as well as potable water supply for both the existing and future developments in the area.

7.1.4 SURFACE DRAINAGE

The site is located on a shallow slope less than 6% towards the northeast. Plate flow is the dominant drainage pattern on site, and no drainage channel intersects the site. Drainage occurs in a north-easterly direction towards the Harts River and the Wentzel Dam.

A narrow non-perennial river, with its active channel and riparian zone, is present at the northern part of the site. An in-channel dam, the Wentzeldam, is present at the northeastern part of the site. This active channel is narrow but well defined. Note that an existing dirt road with a concrete wall across the watercourse, a railway line as well as a tar road (R506) currently run across the watercourse area which is of medium-high sensitivity. Low concrete wall, where the dirt road crosses at the northeastern parts of the site, results in seasonal impoundment of water near an inlet of the Wentzel Dam.

Non-perennial active channel (“dry streambed”) and in-channel dam at site



Figure 4. Indication the narrow non-perennial river and in-channel dam, at the site, as well as some main disturbances.

—	Light blue outline	Route of active channel at the site
—	Darker blue outline and shading	Artificial Waterbody (In-channel Dam)

Riparian zones have distinctive characteristic vegetation which is often visibly distinct from the surrounding vegetation. It is often clearly adapted to different levels of frequency and inundation and distributed accordingly within the broad riparian zone. The more water loving or mesic species are therefore located close to the river channel, while species which are less dependent on water are located further away. It is the ability of species to tolerate different levels of inundation, the need for excessive water availability, or the need for close river proximity for growth, propagation, temperature control and nutrient enrichment which clearly determinate the structural, compositional and functional characteristics of riparian zones (Kemper, 2001).

Riparian zone along the active channel contains indigenous tree species such as *Vachellia karroo*, *Searsia pyroides*, *Searsia lancea*, *Diospyros lycioides* and *Ziziphus mucronata*. Indigenous grass species such as *Cynodon dactylon* and exotic grass species such as *Paspalum dilatatum* are also present at the riparian zone. Alien invasive herb species such as *Oenothera rosea* and *Rumex crispus* are present at the riparian zone/ fringes of the dam. *Persicaria* species (Knotweeds) occur at the permanent zones of watercourse.

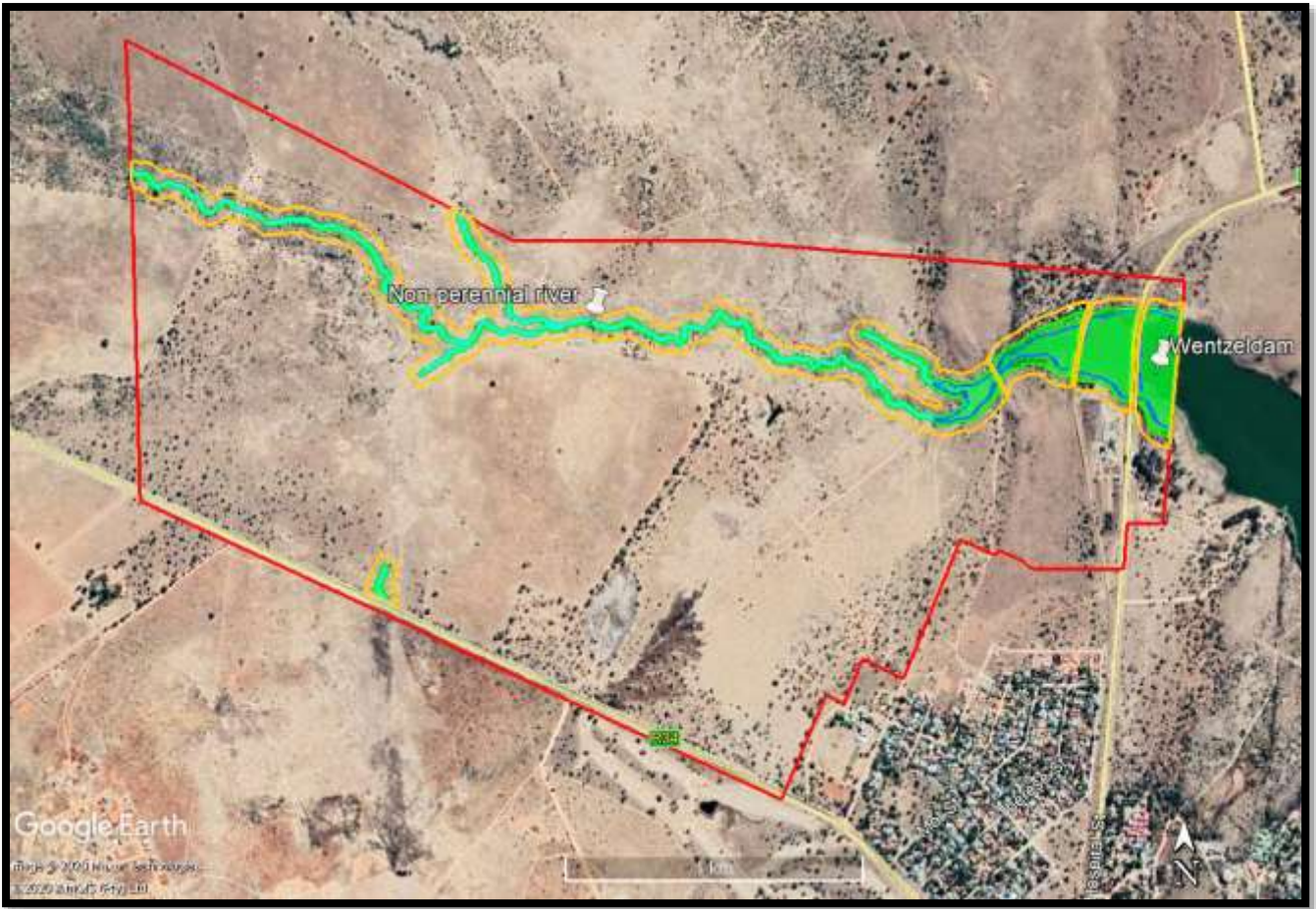






Figure 5. Indication of non-perennial river and in-channel dam, with their riparian zones and buffer zones at the site.

- | | | |
|---|---------------------------------|---------------------------------------|
|  | Light blue outline | Route of active channel at the site |
|  | Green outline and shading | Riparian zone |
|  | Orange outline | Outer edge of buffer zone |
|  | Darker blue outline and shading | Artificial Waterbody (In-channel Dam) |

Present ecological status (PES) of the Non-perennial River at the site is CATEGORY C which means the watercourse is moderately modified but with some loss of natural habitats. Ecological Importance and Sensitivity (EIS) at the site is Category C which is Moderate and refers to watercourses that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.

7.1.5 GROUND WATER

Seepage and the presence of perennial fluctuations of ground water were not encountered on site, but a seasonal perched water table may exist. A ferruginised profile indicates that some perennial water level fluctuations occur.

Ground water in the form of seepage was not intersected in any test pits during the investigation, but some problems are foreseen and normal water tightening techniques such as damp course on foundation levels are required. The expected high permeability of the silty sand may lead to leachate from sanitation systems to reach the ground water,

and with the relative shallow residual rock, a closed water borne sewage system is recommended. Special care must be taken to ensure adequate surface drainage to prevent the accumulation of water next to structures. Storm water diversion measures such as ponding pools are recommended to control peak flows during thunderstorms. All embankments must be adequately compacted and planted with grass to stop any excessive erosion and scouring of the landscape.

The impact and significance of this variable is considered low, probable but with a low significance.

The project could adversely affect ground water if proper steps are not implemented in order to prevent pollution from reaching the groundwater. If proper mitigation and pollution prevention steps are taken during the planning, implementation and post-construction phases it is highly unlikely that the groundwater will be affected. The eventual influence should therefore be one of low significance, probability and intensity.

Possible infiltration into the groundwater have been taken into account. During the construction phase, no spills of lubricants or construction worker sewage should be allowed to pollute the ground water. Special care must be taken to ensure adequate surface drainage to prevent the accumulation of water next to structures, especially within these relative flat areas.

7.1.6 WETLANDS AND RIPARIAN ZONES

Wetlands that could be classified as Floodplain Wetlands, Channelled Valley-bottom Wetlands, Unchannelled Valley-bottom Wetlands, Depressions (Pans), Seeps or Wetland Flats appear to be absent at site. Riparian zone along the active channel contains indigenous tree species such as *Vachellia karroo*, *Searsia pyroides*, *Searsia lancea*, *Diospyros lycioides* and *Ziziphus mucronata*. Indigenous grass species such as *Cynodon dactylon* and exotic grass species such as *Paspalum dilatatum* are also present at the riparian zone. Alien invasive herb species such as *Oenothera rosea* and *Rumex crispus* are present at the riparian zone/ fringes of the dam. *Persicaria* species (Knotweeds) occur at the permanent zones of watercourse. The succulent alien invasive plant species *Cylindropuntia imbricata* (Umbricate Prickly Pear) is conspicuous at the site and also at and near the riparian zone.

The non-perennial river at the site, with its riparian zone and buffer zone, is likely to be impacted by the proposed developments, but to a limited extent. If the development is approved the construction should be planned in such a manner that surface flow function well while erosion is limited. There is no distinct indication that interflow plays an important role in the maintenance of the non-perennial river. The geomorphological setting and flow regime should be as similar as possible post development as to prior the development, if the development is approved (in this case there could be some positive impact on the flow regime). Loss of any wetland animal or plant species of particular conservation importance is not expected. Loss of wetland Threatened or Near-Threatened Plants, Mammals, Reptiles, Amphibians and Invertebrates at the proposed footprint appears to be unlikely

7.1.7 FLORA

The study area is at Ipelegeng, west of Schweizer-Reneke, North West Province, South Africa. Site is situated at the Savanna Biome which is represented by the Schweizer-Reneke Bushveld vegetation type (Mucina & Rutherford, 2006). A brief overview of the vegetation type, which serves as an outline of the ecological context of the site, follows.

SVk 3 Schweizer-Reneke Bushveld

Distribution: Schweizer-Reneke Bushveld is located in the North-West Province of South Africa in an area to the east of Amalia in the west and from farming areas around Broedersput in the north to Never Mind (Christiana District) in the south. Altitude is 1250-1400 m (Mucina & Rutherford, 2006).

Vegetation and landscape features: Plains, slightly undulating plains and some hills, supporting open woodland with a fairly dense shrub layer, with trees *Acacia erioloba*, *Acacia karroo*, *Acacia tortilis*, *Searsia lancea* and shrubs *Acacia hebeclada*, *Diospyros lycioides*, *Grewia flava* and *Tarchonanthus camphoratus* (Mucina & Rutherford, 2006).

Geology and soils: Andesitic lavas of the Allanridge Formation of the Ventersdorp Supergroup, sometimes covered with silcrete or calcrete of the Kalahari Group. Deep (0.9-1.2 m) sandy soils, with Hutton and Clovelly the dominant soil forms. Land Types: Ah and Ae and some Bc (Mucina & Rutherford, 2006).

Climate: Rainfall in summer with very dry winters. Mean annual precipitation (MAP) about 440 – 520 mm. Frost frequent in winter (Mucina & Rutherford, 2006).





Important taxa of the Schweizer-Reneke Bushveld listed by Mucina & Rutherford (2006): Tall tree: *Acacia erioloba*. Small trees: *Acacia karroo*, *Acacia tortilis* subsp. *heteracantha*, *Rhus lancea*. Tall shrubs: *Asparagus laricinus*, *Diospyros lycioides* subsp. *lycioides*, *Grewia flava*, *Tarchonanthus camphoratus*, *Diospyros pallens*, *Ehretia rigida* subsp. *rigida*, *Gymnosporia buxifolia*, *Rhus tridactyla*. Low shrubs: *Acacia hebeclada* subsp. *hebeclada*, *Aptosimum decumbens*, *Chrysocoma ciliata*, *Gnidia polycephala*, *Pentzia viridis*. Woody climber: *Asparagus africanus*. Graminoids: *Anthepera pubescens*, *Digitaria eriantha* subsp. *eriantha*, *Heteropogon contortus*, *Stipagrostis uniplumis*, *Themeda triandra*, *Aristida congesta*, *Aristida stipitata* var. *spicata*, *Chloris virgata*, *Cynodon dactylon*, *Eragrostis biflora*, *Eragrostis rigidior*, *Eragrostis superba*, *Eragrostis trichophora*, *Sporobolus fimbriatus*. Herbs: *Barleria macrostegia*, *Hermannia tomentosa*, *Hibiscus pusillus*, *Indigofera daleoides*, *Lippia scaberrima*, *Osteospermum muricatum*, *Pollichia campestris*, *Rhyncosia adenodes*. Geophytic herbs: *Dipcadi papillatum*, *Nerine laticoma*.

Note: Not all of the above listed plant species for the vegetation types occur at the site in the study area.

