

**DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED
ACCESS ROAD CONSTRUCTION WITHIN THE MADIBENG LOCAL
MUNICIPALITY, BOJANALA PLATINUM DISTRICT, NORTH WEST
PROVINCE**

For

ESTATE d`AFRIQUE

Located on:

**HARTBEESTPOORT 482 JQ & WELGEGUND 491 JQ
NEAR HARTBEESPOORT DAM, NORTHWEST PROVINCE**


Report completed: 15 November 2019

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Title:

Proposed development of a new access road from Estate d'Afrique to James Road in Meerhof, within the jurisdiction of the Madibeng Local Municipality, Bojanala Platinum District, North West Province.

Client:

Estate D'Afrique
R104
Hartbeespoort
0216

Report no:

DBAR/EDAFRQ/2019/11/15

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Report: 15 November 2019

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1 DETAILS OF-

1.1 The EAP who prepared the report.

Name of the practitioner: Prescali Environmental Consultants.

This report was compiled by Mr. Gregory Netshilindi and reviewed by Ms. Elaine van der Linde and Dr. Petro Erasmus.

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1.2 The expertise of the EAP

1.2.1 The qualifications of the EAP

(With evidence as attached in Appendix 1)

- Ms. E. van der Linde has qualifications in Geology, Engineering Geology and Environmental Management and experience in Water and Environmental Management. She is registered as a Pri Sci Nat. (SACNASP), Natural Professional Scientist, Registration number 400219/05. Her qualifications are provided in Appendix 1.
- Dr. P. Erasmus has qualifications in Zoology and Biochemistry and further studied in Zoology and Marine pollution. She is registered as a Pri Sci Nat. (SACNASP), Natural Professional Scientist, for Ecological Sciences, Registration number 116207. Her qualifications are provided in Appendix 1.
- Mr G. Netshilindi has qualifications in Geology, Environmental & Geographical Sciences and Introduction in Project Management. He is a Candidate Natural Scientist and a member of the Geological Society of South Africa. His qualifications are provided in Appendix 1.

1.2.2 Summary of the EAP's past experience

(Attached the EAP's curriculum vitae as Appendix 2)

- Mr G. Netshilindi has 4 years applicable experience (a short resume with a list of projects is attached in Appendix 2) and has been employed by:
 - Minmet Services (Pty) Ltd
 - Tshikovha Green and Climate Change Advocates (Pty) Ltd
 - Prescali Environmental Consultants (Pty) Ltd
- Ms. E. van der Linde has 19 years of applicable experience (a short resume with a list of projects is attached in Appendix 2) and has been employed by:
 - Department: Water Affairs and Forestry (DWAF);
 - Groundwater Consulting Services CC;
 - M2 Environmental Connections CC;
 - Prescali Environmental Consultants (Pty) Ltd.
- Dr. P. Erasmus has 9 years of applicable experience (a short resume with a list of projects is attached in Appendix 2) and has been employed by:
 - Department: Water Affairs and Forestry (DWAF);
 - M2 Environmental Connections (Pty) Ltd;
 - Prescali Environmental Consultants (Pty) Ltd.



2.3 Locality Maps

Please refer to Appendix 3 for more layout maps relevant to the project.

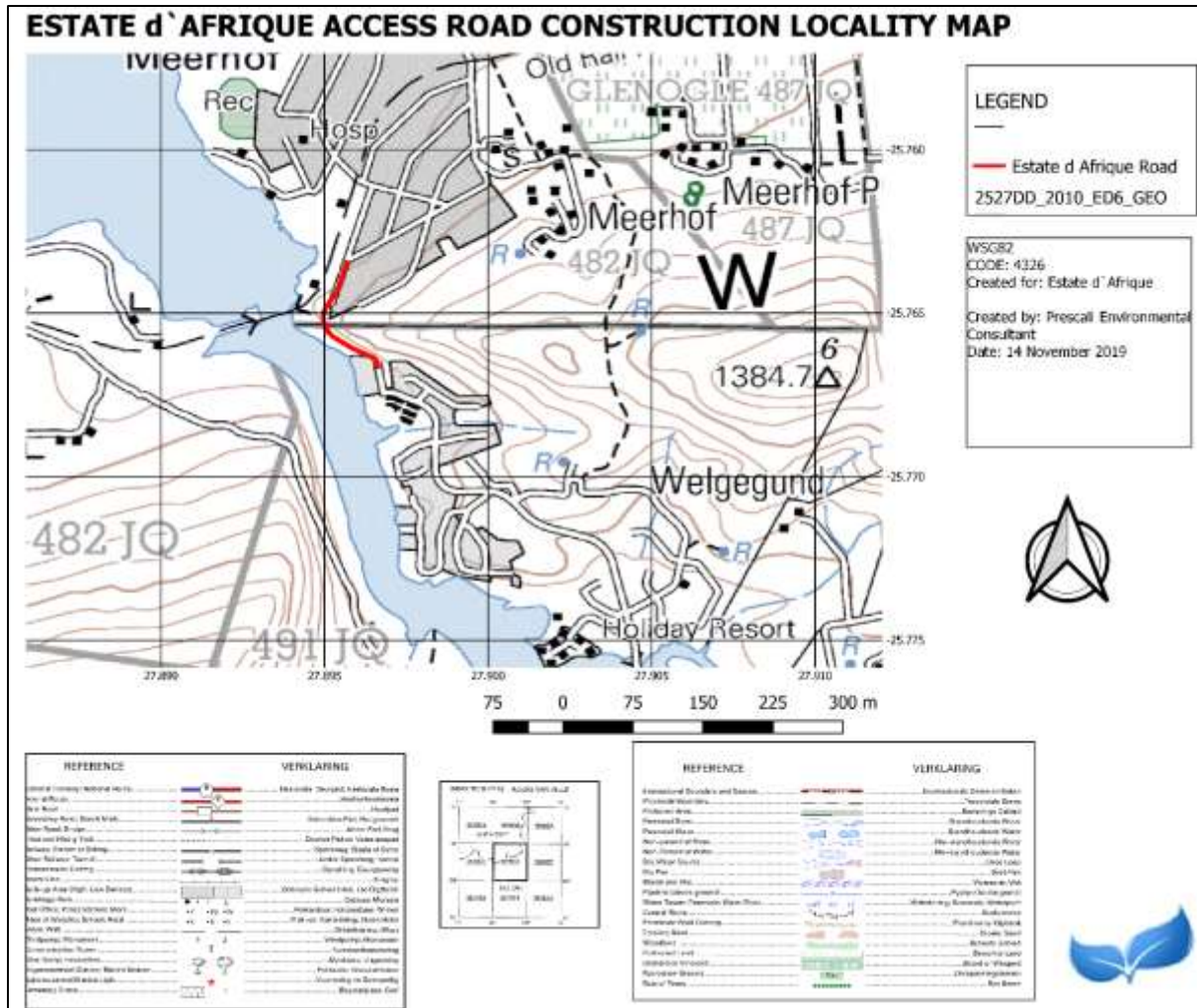


Figure 2-1: 1:12 000 Map indicating the location of the Estate d'Afrique road extension



Figure 2-2: 1: 5 000 Aerial photograph showing an overview of the proposed Estate d'Afrique road extension

3 DESCRIPTION OF THE SCOPE OF WORK

3.1 Description of the activities to be undertaken including associated structures and infrastructure.

Estate d'Afrique Master Association (the "estate") proposes to construct an access road from the Estate d'Afrique connecting to James road in Meerhof in the Hartbeespoort area, in ward 29 of the Madibeng Local Municipality which falls under the greater Bojanala Platinum District, North West Province. Currently the estate has one entry and one exit point located southwards on the R104 in accordance with the township establishment conditions.

The proposed access road will be sealed and will extend about 460 metres long and about 6 metres wide which will include both lanes and associated embankments. The road will fall into properties owned by Manpark (Pty) Ltd, Transnet Limited and the Republic of South Africa.

The proposed access road will include the installation of stormwater infrastructure along the length of the road to facilitate the movement of storm water runoff and drainage from one side of the road to the other without damaging the structural integrity of the road itself. The road will also include the estate's new access-controlled gate at location: 25°45'55.56"S; 27°53'42.10"E. The proposed road route is situated across the foot of a ridge of the Witwatersberg, adjacent to the Hartbeespoort Dam.

The fauna and flora specialist study conducted by Red Kite Environmental Solutions (Appendix 6.1) states that according to the National Vegetation Map (2018), the project site falls within the Gold Reef Mountain Bushveld with a small section of the 200 metres buffer area representative of the Moot Plains Bushveld. The findings of the site survey in terms of floral species composition and characteristics of the vegetation unit identified, is closely representative of the Gold Reef Mountain Bushveld vegetation type. Neither the Gold Reef Mountain Bushveld nor the Moot Plains Bushveld are listed in the National List of Threatened Ecosystems.



The proposed access road will have a positive impact for the resident of the estate. Currently the estate has one entry and one exit point located southwards on the R104 and this route is often characterised by congestion during certain times of the day. The estate believes that the new access road will alleviate the congestion and will have its residents' access Meerhof and Hartbeespoort with ease while also providing an alternative emergency access road should an emergency situation occur at the estate.

3.2 Construction Methodology

The proposed construction methodology can be summarised as follows:

- Conventional construction methods will be used for the construction of the proposed road. The entire site will be surveyed and pegged out to determine the road reserve.
- Clearing of vegetation from the road reserve.
- Earthworks will take place along the route of the road. Depressions will be filled and excess material will be excavated.
- Once the desired levels are met, gravel material of various grades will be brought onto site and layered onto the road using a grader.
- Curbs and V-drains will be installed adjacent to the road surface.
- Soil reinforcement will be implemented at steep slopes - Primary Reinforcement will be done by using the Maccaferri Terramesh™ System.
- The final surface material (refer to option analyses in Section 4.2.2) will be laid and compacted to form the road surface.
- Backfilled soil and disturbed areas will be shaped to resemble the surrounding topography.
- The proposed construction methodology has been developed in an attempt to minimise both the environmental impact and social impact of the project.

3.3 Relevant environmental legislation and standards

This section provides a description of the policy and legislative context within which the development is proposed. The policy and legislative context discussed are to be considered in the assessment process and it is particularly of relevance as it illustrates to the relevant adjudicating authority that the EAP and the applicant, are both aware of the legal requirements and will comply with the necessary legislation and how the proposed development complies with and responds to the legislation and policy context.

Table 3-1: Legislative Framework

Legislation	Compliance of Activity
National Environmental Management Act, 1998	<p>The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) is South Africa's overarching environmental legislation. It includes a set of principles that govern environmental management and against which all Environmental Management Programmes (EMPs) and actions are measured. These principles include and relate to sustainable development, protection of the natural environment, waste minimisation, public consultation, the right to an environment that is not harmful to one's health or wellbeing, and a general duty of care.</p> <p>The Environmental Impact Assessment (EIA) Regulations, 2014: GN R.324, R.325, and R.327 (as amended in 2017) under Section 24 of the NEMA define the activities that require Environmental Authorisation and the processes to be followed to assess environmental impacts and obtain Environmental Authorisation.</p> <p>Environmental authorisation is required for the construction of the Estate d'Afrique access road. Therefore, this application is in line with the requirements of NEMA.</p>



Legislation	Compliance of Activity
Section 28 of the National Environmental Management Act, Act 107 of 1998 Duty of Care and remediation of the environmental damage	<p>Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.</p> <p>The contractor and applicant will be responsible for any pollution on site and must manage the site in an environmentally acceptable manor.</p>
National Water Act, 1998	<p>The purpose of the National Water Act, 1998 (Act No. 36 of 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which takes into account amongst other factors:</p> <ul style="list-style-type: none">• Meeting the basic human needs of present and future generations,• Promoting equitable access to water;• Redressing the results of past racial and gender discrimination;• Promoting the efficient, sustainable and beneficial use of water in the public interest;• Facilitating social and economic development; <p>It is unlikely that any activities carried out by the development will trigger a Water Use Licence.</p>
National Environmental Management: Waste Management Act, 2008	<p>The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) is Act was amended on 1 July 2009 and it aims to consolidate waste management in South Africa.</p> <p>On the 29th of November 2013, the Minister of Water and Environmental Affairs amended the list of waste management activities that might have a detrimental effect on the environment. Please take note of the other amendments/ publications since 29 November 2013:</p> <ul style="list-style-type: none">• 2 June 2014 – NEM: Waste Amendment Act, 2014 (Act No. 26 of 2014)• 2 May 2014 – Remediation of contaminated land and soil• 2 May 2014 – Amendment List of Waste Management Activities that have or are likely to have detrimental effect on the environment <p>The NEMWA provides reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. One of its main objectives is to protect health, wellbeing and the environment by providing reasonable measures for securing ecologically sustainable development while promoting justifiable economic and social development.</p> <p>It is unlikely that any activities carried out by the development will trigger a Waste Management Activity.</p>
Environmental Conservation Act, 1989	<p>The Environmental Conservation Act, 1989 (Act No. 73 of 1989) makes provisions for the application of general environmental principles for the protection of ecological processes, promotion of the environment. This Act has mostly been repealed by NEMA.</p>