Vegetation at most of the site is visibly degraded and cover of vegetation in many areas is conspicuously poor. Vegetation at an informal rubbish dump site is transformed. Some areas have been cleared, exposing soil. A conspicuous high frequency of alien invasive weeds occurs at disturbed areas, in particular at hitherto cleared places. A number of alien invasive weed species are present at previously cleared and perviously cultivated areas. These alien invasive weeds include *Argemone ochroleuca* (Mexican Poppy), *Gomphrena celosioides* (Globe Amaranth), *Schkuhria pinnata* (Dwarf Marigold), *Tagetes minuta* (Khaki Weed), *Conyza bonariensis* (Flea Bane), *Datura ferox* (Large Thorn-apple), *Datura stramonium* (Common Thorn Apple), *Richardia brasiliensis* (Mexican Richardia), *Acanthospermum australe* (Prostrate Starbur) and *Xanthium spinosum* (Spiny Cocklebur). The succulent alien invasive plant species *Cylindropuntia imbricata* (Umbricate Prickly Pear) is conspicuous at the site.



Figure 6. Indication of non-perennial river (active channel, riparian zone, buffer zone), in-channel dam and low rocky ridges at the site.

- | | | |
|---|---------------------------------|---------------------------------------|
|  | Light blue outline | Route of active channel at the site |
|  | Green outline | Riparian zone |
|  | Brown outline and shading | Low rocky ridges |
|  | Darker blue outline and shading | Artificial Waterbody (In-channel Dam) |

Indigenous trees at the site include *Vachellia erioloba* (Camel Thorn), *Vachellia hebeclada* subsp. *hebeclada* (Candlepod Thorn; shrub-height at site), *Vachellia karroo* (Sweet Thorn), *Tarchonanthus camphoratus* (Camphor Bush) and *Grewia flava* (Velvet Raisin; shrub-height at site). The indigenous shrub *Asparagus laricinus* (Wild Asparagus) is found at disturbed places at the site. Indigenous grass species include *Eragrostis lehmanianna*, *Eragrostis superba*, *Aristida congesta*, *Pogonarthria squarrosa*, *Heteropogon contortus*, *Melinis repens* and *Tragus berteronianus*. Indigenous forb species and shrublets include *Bulbine narcissifolia*, *Barleria macrostegia* and *Berkheya onopordifolia*. Herbaceous shrub *Gomphocarpus fruticosus* is also at the site. Dwarf shrubs and shrublets at the site include *Felicia muricata*. The widespread succulent *Aloe grandidentata* occurs at several places at the site.



Photo 5. Branches and foliage of *Vachellia erioloba* (Camel Thorn) at the site.

Photo: R.F. Terblanche

One plant species, *Vachellia erioloba* (Camel Thorn) that is not threatened but listed as Protected tree species occurs at the site. In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. *Vachellia erioloba* is numerous at some areas at the site. A Camel Thorn Tree Forest or large Camel Thorn trees (>10 m) such as at Kathu and Witsand in the Northern Cape Province, are absent at the site. If the development is approved it is likely that some Camel Thorn trees (*Vachellia erioloba*) should be removed, in which case a permit for removal would be imperative, and should be applied for.

Patches of degraded grassland with some indigenous grass species, herbaceous species and few trees remain at the site. The shrub *Protasparagus laricinus* is conspicuous at the site and its concentrations approach bush encroachment at some places. Indigenous grass species include *Panicum coloratum*, *Aristida congesta*, *Aristida adscensionis*, *Eragrostis lehmanianna*, *Chloris virgata*, *Eragrostis superba*, *Hyparrhenia hirta*, *Tragus berteronianus* and *Melinis repens*. Indigenous forbs and dwarf shrubs include *Triptaris aghillana*, *Bulbine narcissifolia*, *Barleria macrostegia*, *Hibiscus pusillus*, *Chamaesyce inaequilatera*, *Felicia muricata* and *Ziziphus zeyheriana*. Herbaceous shrub *Gomphocarpus fruticosus* is widespread at the site. Indigenous trees such as *Ziziphus mucronata* (Buffalo-thorn), *Vachellia karroo* (Sweet Thorn) and *Searsia lancea* (Karee) are present.



Photo 6. Patch of savanna that remains at the site.

Photo: R.F. Terblanche

A number of alien invasive weed species are present at previously cleared and previously cultivated areas. These alien invasive weeds include *Datura ferox* (Large Thorn-apple), *Datura stramonium* (Common Thorn Apple), *Argemone ochroleuca* (Mexican Poppy), *Gomphrena celosioides* (Globe Amaranth), *Schkuhria pinnata* (Dwarf Marigold), *Tagetes minuta* (Khaki Weed), *Conyza bonariensis* (Flea Bane), *Verbena aristigera* (Fine-leaved Verbena), *Plantago lanceolata* (Buckhorn Plantain), *Physalis viscosa* (Sticky Gooseberry) and *Xanthium spinosum* (Spiny Cocklebur).

Two low rocky ridges are found at the northeaster parts of the site.



Figure 7 Indication of low rocky ridges and 30 m buffer zones at the northeastern parts of the site.

- Brown outline and shading Low rocky ridges
- Orange outline and shading Outer edge of buffer zone

Savanna at the site is represented by the Schweizer-Reneke Bushveld vegetation type (SVk 3) which is listed as a Threatened Ecosystem, Vulnerable, according to the National List of Threatened Ecosystems (2011). Terrestrial vegetation at the site has been modified and transformed at parts, in the past and most of the vegetation appears degraded. Some areas contain savanna in fairly natural condition. The scope overall, for the conservation of natural savanna at the site, is small

7.1.8 FAUNA

Mammals

The following Tables list the possible presence or absence of threatened mammal species, and mammal species of which the status is uncertain, respectively, at the site. Literature sources that were used are Friedman & Daly (2004), Skinner & Chimimba (2005) and Wilson & Reeder (2005). Since the site falls outside reserves, threatened species such as the black rhinoceros (*Diceros bicornis*) and the African wild dog (*Lycan pictus*) are obviously not present. No smaller mammals of particular high conservation significance are likely to be found on the site as well.

Mammals of particular conservation concern

Threatened mammal species of the North West Province. Literature sources: Friedman & Daly, (2004), Skinner & Chimimba (2005), Wilson & Reeder (2005). With mammal species which normally needs a large range their residential status does not implicate that they are exclusively dependent on the site or use the site as important

shelter or for reproduction. No = Not recorded at site/ Unlikely to be resident at the site. Yes: Recorded at the site/ Likely to be resident at the site.

Species	Threatened Status	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Chrysoxalax villosus</i> Rough-haired golden mole	Vulnerable	No	No
<i>Cloeotis percivali</i> Short-eared Trident Bat	Vulnerable/ Near-threatened	No	No
<i>Diceros bicornis</i> Black rhinoceros	Critically Endangered	No	No
<i>Lycaon pictus</i> African wild dog	Endangered	No	No
<i>Loxodonta africana</i> African elephant	Vulnerable	No	No
<i>Mystromys albicaudatus</i> White-tailed mouse	Endangered	No	No
<i>Neamblysomus julianae</i> Juliana's Golden Mole	Critically Endangered	No	No
<i>Panthera leo</i> Lion	Vulnerable	No	No
<i>Rhinolophus blasii</i> Blasi's Horseshoe Bat	Vulnerable	No	No
<i>Smutsia temminckii</i> Ground Pangolin	Vulnerable	No	No

Near threatened mammal species known to occur in the North West Province. Literature sources: Skinner & Chimimba (2005). No = Not recorded at site/ unlikely to be resident at the site. Yes: Recorded at the site/ Likely to be resident at the site.

Species	Threatened Status	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Ceratotherium simum</i> White Rhinoceros	Near threatened	No	No

Data deficient (or uncertain) mammal species of the North West Province. Literature sources: Skinner & Chimimba (2005). No = Not recorded at site/ unlikely to be resident at the site. Yes: Recorded at the site/ Likely to be resident at the site.

Species	Threatened Status	Recorded at site during survey	Likely be a resident at the site
<i>Myosorex varius</i> Forest shrew	Uncertain	No	No

Bird species of particular conservation concern

The possible presence or absence of threatened bird species and near threatened bird species at the site. With bird species which often have a large distributional range, their presence does not imply that they are particularly dependent on a site as breeding location. **No threat to any threatened bird species or any bird species of particular conservation importance are foreseen.**

Threatened bird species of the North West Province. Literature sources Barnes (2000), Hockey, Dean & Ryan, P.G. (2005) and Chittenden (2007). No = Not recorded at site/ Unlikely to use site as breeding area or particular habitat on which the species depends. Yes = Recorded at site/ Likely to use site as breeding area or particular habitat on which the species depends.

Species	Common name	Threatened Status	Recorded at site during survey	Likely to use site as breeding area or habitat
<i>Aegypius tracheliotos</i>	Lappet-faced Vulture	Vulnerable	No	No
<i>Anthropoides paradiseus</i>	Blue Crane	Vulnerable	No	No
<i>Aquila rapax</i>	Tawny Eagle	Vulnerable	No	No
<i>Ardeotis kori</i>	Kori Bustard	Vulnerable	No	No
<i>Balearica regulorum</i>	Grey Crowned Crane (Mahem)	Vulnerable	No	No
<i>Botaurus stellaris</i>	Eurasian Bittern	Critically Endangered	No	No
<i>Circus ranivorus</i>	African Marsh- Harrier	Vulnerable	No	No
<i>Crex crex</i>	Corn Crake	Vulnerable	No	No
<i>Eupodotis senegalensis</i>	White-bellied Korhaan	Vulnerable	No	No
<i>Falco naumanni</i>	Lesser Kestrel	Vulnerable	No	No
<i>Geronticus calvus</i>	Southern Bald Ibis	Vulnerable	No	No
<i>Gorsachius leuconotus</i>	White-backed Night-heron	Vulnerable	No	No
<i>Gypaetus barbatus</i>	Bearded Vulture	Endangered	No	No
<i>Gyps africanus</i>	White-backed Vulture	Vulnerable	No	No
<i>Gyps coprotheres</i>	Cape Vulture	Vulnerable	No	No
<i>Pelecanus rufescens</i>	Pink-backed Pelican	Vulnerable	No	No
<i>Polemaetus bellicosus</i>	Martial Eagle	Vulnerable	No	No
<i>Rhynchops flavirostris</i>	African Skimmer	Endangered	No	No
<i>Sagittarius serpentarius</i>	Secretarybird	Vulnerable	No	No

<i>Sarothrura ayresi</i>	White-winged Flufftail	Critically Endangered	No	No
<i>Tyto capensis</i>	African Grass-Owl	Vulnerable	No	No

* Though some of the above bird species that roams over large areas may occasionally be found at the site, the site does not appear to be a habitat of particular importance to these birds, and these birds also do not use the site as particular breeding area.

Near threatened bird species of the North West Province. Literature sources Barnes (2000), Hockey, Dean & Ryan, P.G. (2005) and Chittenden (2007). No = Not recorded at site/ Unlikely to be particularly dependent on the site as breeding area or habitat. Yes = Recorded at site/ Likely to be particularly dependant on the site as breeding area or habitat.

Species	Common name	Threatened Status	Recorded at site during survey	Likely to use site breeding area or habitat
<i>Certhilauda chuana</i>	Short-clawed Lark	Near threatened	No	No
<i>Charadrius pallidus</i>	Chestnut-banded Plover	Near threatened	No	No
<i>Ciconia nigra</i>	Black Stork	Near threatened	No	No
<i>Circus macrourus</i>	Pallid Harrier	Near threatened	No	No
<i>Eupodotis caerulescens</i>	Blue Korhaan	Near threatened	No	No
<i>Falco biarmicus</i>	Lanner Falcon	Near threatened	No	No
<i>Falco peregrinus</i>	Peregrine Falcon	Near threatened	No	No
<i>Glareola nordmanni</i>	Black-winged Pratincole	Near threatened	No	No
<i>Leptoptilos crumeniferus</i>	Marabou Stork	Near threatened	No	No
<i>Mirafra cheniana</i>	Melodious lark	Near threatened	No	No
<i>Mycteria ibis</i>	Yellow-billed Stork	Near threatened	No	No
<i>Phoenicopterus minor</i>	Lesser Flamingo	Near threatened	No	No
<i>Phoenicopterus ruber</i>	Greater Flamingo	Near threatened	No	No
<i>Rostratula benghalensis</i>	Greater Painted-snipe	Near threatened	No	No
<i>Sterna caspia</i>	Caspian Tern	Near threatened	No	No
<i>Certhilauda chuana</i>	Short-clawed Lark	Near threatened	No	No

* Though some of the above bird species that roams over large areas may occasionally be found at the site, the site does not appear to be a habitat of particular importance to these birds, and these birds also do not use the site as breeding area.

Reptiles of particular conservation concern

The following tables list possible presence or absence of threatened reptile or near threatened reptile species in the study area. The Atlas and Red List of Reptiles of South Africa, Lesotho and South Africa (Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers, 2014) has been used as the main source to compile the list for assessment.

Threatened reptile species in North West Province. Main Source: (Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers, 2014). No = Reptile species is not a resident on the site; Yes = Reptile species is found to be resident on the site.

Species	Threatened Status	Resident at site	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Crocodylus niloticus</i> Nile Crocodile	Vulnerable	No	No	No

Near threatened reptile species in North West Province. Main Source: Bates, Branch, Bauer, Burger, Marais, Alexander & de Villiers (2014). Though *Homoroselaps dorsalis* has not yet been recorded from the North West Province, its presence in some areas of the Province is anticipated. No = Reptile species is not a resident on the site; Yes = Reptile species is found to be resident on the site.