Legislation	Compliance of Activity
National Environmental Management Biodiversity Act, 2004	<p>National Environmental Management Biodiversity Act, 2004 (act No. 10 of 2004) aims to provide the framework, norms, and standards for the conservation, sustainable use and equitable benefit-sharing of South Africa's biological resources. Section 52 allows for the publication of a list of threatened ecosystems in need of protection. The list was published in Government Gazette No. 34809 Notice No. 1002 dated 9 December 2011.</p> <p>Locally, in terms of the North West Conservation Plan, the site is categorised as falling within areas characterised as Ecological Support Area 1 (ESA1) and Critical Biodiversity Area 2 (CBA2). Therefore, the proposed project requires an Environmental Authorisation to clear an area of 300 square metres or more of indigenous vegetation being within a sensitive area.</p>
National Forests Act, 1998	<p>The National Forest Act, 1998 (Act No. 84 of 1998) promotes the sustainable management and development of forests for the benefit of all; provide special measures for the protection of certain forests and protected trees; promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes and promotes community forestry.</p> <p>In terms of section 15(1) of the National Forests Act of 1998, forest trees or protected tree species may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under license granted by the Department of Agriculture, Forestry and Fisheries (DAFF).</p> <p>Relevant Authorisation needed for all protected species, in terms of NEMBA (TOPS List) and the National Forests Act, 1998, will be necessary if any of the listed species need to be relocated during any phase of the development.</p>
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	For the protection of South African Heritage to nurture and conserve community's legacy. No archaeological significant artefacts will be disturbed during this project therefore no permits will be required from the provincial heritage authority, AMAFA.
Mineral & Petroleum Resources Development Act 28 of 2002	<p>To provide for the sustainable development of the nation's mineral and petroleum resources which includes activities carried out for the winning of any mineral on, in or under the earth (i.e. the use of borrow pits).</p> <p>Material used in the construction of the road must be obtained from a licensed borrow pit.</p>
The Polluters Pay Principle	The 'polluters pays' principle is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment. The contractor and applicant will be responsible for any pollution on site.
Municipal Planning Framework	
Madibeng Local Municipality IDP	The proposed project is for a private road and therefore does not fall in line with the Madibeng Local Municipality IDP's goal to promote sustainable development.
Magaliesberg Environmental Management Framework and Plan	The project does not disregard the objectives of the Municipality's EMF and C-Plan.

3.4 All listed activities to be triggered and being applied for

Table 3-2: Listed Activities

Indicate the number and date of the relevant notice:	Activity No (s) and Activity Description (in terms of the relevant notice)	Describe each listed activity as per project description
GN. R 324, 7 April 2017	<p>Listed Activity 4 Listing Notice 3: The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p> <p><i>(h) North West:</i></p> <p>(ii) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act as Adopted by the competent authority.</p> <p>(iv) Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority.</p>	<p>The proposed road will be wider than 4 metres with a reserve of approximately 12 meters and will fall within a Critical Biodiversity area (CBA2) and Ecologically sensitive area (ESA1). The proposed combined area of the additional access road and fence patrol road is about 396 m² metres. It is anticipated that the timeframe required for the construction of the road extensions are 6 months to 1 year, however it is requested that the Environmental authorisation be valid for a period of not exceeding 5 years to allow for any unforeseen problems encountered during procurement and construction.</p>
GN. R 324, 7 April 2017	<p>Listed Activity 12 Listing Notice 3: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p><i>(h) North west-:</i></p> <p>(iv) Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority. (v) Sensitive areas identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p>	<p>Clearance of more than 300 m² of Indigenous vegetation will take place within a Critical Biodiversity area (CBA2) and Ecologically sensitive area (ESA1). The area to be cleared of vegetation was determined as about 5 330 m² It is anticipated that the timeframe required for the removal of vegetation are 6 months to 1 year, however it is requested that the Environmental authorisation be valid for a period of not exceeding 5 years to allow for any unforeseen problems encountered during procurement and construction.</p>

4 MOTIVATION, NEED AND DESIRABILITY

4.1 Motivation and explanation of the need and desirability of the activity.

Accessibility to the estate is limited to one entry / exit point located southwards onto the R104. The establishment of the proposed access road will enable ease of accessibility to the estate from the Meerhof area and the ease of movement and safety of vehicles commuting into and out of the estate. The proposed alternative access road will link the estate with the Meerhof and Hartbeespoort communities. The proposed access road will not have any significant impact to the society and local municipality in general, as it is meant to cater mainly for the private residents of the estate. The road

will also provide easier access to emergency services coming from the Brits/Hartbeespoort side should the need arise. The road will also be an alternative emergency exit should the main entrance to the estate be obstructed or flooded during extreme circumstances. It will also provide an exit route away from Pelindaba in the event of an incident at the plant.

The road extension along the fence is needed for enhanced security inspections along the fence line. The area of the proposed fence road is about 396 m²

4.2 Motivation for Preferred Site, Activity and Technology Alternative.

4.2.1 Site Alternative

4.2.1.1 Site Alternative 1 'preferred site'

The preferred site is to align the proposed road with James Road in Meerhof and it will pass through Portion 107 of farm Welgegund 491 JQ and Portion 9 (remainder), 29 and 46 of farm Hartbeestpoort 482 JQ. **Figure 4-1** shows that the access road will continue from Meerhof straight over the mountain crest towards the estate. Currently there is a locked gate on the perimeter fence of the estate on the Meerhof side. The proposed access road will be about 460 metres long and 6 metres wide. The area of the proposed fence security road is about 396 m² with a width of 4 m (Appendix 4).



Figure 4-1: Google earth photograph showing proposed access road site alternatives

4.2.1.2 Site alternative 2

Proposed site alternative route 2 will pass through Portion 4 of farm Welgegund 491 JQ; Remainder of portion 9, portion 46 and 47 of Hartbeestpoort 482 JQ; and Meerhof (Township) 278. **Figure 4-1** shows that route will not affect James Road, instead it will come through Transnet Limited property into ERF 278 of Meerhof Township. There is an existing old railway line which is planned to be re-commissioned in the future, therefore, the proposed access road might not be possible. The proposed site alternative 2 will be about 702 metres long, which is about 240 metres longer than the preferred site alternative.



4.2.2 Technology Alternative.

4.2.2.1 *Technology alternative 1 – Preferred option*

Roadway surfacing choices are known to affect the intensity and spectrum of sound emanating from the tire/surface interaction. One popular measure (and in this case the preferred alternative) is to use brick paving - the noise and vibration slows motorists down. The most important benefit of using brick pavers is that it naturally has a slip resistance surface which helps to decrease the likelihood of accidents near wet areas. It has a textured surface with abrasive characteristics. When the underlying earth along with the material moves, brick paving automatically adjusts itself with the movement and accommodates with the underlying soil, thereby helping to prevent cracking of the entire pavement system. The Maintenance schedule on the road surface for paving is less, much simpler (requires less specialised knowledge and materials e.g. road prime/ tach coats, specific application rates, asphalt type and composition design etc.) and can be done by less specialised and readily available contractors. This is the preferred option.

The fence access road will be gravel.

Blasting of large rocks and boulders will done using chemical means and unlike traditional explosives there is no danger from flying rock or debris¹. The chemical is mixed with water and then injected deep into crevices in the rock or stone which result in the rock expanding and the resulting pressure causing it to fracture and fragment.

4.2.2.2 *Technology alternative 2*

For a road of this nature within the area, an asphalt road is considered a more suitable road compared to a gravel road. In addition, the stormwater runoff from an asphalt road will contain less dust and sediment when compared with that of a gravel road. The concern with asphalt is that the road application of the asphalt on the steep slope might be challenging for the contractor and might slip also forming cracks resulting in eventual base failure. Asphalt also has a tendency to if not "driven or trafficked" dry out and crack - requiring rejuvenation application (as can be seen on estate access road before the entrance gate. This is also unsightly when repaired with crack filler later.

There is no alternative applicable to the fence access road.

Should chemical blasting not be effective traditional blasting may have to be implemented. Not only increases this the danger associated with the placing of the explosives but it may also result in more vibrations, noise and dust¹ and thus is not the preferred option.

4.2.2.3 *Technology alternative 3*

The defining factor on deciding between a gravel/paved and asphalt is dependent on local use and surrounding road network. While a gravel road cost less to construct than asphalt and paved roads in terms of design and technical construction materials, a gravel road will require more maintenance during operation as it is likely to degrade. Further, there is generally more material loss and dust raised from a gravel road compared to a asphalt/paved road which would be problematic not only to the estate residents, however, for the environment as well.

There is no alternative applicable to the fence access road.

¹ <https://www.betonamit.com/html/concrete-breaking-chemical.html> 13 November 2019



4.2.3 The No-Go Alternative

The “No-go” alternative is the “no development alternative”. This option of retaining the *status quo* and not proceeding with the proposed access road development is not reasonable considering that the residents of the estate will be deprived of accessing the Meerhof and Hartbeespoort communities and will be limited to the use of one access road towards the R104 which could result in them being trapped during an emergency situation (flood/fire/Pelindaba). The no go alternative will also be not reasonable considering that the proposed road will not offset any ecologically sensitive area (Appendix 6.1) as per the specialist study.

It is the opinion of the EAP that there are no significant environmental impacts that cannot be mitigated against and that the preferred Alternative 1 (brick paving and proposed route) be authorized.

5 PUBLIC PARTICIPATION

5.1 Notification of Interested and Affected Parties

5.1.1 Newspaper Advertisement

A newspaper advert had been placed within the local newspaper of the Hartbeespoort area as required to notify possible Interested and Affected parties. The newspaper advertisement was placed in the Kormorant issue of 21 November 2019 to 28 November 2019.

5.1.2 Site Notice

To inform the surrounding public, I&APs, communities and immediately adjacent landowners of the proposed activity, site notices was placed at various sites and locations which are visible and accessible in relation to the proposed servitude area on the 21st of November 2019.

A3 Posters placed within the project area:

- Main Entrance of Estate d'Afrique;
- Corner of James and Cloister Roads;
- Corner of James and Lincoln Roads.

5.1.3 Direct Notification of Identified I&AP's

Background information documents were distributed to various stakeholders, home owners and I&APs within close proximity to the project area. Distribution was done on the 21st of November 2019.

5.2 Public Meetings

A public meeting will be held with registered interested and affected parties at the Estate d'Afrique Club House on the 12th of December 2019 at 18h00.

The concept of open meetings will be adopted because it allows for more interaction between project proponents and members of the community/public and entails one to one discussions and small group discussions, picture and map illustrations about the proposed road project in pursuit of full comprehension by I&APs about the proposed project.



5.3 Registration of Interested and Affected Parties

I&AP's who participated in the Public Involvement Process by attending meetings, providing comments in writing and making verbal contact will be included in this list. Government authorities will also be captured as registered I&APs.

None registered to date.

5.4 Comments received to date.

Stakeholders on the database will be notified of the availability of the application reports via email, fax and post. The draft reports will also be made available at the Estate d'Afrique Security Office at the existing entrance of the R104, the Schoemansville Public Library as well as electronically on request.

None received to date.

6 BASELINE ENVIRONMENT

6.1 Local Climate

The climatic conditions of the area could be described as temperate receiving in excess of 600 mm of rain per annum, with most of the rain falling during the early summer months (NWDACE, 2002). This is represented in Figure 6-1 and Figure 6-2 (Weather SA, 1997).

Hartbeespoort falls within the Highveld Climate Region, characterised by warm summers and mild winters with frost (Van Zyl, 2003). According to van Zyl (2003) rain is mostly produced by thunderstorms generated during the summer months. An occasional cold front that has moved up from the south-western area is experienced and can rarely result in snow falls on the higher lying areas.

Temperatures in the study area range from extremes of 38.9 °C to -6.2 °C although average temperatures are in line with a temperate climate. Average summer highs average around 29.6 °C dipping to 15.5 °C at night, whilst typical average winter temperatures range from 23.8°C during the day to 5.4 °C at the night. As can be seen in Figure 6-1, the diurnal range of the study area is quite large, averaging 14 °C during summer and 18.5 °C during the winter months. (Tswelopele Environmental (Pty) Ltd, 2006).

Whilst the precipitation of Highveld Climate Region is characterised by thunderstorms, there are on average only 23 days per year when thunder is recorded in the study area. Hail occurs on average 3 days per year whilst the annual average rainfall is 617 mm. Rain of greater than or equal to 1 mm per day occurs on average 55 days per year. (Tswelopele Environmental (Pty) Ltd, 2006).