Species	Threatened Status	Resident at site	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Homoroselaps dorsalis</i> Striped Harlequin Snake	Near threatened	No	No	No

Amphibians of particular conservation concern

Near threatened amphibian species in North West Province. No = Amphibian species is not a resident on the site; Yes = Amphibian species is found to be resident on the site.

Species	Threatened Status	Resident at site	Recorded at site during survey	Likely to be found based on habitat assessment
<i>Pyxicephalus adspersus</i> Giant Bullfrog	Near threatened (Currently Least Concern)	No	No	No

Assessment of invertebrate species of particular conservation concern

Butterflies of particular conservation concern

Threatened butterfly species in North West Province and Gauteng Province. Sources: Henning, Terblanche & Ball (2009), Mecenero *et al.* (2013). Invertebrates such as threatened butterfly species are often very habitat specific and residential status imply a unique ecosystem that is at stake.

Species	Threatened Status	Recorded at site during survey	Residential status at the site: Yes confirmed, Highly
---------	-------------------	--------------------------------	---

<i>Aloeides dentatis dentatis</i> Roodepoort Copper	Endangered	No	likely, Likely, Medium possibility, Unlikely, Highly unlikely Highly unlikely
<i>Chrysoritis aureus</i> Golden Copper	Endangered	No	Highly unlikely
<i>Lepidochrysops praeterita</i> Highveld Blue	Endangered	No	Highly unlikely
<i>Orachrysops mijburghi</i> Mijburgh's Blue	Endangered	No	Highly unlikely

Butterfly species of the North West Province and Gauteng Province that are not threatened and not near threatened but of which are of particular conservation concern and listed in the **Rare** category (Mecenero *et al.*, 2013). No = Butterfly species is unlikely to be a resident at the study area; Yes = Butterfly species is a resident at the study area.

Species	Threatened Status	Recorded at site during survey	Residential status at the site: Yes confirmed, Highly likely, Likely, Medium possibility, Unlikely, Highly unlikely
<i>Colotis celimene amina</i> Lilac Tip	Rare (Low density)	No	Highly unlikely
<i>Lepidochrysops procera</i> Savanna Blue	Rare (Habitat specialist)	No	Highly unlikely
<i>Metisella meninx</i> Marsh Sylph	Rare (Habitat specialist)	No	Highly unlikely
<i>Platylesches dolomitica</i> Hilltop Hopper	Rare (low density)	No	Highly unlikely

Beetles of particular conservation priority

Fruit chafer species (Coleoptera: Scarabaeidae: Cetoninae) in the Gauteng Province and North-West Province which are of known high conservation priority.

Species	Threatened Status	Recorded at site during survey	Likely to be resident based on habitat assessment
<i>Ichnestoma stobbiai</i>	Uncertain	No	No
<i>Trichocephala brincki</i>	Uncertain	No	No

Scorpion species of particular conservation priority

Rock scorpion species (Scorpiones: Ischnuridae) species that are of known high conservation priority in the Gauteng Province and North-West Province.

Species	Threatened Status	Recorded at site during survey	Likely to be resident at site based on habitat assessment
<i>Hadogenes gracilis</i>	Uncertain	No	No
<i>Hadogenes gunningi</i>	Uncertain	No	No

Ecological Sensitivity at the site

Ecological sensitivity at most of the site is medium. Ecological sensitivity at some of the conspicuously disturbed areas at the site, such as the extensive dumping area is indicated as low. Ecological sensitivity at the non-perennial active channel, in-channel dam and riparian zone, as well as the low rocky ridges and their buffer zones, is medium-high owing to the importance of these watercourses and low rocky ridges as conservation corridors in the larger area (Figure 6). Note that an existing dirt road with a concrete wall across the watercourse, a railway line as well as a tar road (R506) currently run across the area of medium-high sensitivity.

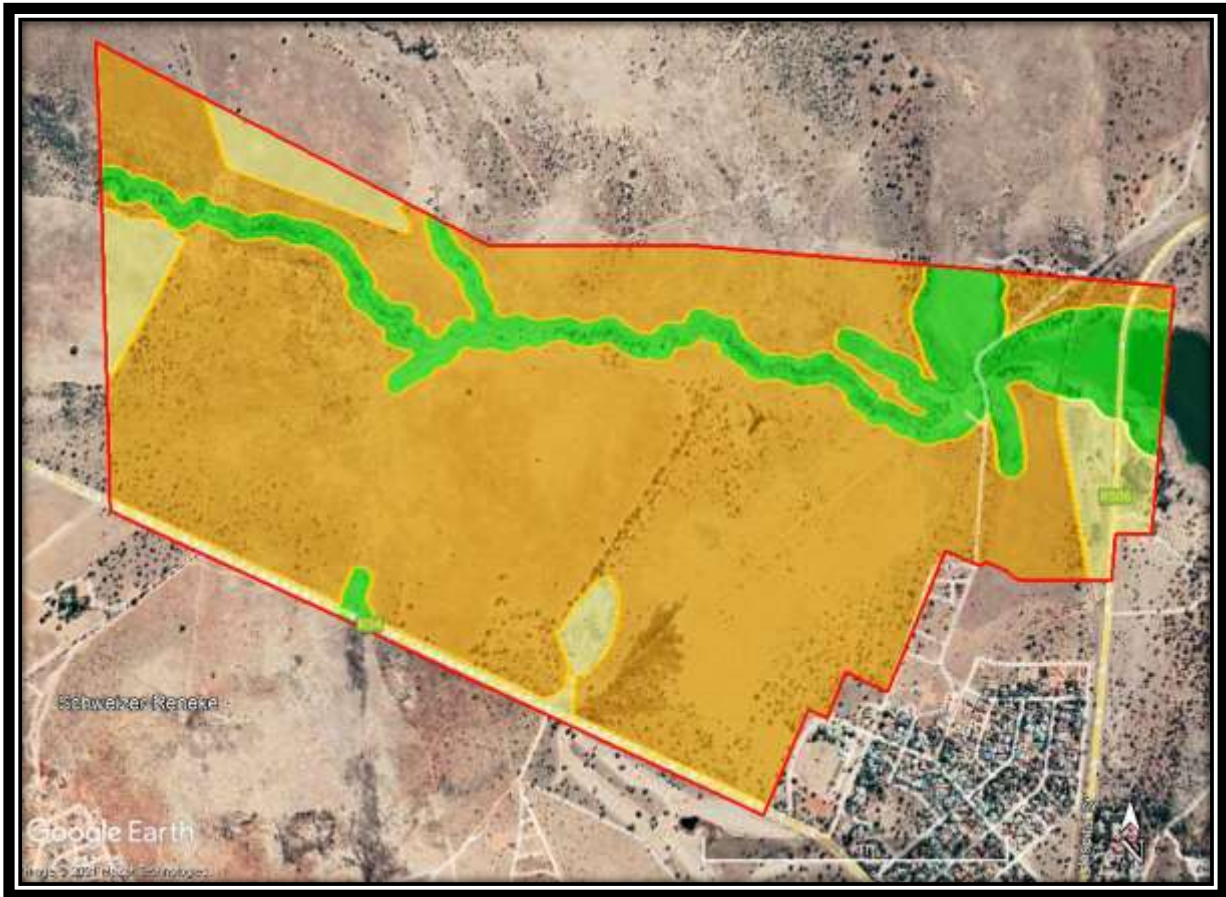


Figure 8 Indications of ecological sensitivity at the site.

- Red outline Boundaries of the site
- Light yellow outline and shading Low Sensitivity
- Orange outline and shading Medium Sensitivity

Summary of risks and impacts

Vegetation at most of the site is visibly degraded and cover of vegetation in many areas is conspicuously poor. Vegetation at an informal rubbish dump site is transformed. Some areas have been cleared, exposing soil. Fairly large patches of disturbed savanna still remain at the site. *Vachellia hebeclada* (Candlepod Thorn) occurs in many clumps at visibly disturbed areas with noticeable poor plant cover.

Indigenous trees at the site include *Vachellia erioloba* (Camel Thorn), *Vachellia hebeclada* subsp. *hebeclada* (Candlepod Thorn; shrub-height at site), *Vachellia karroo* (Sweet Thorn), *Tarchonanthus camphoratus* (Camphor Bush) and *Grewia flava* (Velvet Raisin; shrub-height at site). The indigenous shrub *Asparagus laricin* (Wild Asparagus) is found at disturbed places at the site. Indigenous grass species include *Eragrostis lehmanianna*, *Eragrostis superba*, *Aristida congesta*, *Pogonarthria squarrosa*, *Heteropogon contortus*, *Melinis repens* and *Tragus berteronianus*. Indigenous forb species and shrublets include *Bulbine narcissifolia*, *Barleria macrostegia* and *Berkheya onopordifolia*. Herbaceous shrub *Gomphocarpus fruticosus* is also found at the site. Dwarf shrubs and shrublets at the site include *Felicia muricata*. The widespread succulent *Aloe grandidentata* occurs at several places at the site.

A number of alien invasive weed species are present at previously cleared and perviously cultivated areas. The succulent alien invasive plant species *Cylindropuntia imbricata* (Umbricate Prickly Pear) is conspicuous at the site.

Riparian zone along the active channel contains indigenous tree species such as *Vachellia karroo*, *Searsia pyroides*, *Searsia lancea*, *Diospyros lycioides* and *Ziziphus mucronata*. Indigenous grass species such as *Cynodon dactylon* and exotic grass species such as *Paspalum dilatatum* are also present at the riparian zone. Alien invasive herbaceous species such as *Oenothera rosea* and *Rumex crispus* are present at the riparian zone/ fringes of the dam. *Persicaria* species (Knotweeds) occur at the permanent zones of the watercourse.

Savanna at the site is represented by the Schweizer-Reneke Bushveld vegetation type (SVk 3) which is listed as a Threatened Ecosystem, Vulnerable, according to the National List of Threatened Ecosystems (2011). Terrestrial vegetation at the site has been modified and transformed at parts, in the past and most of the vegetation appears degraded. Some areas contain savanna in fairly natural condition. The scope overall, for the conservation of natural savanna at the site, is small.

No Threatened or Near Threatened plant or animal species appear to be resident at the site.

One plant species, *Vachellia erioloba* (Camel Thorn) that is not threatened but listed as Protected tree species occurs at the site. In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. *Vachellia erioloba* is numerous at some areas at the site. A Camel Thorn Tree Forest or large Camel Thorn trees (>10 m) such as at Kathu and Witsand in the Northern Cape Province, are absent at the site. If the development is approved it is likely that some Camel Thorn trees (*Vachellia erioloba*) should be removed, in which case a permit for removal would be imperative, and should be applied for.

Ecological sensitivity at most of the site is medium. Ecological sensitivity at some of the conspicuously disturbed areas at the site, such as the extensive dumping area is indicated as low. Ecological sensitivity at the non-perennial active channel, in-channel dam and riparian zone, as well as the low rocky ridges and their buffer zones, is medium-high owing to the importance of these watercourses and low rocky ridges as conservation corridors in the larger area

(Figure 6). Note that an existing dirt road with a concrete wall across the watercourse, a railway line as well as a tar road (R506) currently run across this area of medium-high sensitivity.

There is little scope for most of the site to be part of a corridor of particular conservation importance, excluding the watercourse (with its bufferzone) and the low rocky ridges. Non-perennial river at the northern part of the site, as well as the low rocky ridges at the northeastern parts of the site are corridors of particular conservation concern

7.1.8. AIR QUALITY

“The extent and toxicity of emissions is not necessarily a concise indicator of contributions to ground-level air pollution concentrations or of risks to health and the environment. Such contributions are also a function of the height of emission, temporal variations in the release of pollutants, and the proximity of the source to the people or the environment affected by exposure to the pollutant (such as, for instance, children, or the elderly, or people who are ill, or others who may be particularly sensitive receptors to a specific pollutant above a certain concentration). If an industry is operating close to a school or hospital or centre for the elderly, the potential exposure (in combination with the other contributing factors) is high.

Three factors govern the significance of household fuel-burning emissions:

- (i) the low level of emissions (that is, their height above the ground is generally about 3 m, within people’s breathing zone);*
- (ii) the simultaneous occurrence of peak emissions (during the coldest months of winter and in the early mornings and throughout the evenings) and poor atmospheric dispersion (stable atmosphere with low wind speeds, with the possible development of temperature inversions); and*
- (iii) the release of such emissions within high human exposure areas, given that such emissions generally occur in dense, low-income settlements where population density is high (in addition, the pollution is not only outdoors, but frequently indoors as well, due to poor ventilation, so it affects the whole family).*

The significance of vehicle emissions as contributors to air-pollutant concentrations and health risks is similarly increased by the low level (close to the ground) of the emissions, and their proximity to highly populated areas – on highways, for example, with emissions being particularly high when traffic is congested. Vehicle emissions tend to peak early in the morning and in the evenings, when the potential for atmospheric dispersion is reduced (for example, wind speeds are generally low in the early mornings and evenings, reducing their potential for dispersing pollution).

Given the high volumes of pollutants emitted from fuel-burning within the industrial and power-generation sectors, their contribution to ambient concentrations and public health risks is often lower than might be expected. This is because these sources are generally characterized by constant releases, relatively high above ground level, and further away from residential settlements than are household fuel-burning and vehicle emissions.