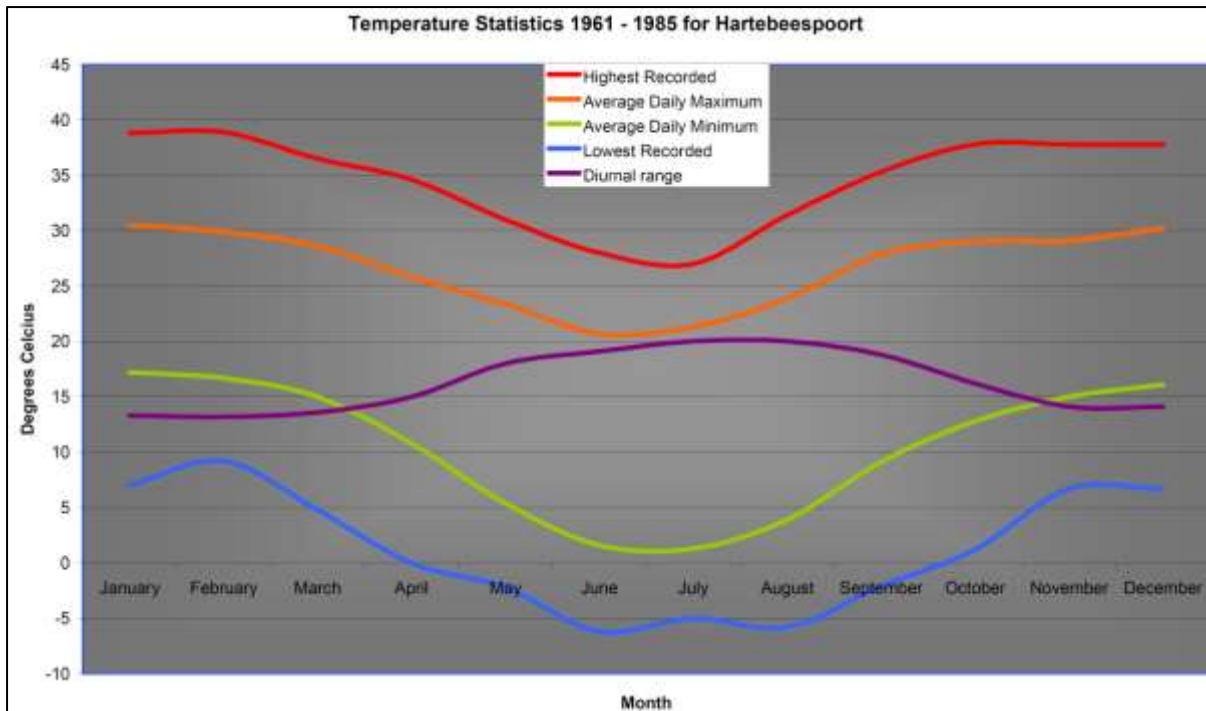


Figure 6-1: Temperature data for Hartbeespoort

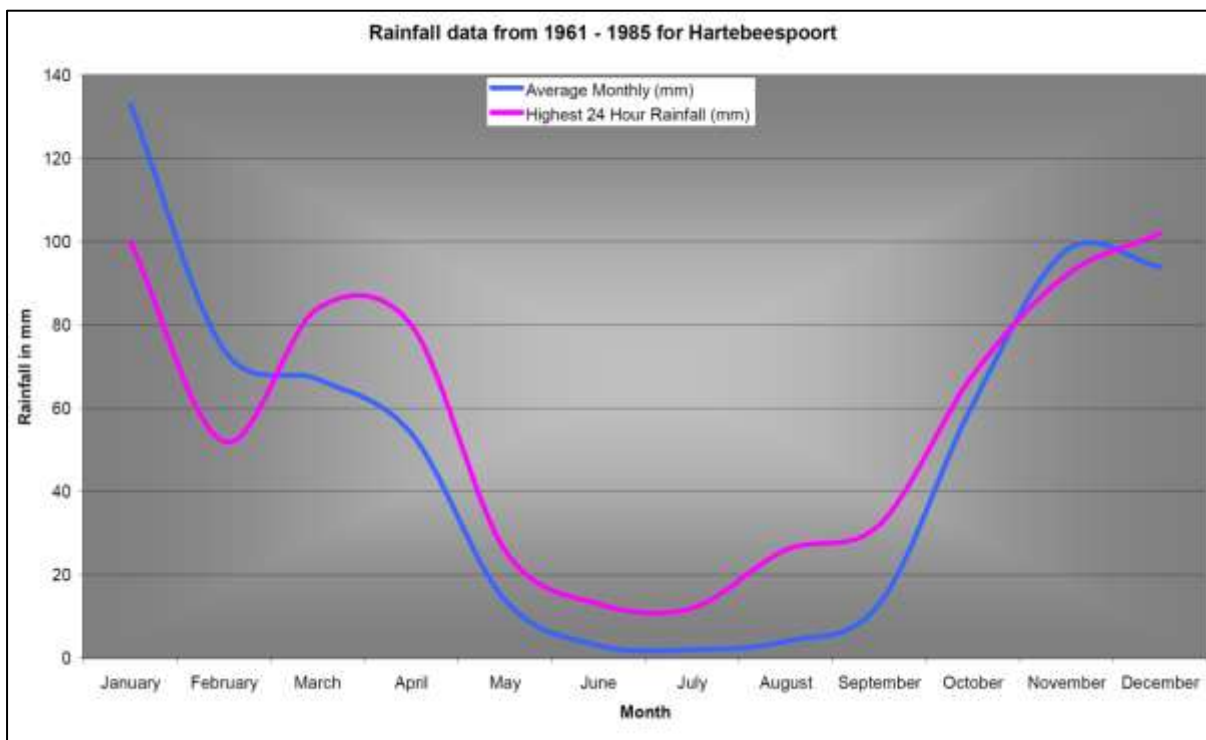


Figure 6-2: Rainfall data for Hartbeespoort

6.1.1 Wind and Evaporation

The prevailing wind direction for the Madibeng area is a north western wind flow. During winter months (July - August), the enhanced influence of westerly wave disturbances is evident in the increase frequency of south westerly winds. An increase in the frequency of north easterly winds during spring months, and the continued prevalence of north westerly and northerly airflow, reflects the combined influence of anti-cyclonic subsidence and easterly wave systems. The dominant day time winds are from the north-east and north-west. The dominant night time wind is from the south and south east. On average, the south and south easterly winds occur approximately 25% of the time and are associated

with low wind speeds between 1 and 2 m/s. On average, the winds from the north-east, north-west and south-west occur less frequently but are associated with higher speeds that are greater than 5 m/s. On average, calm conditions are experienced approximately 14% of the time.

6.2 Topography

The proposed road route is situated across the foot of a ridge of the Witwatersberg, adjacent to the Hartbeespoort Dam. The proposed access road will be between 1183 and 1190 metres above sea level with a total length of about 462 metres.



Figure 6-3: Topography of the proposed Estate d'Afrique access road

6.3 Geology

The geology of the area is dominated by formations in the Pretoria Group of the Transvaal sequence and are largely comprised of quartzites and shales. The quartzite ridges are the dominant landforms in the area as they are harder than the more easily eroded shales, and give rise to the Magaliesberg (Tswelopele Environmental (Pty) Ltd, 2006).

6.4 Hydrology and Aquatic systems

The Madibeng Local Municipality hydrological system is composed of three dams and three main rivers. All of these water sources serve as irrigation sources for the agricultural activities within the municipality. The rivers are the Crocodile River, Moretele River and Tolwane River and the dams are Hartbeespoort Dam, Klipvoor Dam and Rooikoppies Dam. The project area is located where the Crocodile River flows into the Hartbeespoort Dam (Madibeng Local Municipality, 2015) .

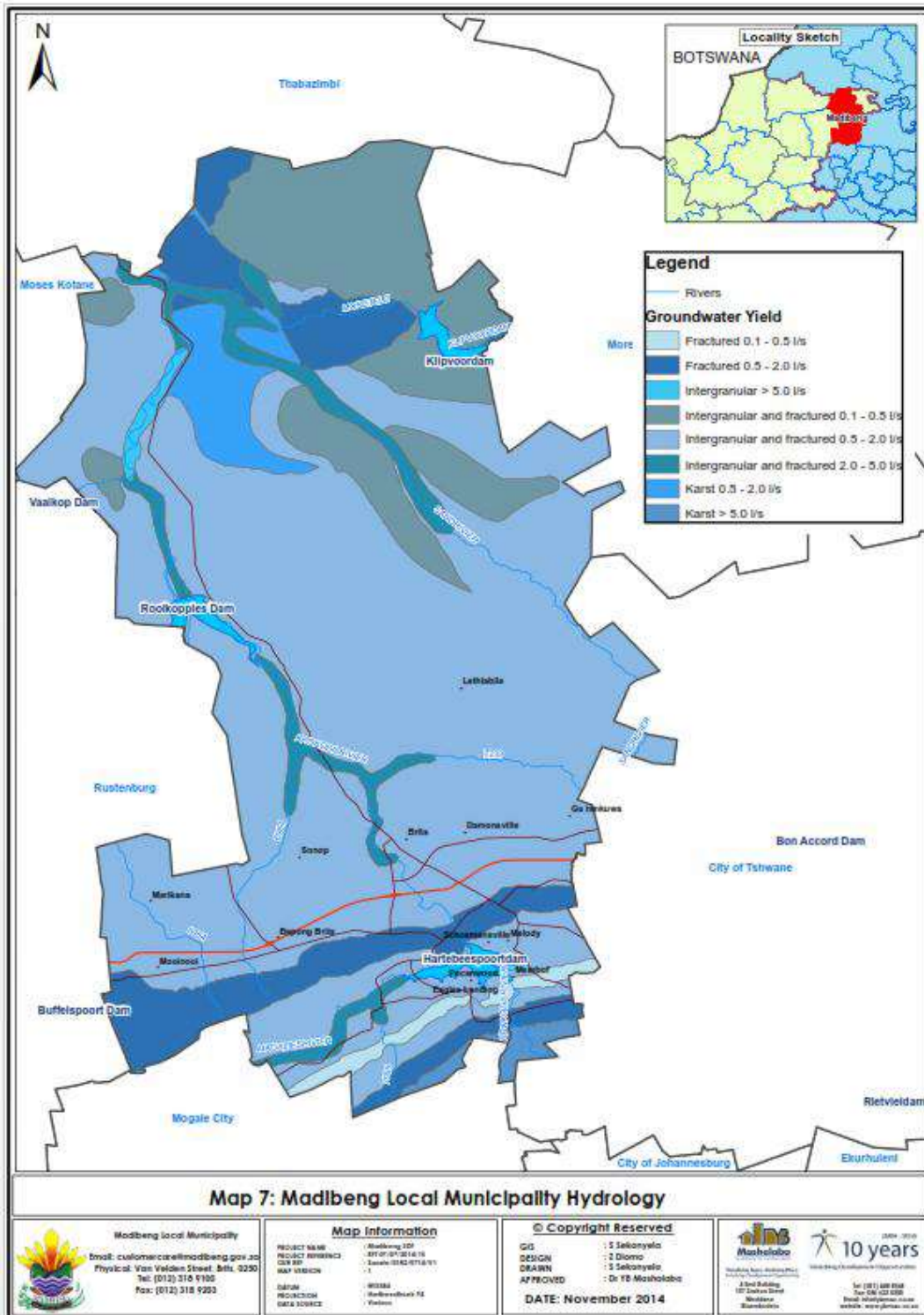


Figure 6-4: Madibeng Local Municipality Hydrology

6.4.1 The Crocodile River

The Crocodile River is the biggest and the primary river within the Madibeng Local Municipality. This river runs parallel to the R511 and stretches from the north western side to the south eastern side of the municipal area. Along its flow, it feeds into the Rooikoppies Dam and the Hartbeespoort Dam (Madibeng Local Municipality, 2015).

The Crocodile River is characterised by intensive agricultural activity located along its banks. This is due to the irrigation and water supply that the river possesses. Thus, the Crocodile River



contributes an enormous role in the agricultural sector within the municipality. For this reason, the protection and sustainable use of this river is of vital importance.

6.4.2 Hartbeespoort Dam

The Magaliesberg River and the Crocodile River (major contributor) feed into the Hartbeespoort dam which is located on the southern area of the municipality. It is found between the Magaliesberg and the Witwatersberg Mountain Range and has a national footprint. The dam wall which connects Damdoryn and Schoemanville is a national landmark known for its historical significance (Madibeng Local Municipality, 2015).

From a tourism point of view, Hartbeespoort Dam is considered a water-based leisure and entertainment zone. The scenic beauty of the dam and its surrounding ranges has resulted in increased residential development and tourist attraction into the local municipality. This ironically exerts pressure on the ecological conditions of the dam.

In an attempt to protect this area, some of the dam banks are declared protected as small nature reserves of which Kommandonek and Oberon are the most noticeable. However, water quality problems (eutrophication, algal blooms that cause toxicity problems) is a major concern with the regards to the dam's ecology and is not attributed to the residential and tourism pressures experienced at the dam but rather by pollution coming upstream from the Crocodile River, beyond the Madibeng jurisdiction. The pollution is dominantly caused by invasive species and fertilizers (Madibeng Local Municipality, 2015). Recreation and tourism, and even real estate prices, have been affected by these undesirable aquatic conditions.

6.5 Biodiversity

Biodiversity information is based on the ecological assessment conducted for this report attached as Appendix 6.1.

6.5.1 Flora

6.5.1.1 Biomes

The project area lies within the Savanna Biome, which is the largest biome in South Africa, covering 34.3% of the country (about 435 000 km²). It is a mixture of grasses and trees or shrubs. Savanna stretches from the Kalahari in the north-west across to the lowveld in the north-east and southwards to the lowlands of Kwa-Zulu Natal and the Eastern Cape. It is found from sea level to about 2 000 metres above sea level. More than 5 700 plant species grow in the Savanna Biome. They include various types of grasses (e.g. Rooigras) and trees like the Baobab, Mopane, Camel Thorn and Knob Thorn.

6.5.1.2 Vegetation Types

According to the National Vegetation Map (2018) the project site falls within the Gold Reef Mountain Bushveld with a small section of the 200 m buffer area representative of the Moot Plains Bushveld.

A summarised description of the vegetation types, extracted from the CD accompanying Mucina and Rutherford (2006), is presented below.