Ranking the significance of different sources of pollution on the basis of the total emissions for which each source is responsible would, for example, place industrial emissions above household fuel-burning. If the aim is to reduce impacts on human health, however, then household fuel-burning would need to be targeted as a top priority (Scorgie et al., 2004d).

Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.

Approaches adopted or considered for future implementation have included: regulation (for example, the use of Atmospheric Emission Licences for Listed Activities); market instruments (such as atmospheric user-charges and pollution taxes); the potential for voluntary agreements, education and awareness raising; and emissions trading. International experience shows that adopting a mix of instruments and interventions is more effective than using a single instrument to improve air quality across various types of source. Although direct regulation remains important in controlling industrial sources, there is evidence that specifying emission limits is more effective than specifying the use of particular technologies, so as to give companies flexibility in selecting the method of achieving success that suits them best. This approach is advocated as being more cost-effective and more likely to stimulate technological advances in pollution control methods and production processes.

For large point sources (that is, sources of pollution that are concentrated on one site, but that have large, constant volumes of many types of pollution) that are few in number, instruments such as emissions trading have been advocated as an effective way to manage pollutant emissions and reduce the costs of compliance.

Implementing an efficient social protection system to alleviate poverty is central to maintaining conditions that facilitate not only economic growth but also environmental sustainability. Many South African households – including those with access to electricity – use coal, wood, and paraffin, due to the relative cost-effectiveness of such fuels for heating (that is, space heating) and cooking purposes.

Many low-cost housing developments and informal settlements are located close to industrial and mining operations, as such land is both available and inexpensive. Poorer communities are more likely to suffer from poor service delivery, including inadequate waste removal that sometimes results in refuse being set alight illegally. These examples show that poverty alleviation could help to improve air quality by enabling people to choose practices that are friendlier to the environment.”

https://www.environment.gov.za/sites/default/files/docs/stateofair_airqualityand_sustainable_development.pdf Date visited: 17/03/2020.

The proposed development is planned and will eventually be developed with the above mentioned in mind. The alleviation of poverty (Jobs that will be created) and the provision of proper accommodation facilities (Which has been designed to be as energy efficient as possible) will contribute towards lessening air pollution in the area.

In addition to the above, it should be noted that the project will however create a certain amount of dust during the construction phase. If proper dust suppression measures are implemented this variable will have very little impact (low in intensity and significance during the construction phase).

7.1.9 NOISE

It is a fact that a certain amount of noise will be generated during the construction phase of the project. Noise levels should however rarely exceed the allowable limits. It is unlikely that the project will create any more noise during the operational phase than that already experienced on site.

7.2 SOCIOLOGICAL AND ECONOMIC ISSUES

7.2.1 SOCIAL AMENITIES

In terms of section 9(1) of the National Housing Act (107 of 1997), every municipality must, as part of the municipality's process of integrated development planning (IDP) take all reasonable and necessary steps to ensure that the inhabitants within its area of jurisdiction have access to adequate housing on a progressive basis by setting housing delivery goals, identifying suitable land for housing development and planning, facilitating, initiating and co-ordinating housing development in its area of jurisdiction.

Housing comprises a series of complex interrelationships between people, their needs and values and resources within a political and legal environment. This complexity requires a focused approach to efforts aimed at providing housing. National Government has started to respond by putting the necessary policy and legislative environment in place.

This framework outlines the roles and responsibilities of different spheres of government in relation to housing, as well as dealing with aspects relating to the design and content of housing policy and legislation. In the context of this framework the Mamusa Local Municipality is required to take all reasonable steps to ensure the provision of adequate housing to its residents.

Various policy directions and legislation exist relating to the role and responsibilities of the different spheres of government to provide and ensure the provision of housing opportunities to affected communities. Of these, the comprehensive plan for the Development of sustainable Human Settlements based on the Breaking New Ground Principles (BNG) forms the basis on which housing development should be implemented.

The aim is to move beyond the provision of basic shelter towards achieving the broader vision of sustainable human settlements and more efficient towns, cities and regions. The following factors will be taken into consideration in order to achieve the vision:

- Progressive Informal Settlement Eradication: These settlements must be integrated into the broader urban setup so as to overcome spatial, social and economic exclusion. The plans encourage the eradication of informal settlements through in-situ upgrading in desired locations coupled with the relocation of household where development is not possible or desirable.
- Promoting densification and Integration: The aim is to integrate previously excluded groups into the urban area so as to enable them to enjoy the benefits it offers and to create more integrated, functional and environmentally sustainable human settlements, towns and cities.
- Enhancing Spatial Planning: Greater co-ordination and alignment of various planning instruments and economic policies lies at the heart of sustainable human settlements.
- Provision of a mix of housing typologies for different income groups (Subsidised, GAP, Affordable and bonded Housing opportunities).
- Enhancing the location of New Housing Projects: The location of past housing projects was said to reinforce apartheid spatial settlement patterns. Spatial restructuring aims to achieve a more decisive Intervention In land markets. The following interventions are envisaged viz. accessing well located state-owned and parastatal land: acquisition of well-located private land for housing development, funding for land acquisition and fiscal incentives.

HOUSING AND STAND NEEDS

- The waiting list of the municipality currently indicated a need for 6000 houses. This waiting list increased drastically from 3171 units in 2014 (NW Multi Year Development Plan 2014).
- According to the 2013 spatial Development Framework (SDF) for Mamusa Local Municipality there were 804 informal structures not on stands (squatters) and 303 informal structures in backgrounds. (This was also indicated in the 2013 Housing Sector Plan for Mamusa Local Municipality)
- Due to the fact that there are no vacant stands in Schweizer-Reneke/ Ipelegeng Urban area, households are currently squatting on municipal vacant land, parks, school sites and in the backyards and the community already submitted two memorandums to the municipality demanding additional stands

The proposed development is based on the premise that the proposed township area should be a fully integrated human settlement catering not only for low cost subsidised housing but also for other housing typologies including inter alia but not limited to GAP housing, affordable bonded housing, the necessary social, community and recreational facilities as well as opportunities for job creation and employment.

It should also be noted that the land is used by the Horse Riding club and the development will have a definite impact on the riding trails and routes as it stands. It will be necessary to reroute the trails and has to be weighed against SPLUMA principles specifically spatial justice and sustainability. It is therefore essential to locate new residential developments in areas that will combat urban sprawl and result in a more compact urban form, which is the reasoning for the location of the proposed development.

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to economic spin-offs that will result.

7.2.2 ARCHAEOLOGY AND CULTURAL SITES

A number of known cultural heritage sites (archaeological and/or historical) exist in the larger geographical area within which the study area falls. There are no known sites on the specific land parcel. No sites, features or material of any real cultural heritage (archaeological and/or historical) origin or significance were identified in the study area during the assessment. The only sites identified are the remains (foundations) of recent farming related structures, but these are of recent age. The dumping of building rubble also occurs in the area in places.

Access to parts of the study was not possible due to the fact that it is fenced-off and is in the hands of private individuals (tenants renting from the Municipality) and entry to these properties were not possible. However, it is believed that it is highly unlikely that any sites of heritage significance will be impacted by the proposed development. The remains of some farming-related structures were also observed on aerial images (Google Earth) of the study area, but these could not be physically assessed however. There could possibly be more similar sites in the larger area.

However, it should be noted that although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors. The subterranean nature of these resources (including low stone-packed or unmarked graves) should also be taken into consideration. Should any previously unknown or invisible sites, features or material be uncovered during any development actions then an expert should be contacted to investigate and provide recommendations on the way forward.

7.2.3 AESTHETICS

Vegetation at most of the site is visibly degraded and cover of vegetation in many areas is conspicuously poor. Vegetation at the dump site is transformed. Some areas have been cleared, exposing soil. Fairly large patches of disturbed savanna still remain at the site. *Vachellia hebeclada* occurs in many clumps at visibly disturbed areas with noticeable poor plant cover.

A number of alien invasive weed species are present at previously cleared and previously cultivated areas. These alien invasive weeds include *Argemone ochroleuca* (Mexican Poppy), *Gomphrena celosioides* (Globe Amaranth), *Schkuhria pinnata* (Dwarf Marigold), *Tagetes minuta* (Khaki Weed), *Conyza bonariensis* (Flea Bane), *Datura ferox* (Large Thorn-apple), *Datura stramonium* (Common Thorn Apple), *Richardia brasiliensis* (Mexican Richardia), *Acanthospermum australe* (Prostrate Starbur) and *Xanthium spinosum* (Spiny Cocklebur). The succulent alien invasive plant species *Cylindropuntia imbricata* (Umbricate Prickly Pear) is conspicuous at the site.

Riparian zone along the active channel contains indigenous tree species such as *Vachellia karroo*, *Searsia pyroides*, *Searsia lancea*, *Diospyros lycioides* and *Ziziphus mucronata*. Indigenous grass species such as *Cynodon dactylon* and exotic grass species such as *Paspalum dilatatum* are also present at the riparian zone. Alien invasive herb species such as *Oenothera rosea* and *Rumex crispus* are present at the riparian zone/ fringes of the dam. *Persicaria* species (Knotweeds) occur at the permanent zones of the watercourse

Visual Intrusion is defined as the level of compatibility or congruence of the project with the particular qualities of the area, or its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

High visual intrusion – results in a noticeable change or is discordant with the surroundings;

Moderate visual intrusion – partially fits into the surroundings, but clearly noticeable;

Low visual intrusion – minimal change or blends in well with the surroundings.

The proposed development will change the scenic resources of the local area from an undeveloped site to a residential area. The visual intrusion is considered to be moderate as the proposed development partially fits into the surroundings but will be clearly noticeable.

The proposed development will require additional lighting on and in buildings and possibly along roads. This will change the night landscape from unlit to lit.

7.2.4 AGRICULTURE

The main objective of Act 70 is to manage the sub-division of agricultural land to prevent injudicious fragmentation of agricultural land and the creation of uneconomical units. In terms of the Draft Bill, *high potential cropping land*

means land best suited to, and capable of, consistently producing acceptable levels of goods and services for a wide range of agricultural enterprises.

Land in capability classes i to iii, unique agricultural land and land under irrigation will qualify from a resource perspective. The proposed development site has no irrigated land and will therefore not automatically qualify as high potential in terms of the *National policy on the protection of high potential and unique agricultural land*.

The above mentioned is confirmed by the Department Agriculture, Land Reform and Rural Development's (DALRRD) map indicating High Potential Agricultural Land in the area. Figure 9 below is a copy of this map, indicating that the proposed site does not fall within an area classified as "High Potential Agricultural land".

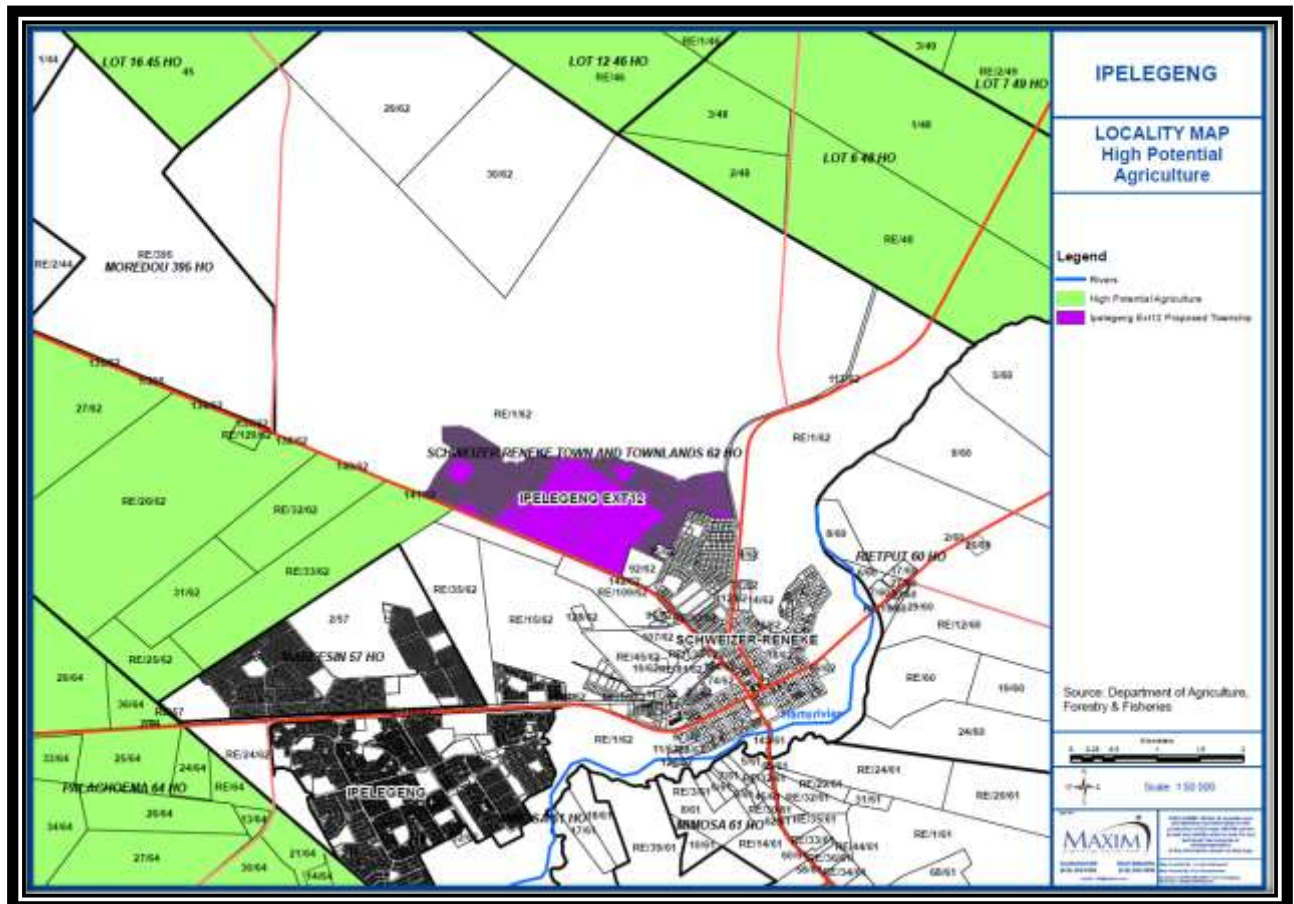


Figure 9: High Potential Agricultural land
(Source: Department of Agriculture, Forestry and Fisheries.)