Note that the Vegetation Type categories of threat given in (Mucina & Rutherford, 2006) as indicated below, have been superseded by Ecosystem categories of threat contained in the Government Gazette (2011), No. 34809, General Notice 1002. Neither the Gold Reef Mountain Bushveld nor the Moot Plains Bushveld are listed in the National List of Threatened Ecosystems.



6.5.1.2.1 Gold Reef Mountain Bushveld (SVcb 9)

The Gold Reef Mountain Bushveld is distributed across the North-West, Gauteng, Free State and Mpumalanga Provinces. The vegetation type occurs along rocky quartzite ridges including the Magaliesberg and the parallel ridge to the south, from around Boshhoek and Koster in the west to near Bronkhorstspuit in the east. The vegetation type is characterised by rocky hills and ridges often west-east trending with more dense woody vegetation often on the south-facing slopes associated with distinct floristic differences (e.g. preponderance of *Acacia caffra* (*Senegalia caffra*, Common Hook thorn) on the southern slopes).

A list of expected common and dominant species in undisturbed vegetation includes the following (those with a "d" are considered to be dominant) (Mucina and Rutherford, 2006):

- **Small Trees:** *Senegalia caffra* (d), *Combretum molle* (d), *Protea caffra* (d), *Celtis africana*, *Dombeya rotundifolia*, *Englerophytum magalismsontanum*, *Ochna pretoriensis*, *Searsia leptodictya*, *Vangueria infausta*, *V. parvifolia*, *Ziziphus mucronata*.
- **Tall Shrubs:** *Canthium gilfillanii*, *Ehretia rigida* subsp. *rigida*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Mystroxydon aethiopicum* subsp. *burkeanum*.
- **Low Shrubs:** *Athrixia elata*, *Pearsonia cajanifolia*, *Searsia magalismsontana* subsp. *magalismsontana*, *Searsia rigida* var. *rigida*.
- **Woody Climber:** *Ancylobotrys capensis*.
- **Graminoids:** *Loudetia simplex* (d), *Panicum natalense* (d), *Schizachyrium sanguineum* (d), *Trachypogon spicatus* (d), *Alloteropsis semialata* subsp. *eckloniana*, *Bewsia biflora*, *Digitaria tricholaenoides*, *Diheteropogon amplexans*, *Sporobolus pectinatus*, *Tristachya biseriata*, *T. leucothrix*.
- **Herbs:** *Helichrysum nudifolium*, *H. rugulosum*, *Pentanisia angustifolia*, *Senecio venosus*, *Xerophyta retinervis*.
- **Geophytic Herbs:** *Cheilanthes hirta*, *Hypoxis hemerocallidea*, *Pellaea calomelanos*.
- **Endemic Taxa:** *Aloe peglerae* and *Frithia pulchra*.

Mucina and Rutherford (2006) classify the vegetation type's conservation status as "Least threatened", with a conservation target of 24%. The vegetation type is mainly conserved in the Magaliesberg Nature Area and much smaller proportions in the Rustenburg, Wonderboom and Suikerbosrand Nature Reserves. Some areas with dense stands of the alien *Melia azedarach* but which is often associated with drainage lines or alluvia (i.e. azonal vegetation) embedded within this unit.

The findings of the site survey in terms of floral species composition and characteristics of the vegetation unit identified, is closely representative of the Gold Reef Mountain Bushveld vegetation type.

6.5.1.2.2 Moot Plains Bushveld (SVcb 8)

Only a small section of the 200 m buffer placed around the preferred route is located in the Moot Plains Bushveld vegetation type. The vegetation unit identified on site is not representative of the Moot Plains Bushveld vegetation type.

The Moot Plains Bushveld is distributed across the North-West and Gauteng Provinces. The main belt occurs immediately south of the Magaliesberg from the Selons River Valley in the west through Maanhaarrand, filling the valley bottom of the Magalies River, proceeding east of the Hartbeespoort Dam between the Magaliesberg and Daspoort mountain ranges to Pretoria. The vegetation type is characterised by open to closed, low, often thorny savanna dominated by various species of *Vachellia* and *Senegalia* in the bottomlands and plains as well as woodlands of varying height and density on the lower hillsides.

A list of expected common and dominant species in undisturbed vegetation includes the following (those with a "d" are considered to be dominant) (Mucina and Rutherford, 2006):

- **Small Trees:** *Vachellia nilotica* (d), *V. tortilis* subsp. *heteracantha* (d), *Searsia lancea* (d).
- **Tall Shrubs:** *Buddleja saligna* (d), *Euclea undulata* (d), *Olea europaea* subsp. *africana* (d), *Grewia occidentalis*, *Gymnosporia polyacantha*, *Mystroxydon aethiopicum* subsp. *Burkeanum*;
- **Low Shrubs:** *Aptosimum elongatum*, *Felicia fascicularis*, *Lantana rugosa*, *Teucrium trifidum*.
- **Succulent Shrub:** *Kalanchoe paniculata*.
- **Woody Climber:** *Jasminum breviflorum*.
- **Herbaceous Climber:** *Lotononis bainesii*.
- **Graminoids:** *Heteropogon contortus* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Aristida congesta*, *Chloris virgata*, *Cynodon dactylon*, *Sporobolus nitens*, *Tragus racemosus*.
- **Herbs:** *Achyroopsis avicularis*, *Corchorus asplenifolius*, *Evolvulus alsinoides*, *Helichrysum nudifolium*, *undulatum*, *Hermannia depressa*, *Osteospermum muricatum*, *Phyllanthus maderaspatensis*.

The conservation status of the Moot Plains Bushveld is categorised as “Vulnerable” by Mucina and Rutherford (2006), with a conservation target of 19%. Some 13% is statutorily conserved mainly in the Magaliesberg Nature Area. Very scattered occurrences to sometimes dense patches in places of various alien plants including *Cereus jamacaru*, *Eucalyptus* species, *Jacaranda mimosifolia*, *Lantana camara*, *Melia azedarach* and *Schinus* species.