8. ENVIRONMENTAL MANAGEMENT OBJECTIVES AND TARGETS

The following table is a summary of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process.

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
DOCUMENTATION AND TRAINING		
The necessary documentation must be available in the site office	Ensure that all concerned is aware of the EMP and related environmental aspects	Availability of documents Trained and informed workforce.
SITE ACCESS & TRAFFIC MANAGEMENT		

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
Access roads may increase the construction footprints	Construction vehicles, machinery and workers must be restricted to the designated access roads, and may not drive through undeveloped vegetation outside of the existing access route except where that vegetation falls within the authorised working area (development footprint) at the site.	Minimizing eradication of vegetation.
VEGETATION CLEARING		
Vegetation will be cleared from within the footprint of the working area, before earthmoving and construction activities commence.	Vegetation clearing may only commence once the working area has been clearly demarcated to the ECO's satisfaction.	Land clearing must be restricted to the demarcated working area, and no vegetation may be cleared outside of the demarcated working area.
TOPSOIL & SUBSOIL MANAGEMENT		
Topsoil (where present) will be removed from any area where physical disturbance of the surface will occur.	Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas on site	The topsoil must be adequately protected from being blown away or eroded by storm water. Removed subsoil should be stockpiled separately from topsoil. Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped on the site
EXCAVATIONS & EARTHWORKS		
It will be necessary to employ heavy machinery (excavators, back-actors, bulldozers, dump trucks etc.) for the earthmoving required	Use of heavy machinery can substantially increase the likelihood, intensity and significance of potential negative environmental impacts, and it is thus essential that earthworks be performed under constant supervision, and that operators must be made aware of all the environmental obligations, as there is always the potential to inflict damage to sensitive areas.	Use of machinery should be restricted to only that which is strictly required, and the unnecessary or excessive movement/ use of such machinery must be kept to a minimum. Machinery must enter and exit the site via the indicated access roads, and may not enter/ exit the river channel at any other location. Excavations and earth-moving may only take place within the demarcated working area
DANGEROUS AND TOXIC MATERIALS (CHEMICALS)		
Safe storage of chemicals See also below for further aspects on this subject Availability of safety kits to prevent oils/toxic materials spreading in the environment Proper storage must be provided for chemicals , paint and construction materials needed	Clean environment Safe storage of materials	No spills of chemicals Proper storage provided
STORAGE OF OIL AND FUEL		
Safe handling of fuel and oil and prevention of spills.	Clean environment	No spills of oil or fuel No leakages of oil
USE OF OIL AND CHEMICALS		

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
Drip trays must be provided for vehicles in storage yard Wash bay and oil trap to be provided	No spills of oil Cleaning area for vehicles	No oil spills from vehicles No oil or fuel into environment due to cleaning of vehicles or equipment
STORAGE OF CEMENT		
Safe handling of cement	Clean environment	No spills of cement
STORAGE OF EQUIPMENT AND MATERIALS		
Safe and proper storage of equipment and material	Safe and proper storage of equipment and material	Neat, clean and ordered storage of material
CONCRETE		
The contractors must provide information on proposed handling of concrete.	Minimise the possibility of concrete residue entering into the surrounding environment	No evidence of contaminated soil on the construction site
TOILETS AND ABLUTION FACILITIES		
Clean sanitary environment	Clean and sanitary environment	Toilets for workers in accordance with the instructions in the EMP
WASTE MANAGEMENT		
A clean and waste free environment	Clean environment with waste handled in accordance with the EMP	No waste in the environment
WORKSHOP EQUIPMENT, MAINTENANCE AND STORAGE OF MATERIAL		
Clean and safe work area	Clean and safe work area	Safe and clean work and storage area
FIRES		
No burning of waste and or fires originating from the construction area	No burning of waste and or fires originating from the construction area	No fire incidents
OTHER ENVIRONMENTAL ASPECTS		
<p>Stockpiles</p> <p>All stockpiled material must be easily accessible without any environmental damage to adjacent grasslands/farmlands.</p> <p>All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised.</p> <p>The stockpiles may only be placed within the demarcated areas - the location of which must be approved by the ER or ECO.</p> <p>Stockpiled material at batching plant must be contained to prevent the spread of gravel in the area.</p> <p>Erosion, sedimentation and storm water</p> <p>No erosion and or sedimentation</p> <p>Vegetation</p> <p>The contractor must avoid vegetated areas that will not be cleared.</p>	<p>Properly constructed and well maintained stockpiles</p> <ul style="list-style-type: none"> • Minimise scarring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint <p>Minimise impacts on vegetation</p>	<p>No erosion or spread of material from stockpiles</p> <p>Gravel stockpiles must be properly managed</p> <p>No erosion or sedimentation.</p> <p>Limit impact on vegetation</p>
Waste management		

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
Any illegal dumping of waste must not be tolerated. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request. Bins must be clearly marked for ease of management. Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's wastes generated on the site.	<ul style="list-style-type: none"> Sustainable management of waste; to keep the site neat and tidy. This will control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment. It will also minimise the potential to pollute soils, water resources and natural habitats 	<ul style="list-style-type: none"> Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site Sufficient containers available on site
Dust Dust production must be controlled by regular watering of roads and works area, should the need arise.	Reduce dust fall out	No visible signs of dust
SAFETY	Children's access to construction site controlled, Access to construction camp controlled Safety aspects considered	No children on construction site Safety fence and controlled access available Safety signs with necessary information displayed

9. ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES

9.1 ASSESSMENT CRITERIA

Impacts were rated using the following methodology

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
Duration (time scale)	Short term	Up to 5 years
	Medium term	6 – 15 years
	Long term	More than 15 years
Extent (area)	Local	Confined to study area and its immediate surroundings
	Regional	Region (cadastral, catchment, topographic)
	National	Nationally (The country)
	International	Neighboring countries and the rest of the world.
Magnitude (Intensity)	Low	Site-specific and wider natural and/or social functions and processes are negligibly altered. ((A low intensity impact will not affect the natural, cultural, or social functions of the environment).
	Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way. (Medium scale impact will alter the different functions slightly).
	High	Site-specific and wider natural and/or social functions and processes are severely altered. (A High intensity impact

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
		will influence these functions to such an extent that it will temporarily or permanently cease to exist).
Probability	Improbable	Possibility of occurrence is very low. (Such an impact will have a very slight possibility to materialise, because of design or experience).
	Possible	There is a possibility that the impact will occur
	Probable	It is most likely that the impact will occur
	Definite	The impact will definitely occur
Significance	Insignificant	Impact is negligible and will not have an influence on the decision regarding the proposed activity (No mitigation is necessary)
	Very Low	Impact is very small and should not have any meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Low	The impact may not have a meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Medium	The impact should influence the decision regarding the proposed activity (The project can only be carried through if certain mitigatory steps are taken)
	High	The impact will influence the decision regarding the proposed activity
	Very High	The proposed activity should only be approved under special circumstances
Reversibility	Low	There is little chance of correcting the adverse impact
	Medium	There is a moderate chance of correcting the adverse impact
	High	There is a high chance in correcting the adverse impact
Risk	Low	Assessing a risk involves an analysis of the consequences and likelihood of a hazard being realized. In decision-making, low-consequence / low-probability risks (green) are typically perceived as acceptable and therefore only require monitoring.
	Medium	Other risks (amber) may require structured risk assessment to better understand the features that contribute most to the risk. These features may be candidates for management
	High	High-consequence / high-probability risks (red) are perceived as unacceptable and a strategy is required to manage the risk.

Attributes associated with the alternatives were assessed and is outlined below:

Geographical attributes

The Geographical attributes of an area relates to the characteristics of a particular region, area or place. It influences the determination of site alternatives as it relates to the location of a site in relation to relevant features in the area.

Physical attributes

Physical attributes of an area relates to the processes and patterns in the natural environment. For the purpose of this assessment, the following processes and patterns have been investigated. Geology, soil, topography and landforms, climate and meteorology, surface water and ground water.

Biological attributes

Biological attributes for the purpose of this study includes the distribution of species and ecosystems in geographic space and through geological time. Organisms and biological communities often vary in a regular fashion along geographic gradients of latitude, elevation, isolation and habitat area. The two main branches assessed will be:

Phytogeography is the branch of biogeography that studies the distribution of plants.

Zoogeography is the branch that studies distribution of animals.

Social attributes

Social attributes is closely related to social theory in general and sociology in particular, dealing with the relation of social phenomena and its spatial components.

Economic attributes

Economic attributes includes the location, distribution and spatial organization of economic activities and also takes into account social, cultural, and institutional factors in the spatial economy of the development.

Heritage attributes

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

Cultural attributes

Cultural attributes relates to the specific characteristics such as language, religion, ethnic and racial identity, and cultural history & traditions of people. These attributes influences family life, education, economic and political structures, and, of course, business practices.

It should be noted that the above mentioned attributes do not occur in isolation and it is not uncommon for an identified impact to overlap with two or more of these attributes. Also note, not all risks require comprehensive and detailed assessment. Solid problem formulation should allow decision-makers to evaluate the extent of subsequent analysis required. The level of effort put into assessing each risk should be proportionate to its significance and priority in relation to other risks, as well as its complexity, by reference to the likely impacts. Consideration should be given to stakeholders' perceptions of the nature of the risk.

9.2 ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES

1. A full copy of the signed EA from DEDECT in terms of NEMA, granting approval for the development must be available on site
2. A copy of the EMPr as well as any amendments thereof must be available on site
3. A suitably qualified ECO must be appointed.
4. Impacts on the environment must be minimised during site establishment and the development footprint must be kept to the approved development area.
5. Vegetation clearing may not commence until such time as the development footprint has been clearly defined.
6. No clearance of vegetation outside of the development footprint may occur. The sensitive area must be clearly demarcated as "No-go zones".
7. No Camel Thorn trees (*Vachellia erioloba*) may be removed before a permit in terms of the National Forests Act No. 84 of 1998 has been obtained.
8. At the end of the construction phase the site and its surrounding area must be free from any pollution that originated as a result of the construction activities.

9. No disturbance of topsoil & subsoil may commence until such time as the development footprint has been clearly defined.
10. No disturbance of topsoil & subsoil outside of the development footprint may occur.
11. At the end of the construction phase the site and its surrounding area must be free from any chemical, fuel, oil and cement spills that originated as a result of the construction activities.
12. At the end of the construction phase the site and its surrounding area must be free from any sewage that originated as a result of the construction activities.
13. At the end of the construction phase the site and its surrounding area must be free from any hazardous or general waste pollution that originated as a result of the construction activities.
14. Dust prevention measures must be applied to minimise the generation of dust.
15. Noise prevention measures must be applied to minimise the generation of unnecessary noise pollution as a result of construction activities on site.
16. Absolutely no burning of waste is permitted.
17. Fires will only be allowed in facilities especially constructed for this purpose.
18. No hunting of animals will be allowed.
19. No intentional destruction of any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance may occur.
20. All Contractors and sub-contractors must abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.
21. No occupation of the site will be allowed until such time as all services has been installed as designed by the Civil Engineer.

10. MITIGATION MEASURES

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE	A complete copy of the signed EA from DEDECT in terms of NEMA, granting approval for the development must be available on site	Obtain the Environmental Authorization and plan to have a copy of the signed EA on site.	Ensure that a signed copy of the EA is available in the site office	No action required	The Applicant, assisted by the EAP to be monitored by the ECO
	A copy of the EMPr as well as any amendments thereof must be available on site	Ensure that a site specific EMPr is compiled and approved and plan to have a copy of the approved document on site	Ensure that a copy of the approved EMPr is available in the site office	No action required	The Applicant, assisted by the EAP to be monitored by the ECO
	A suitably qualified ECO must be appointed.	Prior to the start of construction activities, an ECO must be appointed to ensure that an Environmental Control document is compiled. This	Ensure that the ECO document is available on site and that everyone on site is informed and trained regarding their Environmental obligations in terms of the EA and EMPr. Records of training sessions must be kept on site.	No action required	The Applicant and the ECO

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
		document must explain the roles and responsibilities of everyone involved and must also contain an Environmental awareness training manual.			
			ECO's report must be an item on monthly site meeting agenda	No action required	The project manager.
		The ECO must ensure that the contractor provides method statements for the various environmental aspects.	The method statements must be available in the site office	No action required	The Applicant and the contractor must ensure that the method statements are developed and approved by the ECO
SITE ESTABLISHMENT	Impacts on the environment must be minimised during site establishment and the development footprint must be kept to the	A Land surveyor must peg the parameters of the development footprint.	Construction vehicles, machinery and workers must be restricted to only operate within the approved development footprint.	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that
			The development footprint must be clearly demarcated and the extent of this area must be communicated to all contractors and sub-contractors.		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	approved development area.		Existing access roads must be utilised to access the site camp(s) and working/ construction areas Appropriate traffic management strategies must be implemented to ensure the safety of construction vehicles and other road-users. If needed, signage to warn other road users of the presence of construction vehicles should be erected at appropriate locations, where the signage will be clearly visible to potentially affected road users.		all concerned are trained in this regard. The ECO will monitor compliance.
VEGETATION CLEARING	Vegetation clearing may not commence until such time as the development footprint has been clearly defined.	A Land surveyor must peg the parameters of the development footprint.	Land clearing must be restricted to the demarcated working area, and no vegetation may be cleared outside of the demarcated working area.	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO will monitor compliance.
	No clearance of vegetation outside of the development footprint may occur.				
	One plant species, <i>Vachellia erioloba</i> (Camel Thorn) that is not threatened but	A permit for the removal of the Camel Thorn trees	Remove the Camel Thorn trees (<i>Vachellia erioloba</i>) according to the approved permits.	No action required	The developer has to ensure that permits are applied for and obtained

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	listed as Protected tree species occurs at the site. In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.	(<i>Vachellia erioloba</i>) must be obtained.			before the start of construction activities on site.
NO-GO AREA	No construction workers or machinery will be allowed within the no-go area that is defined as the non-perennial river, including its riparian and buffer zone.	The no-go area must be clearly defined.	The no-go area that is defined as the non-perennial river, including its riparian and buffer zone must be clearly demarcated. Construction workers must be informed of the no-go area and the need to protect this area from disturbance. This must form part of the environmental awareness training given to construction workers and the instruction must	The no-go area must be preserved.	The developer must ensure that a Land surveyor pegs the parameters of the no-go area and that all concerned are trained in this

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>be emphasized and enforced throughout the construction phase.</p> <p>Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager</p>		regard. The ECO will monitor compliance.
STORM AND WASTE WATER MANAGEMENT	At the end of the construction phase the site and its surrounding area (Including the non-perennial stream) must be free from any pollution that originated as a result of the construction activities.	The developer must compile a storm water management plan.	All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility.	No action required	The developer must ensure that a storm water management plan is developed. The ECO must monitor compliance.
			Natural storm water runoff not contaminated by construction activities can be discharged directly into the non-perennial stream		
			No wastewater may run freely into any naturally vegetated areas. Run-off containing high sediment loads must not be released into drainage channels		
			Approval must be obtained from DW&S for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998).		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>Surface water or storm water must not be allowed to concentrate, or to flow down cut or fill sloped routes without erosion protection measures being in place</p> <p>Ensure that storm water channels do not discharge straight down contours. These must be aligned at such an angle to the contours that they have the least possible gradient</p> <p>To reduce the loss of material by erosion, the contractor must ensure that disturbance on site is kept to a minimum. The contractor is responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed</p> <p>The non-perennial stream must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities</p> <p>Water that has been contaminated with suspended solids, such as soils and silt, may be released into the non-perennial stream only once all suspended solids have been removed from the water by settling out these solids in settlement ponds.</p>		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			Land clearing must be restricted to the demarcated working area, and no disturbance of topsoil & subsoil outside of the demarcated working area will be allowed.		
TOPSOIL & SUBSOIL	No disturbance of topsoil & subsoil may commence until such time as the development footprint has been clearly defined.	A Land surveyor must peg the parameters of the development footprint.	Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas.	No action required	<p>The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard.</p> <p>The Contractor will be responsible for the removal and correct stockpiling of the topsoil and subsoil.</p> <p>The ECO will monitor compliance.</p>
			The topsoil must be adequately protected from being blown away or eroded by storm water. The topsoil storage area must be located on a level area outside of any surface drainage/ storm-water channels, and at a location where it can be protected from disturbance during construction and where it will not interfere with construction activities.		
			Removed subsoil should be stockpiled separately from topsoil.		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	No disturbance of topsoil & subsoil outside of the development footprint may occur.		<p>Handling of topsoil should be minimized as much as possible, and the location of the topsoil berm should be chosen carefully to avoid needing to relocate the topsoil berm at a later date. Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.</p> <p>The topsoil berm may be a few meters wide but should ideally not be more than 0.5m high to allow sufficient light and air penetration.</p> <p>Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped.</p> <p>Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped.</p> <p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>		
DANGEROUS AND TOXIC MATERIALS	At the end of the construction phase the site and its surrounding area (Including the non-perennial stream) must be free from any	CHEMICALS			All hazardous substances must be stored in suitable containers as defined in the Method Statement;
		The Contractor must provide method statements for the storage and handling of chemicals on site.	<p>Containers must be clearly marked to indicate contents, quantities and safety requirements</p> <p>All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers</p>	No Action required	

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	chemical, fuel, oil and cement spills that originated as a result of the construction activities.		<p>Bunded areas to be suitably lined with a SABS approved liner</p> <p>An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis</p> <p>All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);</p> <p>All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet</p> <p>Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available</p> <p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.</p>		
		FUEL AND OIL			
		The Contractor must provide method statements for the storage and handling of fuel and oil on site.	Fuel storage tanks must be located in a portion of the construction camp where they do not pose a high risk in terms of water pollution (i.e. they must be located away from water courses)	No Action required	

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 110% of the total capacity of all the storage tanks/ bowsers</p> <p>The floor of the bund must be sloped, draining to an oil separator</p> <p>Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained</p> <p>All empty externally dirty drums must be stored on a drip tray or within a bunded area</p> <p>Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (SUNSORB is a recommended product that is environmentally friendly)</p> <p>Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used</p>		appropriate storage tanks or in bowsers

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>The responsible operator must have the required training to make use of the spill kit in emergency situations</p> <p>In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008.</p> <p>During servicing of vehicles or equipment, a suitable drip tray must be used to prevent spills onto the soil.</p> <p>Leaking equipment must be repaired immediately or be removed from site to facilitate repair</p> <p>Construction area must be monitored for oil and fuel spills</p> <p>Drip trays (minimum of 10cm deep) must be placed under all vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing.</p>		
		CONCRETE AND CEMENT			The mixing of concrete must only

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
					be done at specifically selected sites on mortar boards or similar structures to contain run-off into soils rocky outcrops, streams and natural vegetation
		The contractors must provide and maintain a method statement for "cement and concrete batching". The method statement must provide information on proposed storage, washing & disposal of cement, packaging, tools and plants	Cleaning of cement mixing and handling equipment must be done using proper cleaning trays	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
	All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed facility				
	Any spillage that may occur must be investigated and immediate remedial action must be taken				
	The visible remains either of concrete, solid, or from washings, must be physically removed immediately or disposed of as waste to a registered landfill site				
	Cement batching areas must be located in an area where residues are contained and that the location does not fall within storm water channels				

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet must be provided per 30 persons and should include male and female toilets.		
TOILETS AND ABLUTION FACILITIES	At the end of the construction phase the site and its surrounding area (Including the non-perennial stream) must be free from any sewage that originated as a result of the construction activities.	The contractor must provide method statement for the operation and maintenance of toilets and ablution facilities	Sanitary arrangements must be to the satisfaction of the ECO. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet paper to all toilets at all times. Toilet paper dispensers must be provided in all toilets	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			The contractor must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor must ensure that no spillage occurs when the toilets are cleaned or emptied.		
			The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances		
			Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>Waste must be separated into recyclable and non-recyclable waste, and must be separated as follows:</p> <ul style="list-style-type: none"> • Hazardous waste: including (but not limited to) old oil, paint, etc. <p>General waste: including (but not limited to) paper, plastic, glass and construction rubble</p>		
WASTE MANAGEMENT	At the end of the construction phase the site and its surrounding area (Including the non-perennial stream) must be free from any hazardous or general waste pollution that originated as a result of the construction activities.	The contractors must provide and maintain a method statement for "solid waste management". The method statement must provide information on the proposed licensed facility to be utilised and details must be kept of record keeping for auditing purposes	<ul style="list-style-type: none"> • Any illegal dumping of waste must not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request. 	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>
			Bins must be clearly marked for ease of management		
			All refuse bins must have a lid secured so that animals cannot gain access		
			Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's waste generated on the site		
			Subcontractor(s) contracts must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP. Proof of this undertaking must be issued to the ECO</p> <p>All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the ECO</p> <p>Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site</p> <p>A suitably positioned and clearly demarcated waste collection site must be identified and provided The waste collection site must be maintained in a clean and orderly manner. A covered container (Like a skip, with a cover), must be used to contain refuse from campsite bins, rubble and other construction material..</p>		
DUST	Dust prevention measures must be applied to minimise the generation of dust.	The contractors must provide and maintain a method statement for "dust control". The method statement must provide information on the	<p>All forms of dust pollution must be managed in terms of the National Environmental Management: Air quality Act, 2004 (Act No 39 of 2004)).</p> <p>Acceptable dust fall rates for residential areas are:</p>	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
		proposed source of water to be utilised.	<p>Dust fall rate (D) (mg/m²/day, 30 days average): D<600</p> <p>Permitted frequency of exceeding dust fall rate: Two within a year, not sequential months</p> <p>A standard test method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739. The latest version of this method shall be used</p> <p>Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be revegetated or stabilised as soon as is practically possible.</p> <p>Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present</p> <p>The construction camp must be watered during dry and windy conditions to control dust fallout.</p> <p>Dust production must be controlled by regular watering of roads and work area, should the need arise</p> <p>During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust damping</p>		<p>training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level</p> <p>Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind</p> <p>Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO</p> <p>Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas</p> <p>All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained.</p>		
NOISE	Noise prevention measures must be applied to minimise the generation of unnecessary noise pollution as a result of construction activities on site.	The contractors must provide and maintain a method statement for noise.	<p>Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise Management.</p> <p>It is proposed that normal working hours are between 08h00 and 17h00 (Mondays to</p>	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>Saturdays). No work will be allowed on Sundays or outside of the abovementioned hours.</p> <p>Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.</p> <p>Absolutely no burning of waste is permitted.</p>		
FIRES	Absolutely no burning of waste is permitted.	The contractors must provide and maintain a method statement for "fires", clearly indicating where and for what, fires will be utilised plus details on the fuel to be utilised	Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor's camps. Wood, charcoal or anthracite are the only fuels permitted to be used for fires. The contractor must provide sufficient wood (fuel) for this purpose.	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>
	Fires will only be allowed in facilities especially constructed for this purpose.		Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.		
			The contractor must designate a smoking area for the labour force so as to prevent unanticipated incidents of veldt fires.		
			No wood is to be collected, chopped or felled for fires from private or public property as well as from no-go or sensitive areas within the site and any surrounding natural vegetation		
			All construction workers must be informed that the intentional killing of any animal is not		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake, a specialist must be called in to safely relocate the animal.		
FAUNA	No hunting of animals will be allowed.	Plan to ensure that all activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962)	Environmental induction training and awareness must include aspects dealing in safety with wild animals into and on site. Focus on animals such as snakes and other reptiles that often generate fear by telling workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones, etc.	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			In terms of the National Heritage Act, 1999 (Act No. 25 of 1999), construction personnel must be alert and must inform the local heritage agency within 48 hours should they come across any signs of heritage resources.		
HERITAGE	No intentional destruction of any sites, features or material of cultural	Conduct a Phase 1 HIA for the development to identify any sites,	Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance.	No action required	The developer and applicant.

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	heritage (archaeological and/or historical) origin or significance may occur.	features or material of cultural heritage (archaeological and/or historical) origin or significance	<p>Should any archaeological artefacts be exposed during site activities, work on the area where the artefacts were found must cease immediately and the ECO must be notified immediately.</p> <p>All work must cease immediately, if any human remains are uncovered. Such material, if exposed, must be reported to the South African Police Services, so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences</p> <p>The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations</p>		<p>Study to be conducted by a suitable qualified specialist.</p> <p>Findings to be monitored by the ECO.</p>
CRIME, SAFETY AND SECURITY	All Contractors and sub-contractors must abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.	Plan to appoint a health and safety officer for the construction site.	The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc.	No actions required	Health and safety officer.
		Compile an Emergency	The contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all		

ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
		Response Action Plan (ERAP) prior to the commencement of the project	<p>numbers and names are posted at relevant locations throughout the construction site.</p> <p>Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc</p> <p>All unattended open excavations must be adequately fenced or demarcated.</p> <p>Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.</p> <p>Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS. The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area</p> <p>Workers must be instructed not to trespass onto adjacent land. Trespassers will be prosecuted.</p>		

11. ENVIRONMENTAL AWARENESS PLAN

11.1 INTRODUCTION

Training is essential for ensuring that the EMP provisions are implemented efficiently and effectively. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

The Construction Contractor should make allowance for all construction workers, including all subcontractors that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing work on site. During this training, the ECO will explain the EMP and the conditions contained therein. Attention will be given to the construction process and how the EMP fits into this process.

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimized and environmental compliance maximized.

Environmental awareness training and education should be ongoing throughout the construction phase, and should be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the EMP), or as new workers come to site. Translators should be utilized where needed.

Environmental awareness could be fostered in the following manner:

- Induction course for all workers on site, before commencing work on site.
- Refresher courses as and when required.
- Daily toolbox talks at the start of each day with all workers coming on site, where workers might be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working.

Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.

11.2 ORGANISATIONAL STRUCTURE

This section describes the roles and responsibilities of the key stakeholders involved in the development, implementation and review of the EMP.

11.2.1 PROJECT PROPONENT

The Project Proponent will be the **Mamusa Local Municipality**. Ultimately, they will be responsible for the development and implementation of the EMP and for ensuring that the conditions in the eventual Environmental Authorization (EA) are satisfied. Although construction activities will be contracted out,

the liability associated with non-compliance still rests with the Project Proponent. The Project Proponent (and not the Contractor) is therefore responsible for liaising directly with the relevant authorities with respect to the preparation and implementation of the EMP and meeting EA conditions.

The Project Proponent must inform the Contractor of the EA and EMP obligations, as well as **Method Statements** to be prepared and environmental training to be undertaken by the Contractor in terms of these obligations.

The Project Proponent must identify a **Project Manager (PM)** who has overall responsibility for managing the Project, Contractors and for ensuring that the environmental management requirements are met. During the construction phase, the Project Manager will be the Proponent's construction manager; during the operations phase this role will be fulfilled by the operations manager.

All decisions regarding environmental procedures and protocol must be approved by the Project Manager, who also has the authority to stop any construction activity in contravention of the EMP or EA.

An **Environmental Control Officer (ECO)** must be employed by the Project Proponent for the duration of the project. The ECO should have appropriate training and experience in the implementation of environmental management specifications. The ECO provides feedback to the Project Manager regarding all environmental matters. Contractors are answerable to the ECO (or Project Manager, depending on contractual arrangements) for non-compliance with the requirements stated in the EMP or EA.

11.2.2 ENVIRONMENTAL CONTROL OFFICER (ECO)

The appointed Environmental Control Officer (ECO) is responsible for monitoring the site at regular intervals (including pre-construction set-up and final rehabilitation), in order to ensure that the provisions of this EMP is adhered to and that sound environmental management is ensuing on site.

The ECO must inspect all areas of the site that may be affected by construction-related activities, including the working area, site camp, stockpile areas and access roads. After each ECO inspection the ECO must compile an ECO report detailing the ECO's observations on site, any instances of non-compliance and any issues or aspects that require attention, follow-up or remedial action. The ECO reports must be submitted to the Applicant, the ER, Construction Contractor(s) and the Competent Authority. The ECO inspection reports should include both photographic and written records.

The ECO will have the following responsibilities:

- Maintenance, update and review of the EMP.
- Liaison between the Project Proponent, Contractors, authorities and other lead stakeholders on all environmental concerns.
- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective.

- Monitoring the performance of the Contractor (and Sub-contractors) and ensuring compliance with the EMP and associated Method Statements.
- Validating the regular site inspection reports, which are to be prepared by the Contractor's Environmental Officer (EO).
- Checking the EO's *record of environmental incidents* (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken.
- Checking the EO's *public complaints register* in which all complaints are recorded, as well as action taken.
- Issuing of site instructions to the Contractor for corrective actions required.
- Assisting in the resolution of conflicts.
- Communication of all modifications to the EMP to the relevant stakeholders.
- Conducting regular audits to ensure that the system for implementing the EMP is operating effectively.

11.2.3 CONTRACTOR

The Contractor should appoint a **Contractor's Representative**, who is responsible for the on-site implementation of the EMP and EA. The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. The Contractor's Representative ensures that all Sub-contractors working under the Contractor abide by the requirements of the EMP.

The Contractor is answerable to the Project Manager (PM) for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria.

The Contractor will be required to provide the following **Method Statements**, setting out in detail how the management actions contained in an EMP and EA will be implemented in order to ensure that the environmental management objectives are achieved. The Method Statements must be reviewed and approved by the Project Proponent.

- > Stockpiles
- > Excavation stabilisation
- > Oil and chemicals
- > Cement
- > Storage of fuel and oils

- > Use of dangerous and toxic materials
- > Toilets and ablution facilities
- > Waste Management
- > Dust
- > Workshop equipment, maintenance and storage
- > Noise
- > Fires
- > Erosion and sedimentation
- > Flora and Fauna (Including no-go areas)
- > Crime, safety and security
- > Hydrology

The Contractor may appoint an **Environmental Officer (EO)**, or officers, if more than one is required. Their primary role is to coordinate the environmental management activities of the Contractor on site. The EO may be required to perform the following roles:

- Support the ECO in the monitoring and execution of the Contractors or Sub-contractors' Method Statements by maintaining a permanent presence on site.
- Inspect the site as required to ensure adherence to the management actions of the EMP, EA and the Method Statements.
- Complete Site Inspection Forms on a regular basis (eg. daily or weekly).
- Provide inputs to the regular (eg. monthly) environment report to be prepared by the ECO.
- Liaise with the construction team on issues related to implementation of, and compliance with, the EMP and EA.
- Maintain a *record of environmental incidents* (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken, for submission to the Project Proponent.
- Maintain a *public complaints register* in which all complaints are recorded, as well as action taken, for submission to the Project Proponent.

11.3 CHECKLISTS

The table below provide the main mitigation measures and/or management interventions to minimise or reduce the negative impacts and enhance positive impacts identified by the specialists associated with the proposed development.

The intent is for the document to be a live, dynamic document that should be maintained and updated throughout the project lifecycle, *inter alia*, by including the necessary Environmental Authorisation from the approving Authority as an attachment.

The table below provide the main mitigation measures and/or management interventions appropriate to the Planning and Construction Phases of the proposed project. The tables present the objectives to be achieved and the management actions that need to be implemented in order to reduce the negative impacts and enhance the positive impacts per management activity. The associated monitoring and implementation frequencies and the responsible person(s) are indicated.

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
1. Construction and operational activities planning	The construction/operational activities must conform to the conditions of authorisation contained in the Environmental Authorisation and mitigation measures contained within this EMPr	Proponent	Continuous
2. Appointment of the ECO	The Proponent must appoint an independent Environmental Control Officer (ECO) who must monitor the Contractor's compliance with the EMPr and who must complete ECO checklist reports (audits) on a regular basis (at least once a month).	Proponent	Once-off
	The Proponent must provide the ECO with a copy of the EMPr.	ECO	Once-off
	The ECO must form part of the project management team and should attend the monthly project progress meetings.	ECO	Continuous
	The Contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing activities on site.	ECO, Contractor	Once-off
3. EMPr	This EMPr must be made binding to the main Contractor and to individual Contractors, and must be included in the tender documentation for the construction contract.	Proponent	Once-off
4. Licences/ permits and permissions	The Proponent must ensure that all pertinent licences/permits, certificates and permissions required for the project have been obtained prior to any activities commencing on site and ensure that they are strictly enforced/adhered to. These documents must be made available on site at all times, and the Contractor must be made aware of their content.	Contractor, Proponent, ECO	Prior to commencement of work
	The Contractor must maintain a database of all pertinent permits and permissions required for the contract.	Contractor, Proponent, ECO	Continuous
5. Method Statements	The Contractor must submit written Method Statements to the PM and ECO for the activities identified during consultation.	Contractor, PM, ECO	As required
	Method Statements must be submitted at least five working days prior to the proposed commencement of work on an activity to allow the PM (and/or ECO) time to study and approve the method statement.	Contractor, PM, ECO	As required
	The Contractor may not commence work on that activity until such time as the Method Statement has been approved in writing.	Contractor, PM, ECO	Continuous
	The Contractor must carry out the activities in accordance with the approved Method Statement.	Contractor, PM, ECO	Continuous

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Under certain circumstances, the PM may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the PM, and appropriate records retained.	Contractor, PM, ECO	Continuous
	Approved Method Statements must be readily available on the site and must be communicated to all relevant personnel. Approval of the Method Statement shall not absolve the Contractor from any of his/her obligations or responsibilities in terms of the EMPr specifications.	Contractor, Proponent	Continuous
6. Existing services and infrastructure	The Contractor must ensure that existing services (e.g. roads, pipelines, power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the PM, ensuring the necessary way-leaves; permissions and permits are in place.	Contractor, PM, ECO	Continuous
	The Contractor must be responsible for the repair and reinstatement of any existing infrastructure that is damaged, or services which are interrupted, at his/her own cost.	Contractor	As required
	The Contractor must adhere to any time limits for the repairs that may be stipulated by the PM in consultation with the Contractor.	Contractor, ECO	As required
7. Environmental incidents	The Contractor must take timeous corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves. The Contractor must adhere to any time limits for such corrective actions that may be stipulated by the ECO in consultation with the PM.	ECO, Contractor	Continuous
8. Labour	Local labour must be used wherever possible to stimulate the local economy.	Contractor	Once-off
	The Contractor should use labour intensive construction measures where appropriate, practical and financially feasible.	Contractor	Once-off
	The workforce should be trained to benefit individuals beyond the completion of the project.	Contractor	Once-off
	The Contractor should use local suppliers where possible.	Contractor	Once-off
	The PM must ensure that all staff working on the project must be in possession of a South African Identity Document or a relevant work permit. A register must be kept on site of all staff working on site.	PM	Continuous
	Equal opportunities for employment should be created to ensure that all sectors of society (especially women) have equal access to such opportunities.	Contractor	Continuous
9. Training of staff	The Contractor must ensure that all construction staff receive environmental awareness training concerning, amongst others, the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts, protection of any animals encountered on site, no-go areas, the use of toilets and basic sanitation, and basic health and safety on site.	Contractor, ECO	Once-off
	It is the Contractor's responsibility to provide the site foreman with environmental training (including explaining the content of the EMPr and any Conditions of Approval) and is to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.	Contractor, ECO	Once-off
	Training must be provided to the staff members in the use of the appropriate fire-fighting equipment.	Contractor, Health and Safety Officer	Once-off
	The Contractor must ensure that all staff operating machinery/construction vehicles are adequately trained to carry out the designated tasks.	Contractor, Health and Safety Officer	Once-off

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
10. Worker health and safety	<p>A Health and Safety Plan must be developed and implemented by the Contractor for the construction period to ensure worker safety.</p> <p>Should any injury be obtained as a result of work the Contractor must ensure the necessary medical attention is received.</p> <p>The necessary Health and Safety file and incident register must be kept on site at all times.</p>	Contractor, Health and Safety Officer	Continuous
11. Site access & traffic management	Construction vehicles, machinery and workers must be restricted to the designated access roads, and may not drive through undeveloped vegetation outside of the existing access route except where that vegetation falls within the authorised working area (development footprint) at the site.	Contractor ECO	Continuous
12. Vegetation clearing	Vegetation clearing may only commence once the working area has been clearly demarcated to the ECO's satisfaction.	Proponent Contractor ECO	Once-off
13. EMPr	This EMPr must be made binding to the main Contractor and to individual Contractors, and must be included in the tender documentation for the construction contract.	Proponent	Once-off
14. Topsoil & subsoil management	<p>Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas on site.</p> <p>The topsoil must be adequately protected from being blown away or eroded by storm water.</p> <p>Removed subsoil should be stockpiled separately from topsoil.</p> <p>Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped on the site</p>	Contractor ECO	Continuous
15. Excavations & earthworks	<p>Use of heavy machinery can substantially increase the likelihood, intensity and significance of potential negative environmental impacts, and it is thus essential that earthworks be performed under constant supervision, and that operators must be made aware of all the environmental obligations, as there is always the potential to inflict damage to sensitive areas.</p> <p>Use of machinery should be restricted to only that which is strictly required, and the unnecessary or excessive movement/ use of such machinery must be kept to a minimum.</p> <p>Machinery must enter and exit the site via the indicated access roads, and may not enter/ exit the river channel at any other location.</p> <p>Excavations and earth-moving may only take place within the demarcated working area</p>	Contractor ECO	Continuous
16. Groundwater contamination	Ensure vehicles are serviced and refuelled in bunded areas	Contractor	Continuous
	Ensure vehicles are checked weekly for faults and serviced timeously if faulty	Contractor	As required
	Should any leaks occur ensure contaminated soil is dug up to 1 cm below the level of visible contamination and disposed of as hazardous waste	Contractor	As required

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
17. Noise	Drip trays should be placed under all vehicles remaining stationary for more than 24 hours	Contractor	Continuous
	Limit construction activities to normal working hours	Contractor	Continuous
	Coincide any excessively noisy activities to minimise duration of inconvenience	Contractor	As required
18. Construction in a watercourse: river diversion	Ensure noise standards are complied with and that construction staff are provided with personal protective equipment when undertaking noisy operations	Contractor	Continuous
	It is recommended that construction be undertaken during the dry summer months when water flow in the river is low or non-existent, in order to reduce the magnitude of the diversion required and to reduce the potential disturbance to the aquatic environment. The temporary diversion channel should take the shape and form of the stream, upstream and downstream of the diversion	Proponent	As required
19. Safety	No children on construction site. Safety fence and controlled access should be enforced Safety signs with necessary information displayed	Proponent Contractor ECO	Continuous
20. No go areas	Any sensitive areas identified as such by the ECO need to be considered no-go areas.	Contractor, ECO	Monthly
	The Contractor must, as advised by the ECO, erect temporary fencing along the perimeter of designated sensitive no-go areas. Temporary fencing must, as a minimum, consist of wooden or metal posts at 3 m intervals, with two plain wire/plastic strands tensioned horizontally at heights of 300 mm and 900 mm above the ground – it is essential that the strands are visible. The Contractor must maintain in good order all demarcation fencing and barriers for the duration of construction activities, or as otherwise instructed. Commercial type danger tape should not be used, as this perishes rapidly, and pollute the environment when torn and blown away by strong winds.	Contractor, ECO	Once-off, as required
21. Stockpiles	Soil stockpiles must not be situated within 50m of any water course.	Contractor, ECO	Monthly
	If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.	Contractor, ECO	Monthly
	Stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding.	Contractor, ECO	Monthly
	Where contamination of soil is expected, analysis must be done prior to disposal of excess soil to determine the appropriate disposal method. Proof from an applicable waste disposal site where contaminated soils are dumped if and when a spillage / leakage occur must be provided to the ECO upon request.	Contractor, ECO	Monthly
	Stockpiles must not exceed 2m in height unless otherwise permitted by the PM and / or ECO.	Contractor, ECO	Monthly
22. Erosion control	Wind screening and stormwater control must be undertaken where required by the ECO to prevent soil loss from the site.	Contractor, ECO	Twice monthly
	The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion, if required by the ECO.	Contractor, ECO	Twice monthly
	Other erosion control measures that can be implemented are as follows: <ul style="list-style-type: none"> • Brush packing with cleared vegetation; • Mulch or chip packing; • Planting of vegetation; and • Hydro-seeding / hand sowing. 	Contractor, ECO	

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.	Contractor, ECO	Twice monthly
	All erosion control mechanisms need to be regularly maintained.	Contractor, ECO	Twice monthly
	Re-vegetation of disturbed surfaces must occur as soon as possible after construction activities are completed.	Contractor, ECO	Twice monthly
	No impediment to the natural water flow on site other than approved erosion control or rehabilitation works is permitted.	Contractor, ECO	Twice monthly
	Stockpiles not used in three (3) months after stripping should be seeded to prevent dust and erosion, as advised by the ECO	Contractor, ECO	Twice monthly
23. Hazardous materials	Use and or storage of materials, fuels and chemicals which could potentially leak into the ground must be controlled.	Contractor, ECO	Monthly
	Any hazardous substances must be stored at least 50m from any of the watercourses on site in a bunded area.	Contractor, ECO	Monthly
	The Contractor must ensure that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry. Such materials may also be temporarily stored on drip-trays.	Contractor, ECO	Monthly
	Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licenced waste disposal facility or sewage works.	Contractor, ECO	Monthly
	All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material. Such bunded areas must be regularly emptied of accumulated rainwater. Wastewater from such emptying, if contaminated, must be disposed at an appropriately licenced waste disposal facility or sewage works.	Contractor, ECO	Monthly
	In the event of a spill, the Contractor must take prompt action to clear polluted areas and prevent spreading of the pollutants. The Contractor will be liable to arrange for professional service providers to clear affected areas, if required.	Contractor, ECO	As required
	Proper facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater. These pollution prevention measures for storage must include a bunded containment area with a wall high enough to contain at least 110% of any stored volume. This containment area must be sited at least 50m away from any drainage line, in a site approved by the ECO.	Contractor, ECO	Monthly
	Cement storage and batching must only take place in a bunded area, and any runoff		
	Any spillage, which may occur, must be investigated and immediate action must be taken. This must be reported to the ECO and to the relevant authorities if so required by the ECO.	Contractor, ECO	As required
24. Cement and concrete batching	Concrete must not be mixed on the ground, but in a bunded area with any runoff captured for disposal as hazardous wastewater.	Contractor, ECO	Continuous
	The batching area is to be located in an area of low environmental sensitivity, as approved by the ECO.	Contractor, ECO	Once-off
	Cement bags must only be stored in a covered, bunded area and not directly on the ground. Used cement bags must be disposed of as hazardous waste.	Contractor, ECO	Weekly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
25. Hydrology and stormwater	Silt fences must be used where required by the ECO to remove any suspended silt from stormwater before it enters the stormwater system.	Contractor, ECO	Monthly
	Temporary cut-off drains and berms must be used where necessary to capture stormwater and promote infiltration.	Contractor, ECO	Monthly
	Stormwater and surface water must be diverted away from excavation trenches, and care must be taken to avoid surface stormwater from the site running into the seasonal pan on the site.	Contractor, ECO	Monthly
	No rubble, litter or sand may be deposited into any freshwater systems or water courses.	Contractor, ECO	Monthly
26. General materials handling, use and storage	Choice of location for storage areas must take into account prevailing winds, distances to the seasonal watercourses (50m minimum), general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.	Contractor, ECO, Health and Safety Officer	Once-off
	Storage areas must be designated, demarcated and fenced. Storage areas must be secure so as to minimize the risk of crime. They must also be safe from access by unauthorised persons. Fire prevention facilities must be present at all storage facilities.	Contractor, ECO	Monthly
	Material Safety Data Sheets (MSDSs) must be readily available on site for all chemicals and hazardous substances to be used on site. Where possible, the available MSDSs should include information on ecological impacts and measures to minimise negative environmental impacts during accidental spills.	Contractor, ECO, Health and Safety Officer	Once-off, as required
	Clear signage must be placed at all storage areas containing hazardous substances / materials.	Contractor, ECO, Health and Safety Officer	Once-off
	The Contractor must be responsible for the training and education of all personnel on site who will be handling the hazardous material about its proper use, handling and disposal. The Contractor must ensure that information on the management of spill and accidental ingestion is kept on site. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.	Contractor, Health and Safety Officer	Once-off
	The provisions of the Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practice must be adhered to. This applies to solvents and other chemicals possibly used in the construction time.	Contractor, Health and Safety Officer	Continuous
	The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.	Contractor, Health and Safety Officer	Continuous
	All excess cement and concrete mixes must be contained on the construction site prior to disposal off site.	Contractor, ECO	Monthly
27. Fuel storage	Hazardous substances must be stored at least 50m away from any water bodies on site to avoid pollution.	Contractor, ECO	Monthly
	Topsoil and subsoil to be protected from contamination.	Contractor, ECO	Monthly
	Fuel and material storage must be away from stockpiles on site in appropriate containers in a bunded area.	Contractor, ECO	Twice monthly
	Chemicals must be mixed on an impermeable surface and provisions must be made to contain spillages or overflows into the soil.	Contractor, ECO	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. Drip trays may be used for temporary storage of such materials.	Contractor, ECO	Monthly
	Contaminated soil must be contained and disposed of off-site at an approved hazardous waste disposal site.	Contractor, ECO	Monthly
28. Transportation	Material must be appropriately secured to ensure safe passage between destinations during transportation. Loads must have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor must be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.	Contractor, ECO, Health and Safety Officer	Monthly
29. General waste management	Litter generated by the construction crew must be separated on site into general waste and recyclables and collected in covered rubbish bins. General waste is to be removed to a licenced landfill site on a weekly basis and recyclables must be taken to a recycling centre monthly.	Contractor, ECO	Weekly/ Monthly
	Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires shall be allowed on site, unless in designated areas approved by the PM and by the ECO or by the Health and Safety Officer.	Contractor, ECO, PM, Health and Safety Officer	Monthly
	The Contractor must supply waste bins/skips throughout the site at locations where construction personnel are working. The bins must be provided with lids and an external closing mechanism to prevent their contents blowing out and must be scavenger-proof to deter animals that may be attracted to the waste. The Contractor must ensure that all personnel immediately deposit all waste in the waste bins for removal by the Contractor. Bins must be emptied on a weekly basis and the waste removed to the construction camp where it must be properly contained in scavenger, water and windproof containers until disposed of. The bins must not be used for any purposes other than waste collection.	Contractor, ECO	Monthly
	Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders waste generated on the premises be placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project.	Contractor, ECO	Monthly
	If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled.	Contractor, ECO	Monthly
30. Hazardous waste management	The waste, resulting from the use of hazardous materials, must be disposed of at a registered hazardous waste disposal site by a certified waste disposal Contractor as approved by the ECO. A disposal certificate must be obtained from the disposal Contractor.	Contractor, ECO	As required
	Staff must be trained in the identification of hazardous waste.	Contractor, ECO	As required
	Temporary storage and disposal of hazardous waste is regulated by legislation which must be complied with, i.e. the Occupational Health and Safety Act.	Contractor, ECO	Monthly
31. Noise	The Contractor must aim to adhere to the relevant noise regulations and limit noise to within standard working hours.	Contractor, ECO	Monthly
	Construction site camp and other noisy facilities must be located well away from noise sensitive neighbours.	Contractor, ECO	Once-off
	Truck traffic must be routed away from noise sensitive areas, where possible.	Contractor, ECO	As required
	All noise and sounds generated must adhere to SABS 0103 specifications for maximum allowable noise levels for residential areas. No pure tone sirens or hooters may be	Contractor, ECO	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	utilised except where required in terms of SABS standards or in emergencies.		
	Noisy operations must be combined so that they occur where possible at the same time.	Contractor, ECO	Monthly
	Construction activities must be contained to reasonable working hours. Night-time activities near noise sensitive receptors must not be allowed.	Contractor, ECO	Monthly
	With regard to unavoidable noisy construction activities, the Contractor must liaise with local residents to inform them of such events.	Contractor	As required
	As construction workers operate in a noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993). Where necessary, ear protection gear must be worn.	Contractor, ECO, Health and Safety Officer	Monthly
	Noise suppression measures must be applied to all construction equipment where required. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.	Contractor, ECO, Health and Safety Officer	Monthly
32. Worker health and safety	Safety measures, work procedures and first aid must be implemented on site.	Contractor, , Health and Safety Officer	Monthly
	A Health and Safety Plan in terms of the Occupational Health and Safety Act (Act No. 85 of 1993) must be drawn up to ensure worker safety.	Contractor, Health and Safety Officer	Once-off
	Workers must be thoroughly trained in using potentially dangerous equipment.	Contractor, Health and Safety Officer	As required
	Contractors must ensure that all equipment is maintained in a safe operating condition.	Contractor	Monthly
	A safety officer must be appointed.	Contractor	Once-off
	A record of health and safety incidents must be kept on site.	Contractor, , Health and Safety Officer	Monthly
	Any health and safety incidents must be reported to the project manager immediately.	Contractor, , Health and Safety Officer	As required
	First aid facilities must be available on site at all times. All incidents requiring first aid occurring on site must be recorded in the incidents book on site.	Contractor, , Health and Safety Officer	Monthly
	A record must be kept of medication administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against the Contractor.	Contractor, , Health and Safety Officer	Monthly
	Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	Contractor, ECO, Health and Safety Officer	Monthly
33. Personal Protective Equipment	Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn were necessary i.e. dust masks, ear plugs etc.	Contractor, ECO, Health and Safety Officer	Monthly
	No person is to enter the portion of the site where construction activities are being undertaken without the necessary PPE.	Contractor, ECO, Health and Safety Officer	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	SABS Standards and specifications governing dangerous processes such as welding must be strictly applied, with a view to proper protection of the public and workers.	Contractor, ECO, Health and Safety Officer	As required
34. Fauna and Flora	Implement the eradication programme for invasive species in terms of the Conservation of Agricultural Resources Act (Act No. 43 of 1983).	Contractor, ECO	Monthly
	Institute the rehabilitation of areas as soon as construction activity allows it.	Contractor, ECO	As required
	No disturbance, capture or injury of any fauna will be permitted. Should any fauna be found on site it must be removed from site by the ECO or a suitably qualified person.	Contractor, ECO	Continuous

12. MONITORING, AUDITING AND REPORTING

The Applicant **Mamusa Local Municipality** is responsible for ensuring that all environmental management measures prescribed in this EMP, as well as any other conditions specified by the relevant authorities, are implemented and adhered to during all phases of the proposed development. The Applicant may delegate the responsibilities for implementing the requirements to other persons/entities, however the Applicant remains responsible for ensuring that the delegated responsibilities are carried out.

It is the responsibility of the project team or their delegate to ensure that regular monitoring of environmental issues addressed in this management plan is undertaken. The applicant is responsible for the monitoring of the infrastructure.

Site inspections to determine maintenance needs during the operational phase are imperative for good housekeeping.

Internal environmental audits must be undertaken at regular monthly intervals throughout the construction phase to ensure compliance.

The applicant will be responsible for maintaining a database of all records pertaining to the environment for the study area.

All incidents such as spills of toxic or any other substance that may negatively affect the environment must be reported to the relevant authorities.

FINES

The ECO can impose fines on the Contractor for any contraventions of this EMP. The imposition of fines will enable the ECO to ensure that the requirements of the EMP are taken seriously by the Contractor.

The Contractor shall be advised in writing of the nature of the infringement and the amount of the fine. The Contractor shall also take the necessary steps (e.g. training) to prevent a recurrence of the infringement.

The Contractor is also advised that the imposition of spot fines does not replace any legal proceedings the authorities, landowners and/or members of the public may institute against the Contractor.

In addition to the fine, the Contractor shall be required to make good any damage caused as a result of the infringement at his own expense.