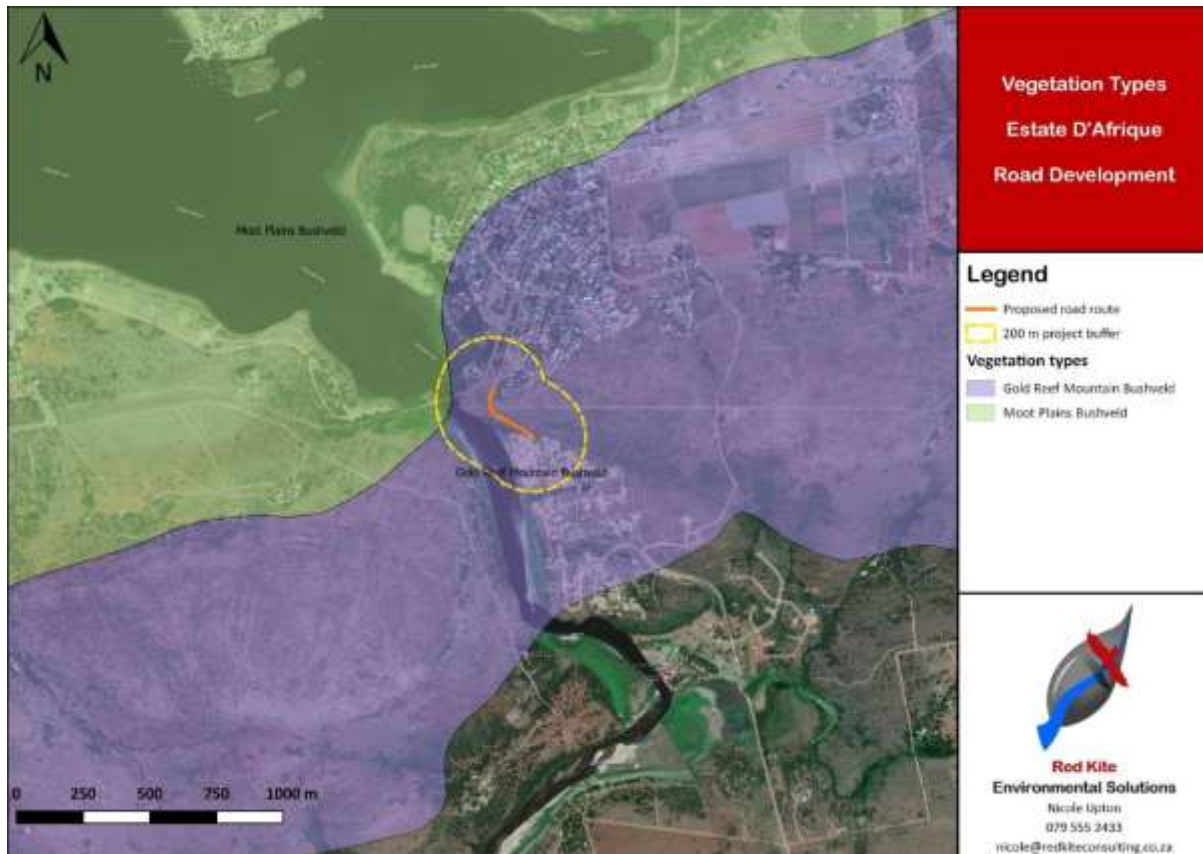


Figure 6-5: Vegetation types of the project area and 200 m buffer area around development footprint

6.5.1.3 Plants of South Africa Plant Species

The study area falls within the 2527DD Quarter Degree Square. Information on plant species recorded was extracted from the POSA online database hosted by SANBI, based on a 25 km x 25 km square surrounding the project area. A list of plant species that have been recorded for the QDS is provided in Appendix B of Appendix 6.1. The results indicate that approximately 53 plant species have been recorded within the square, consisting of 29 families. The most prominent families are *Fabaceae* and *Asteraceae*, with 6 and 8 species each, respectively. Four species of conservation concern were



found to possibly occur in the area. Thirteen exotic plant species are recorded as occurring in the QDS. Of the 53 plant species listed as occurring in the project area, 16 are endemic to South Africa (refer to species list in Appendix 6.1)

No protected tree species, as promulgated in terms of the National Forest Act, 1998 (Act No. 84 of 1998), have been recorded in the QDS. None of the species listed for the QDS are contained in the ToPS list.

Although specifically searched for, none of the species of conservation concern listed in Appendix 6.1 were identified as occurring on the project site. However, this does not preclude them from possibly occurring on the proposed road route.

Thirteen plant species not indigenous to South Africa were listed for the project area (refer to Appendix 6.1), seven of which are listed as alien and invasive plant species in the National Environmental Management: Biodiversity Act (2004). Category 1 is the strictest category of species and none of these species are allowed to occur and/or become established on any land area except for the use of a biological control reserve. They possess characteristics that are harmful to humans, animals or the environment. Category 1b is described in the National Environmental Management: Biodiversity Act (2004) as invasive species that may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway. Category 1b species are major invaders that may need government assistance to remove.

6.5.1.4 Vegetation Units identified

Vegetation units were identified according to plant species composition, previous land use and topography. The state of the vegetation of the proposed road route varies from being natural to completely transformed. Note that no riparian vegetation unit was identified even though the project area is located adjacent to the Hartbeespoort Dam and banks. Flora species representative of Vegetation Unit 1 (mountain slopes bushveld) continued to the edge of the Hartbeespoort Dam waters.

The following broad classification of Vegetation Units (VU) was found to occur on the proposed road route and 200 m buffer:

- 1) Mountain slopes bushveld (VU1); and
- 2) Transformed areas (VU2).

The vegetation units as identified during site visit, databases and aerial imagery are indicated in Figure 6-6.

Mountain slopes bushveld (VU1)

This vegetation unit occurs on the rocky ridges and slopes of the project area and extend to the water's edge of the Hartbeespoort Dam. The areas of this VU, that are located on the proposed project footprint, will be cleared entirely as part of the road construction. The woody structure consists of tall trees and shrubs, with a land use largely related to wilderness and some recreation for residents. Current impacts to the vegetation composition of this VU are from footpaths and occasional human foot traffic. The VU is considered to be largely natural with moderate to low disturbances to the vegetation composition. Refer to Table 5 in Appendix 6.1 for a detailed list of species identified during the site visit.

A few scattered AIP species were observed to occur in this vegetation unit, namely *Cereus jamacara* (Queen of the night), *Lantana camara* (Lantana), *Melia azedarach* (Seringa) and *Solanum sisymbriifolium* (Dense-thorned bitter apple). A few Seringa trees were found to occur closer to the edge of the dam, but the other AIP species occurred as isolated individuals.

Dominant woody plant species in this VU include: *Senegalia caffra* (Common hook-thorn), *Faurea saligna* (Boekenhout), *Searsia* spp., *Nuxia congesta* (Wild-elder), *Dombeya rotundifolia* (Wildpear), *Celtis africana* (White stinkwood), and *Euclea crispa* (Blue guarri).

Dominant graminoid species include: *Eragrostis chloromelas* (Curley leaf), *Eragrostis inamoena* (Tite grass), *Hyperthelia dissoluta* (Yellow thatching grass) and *Setaria lindenbergiana* (Mountain bristle grass).

The vegetation unit is classified as having a high sensitivity due to the largely natural state of this vegetation unit and its classification as a Critical Biodiversity Area (CBA).

Transformed areas (VU2)

Vegetation Unit 2 consists of areas totally transformed by residential developments and associated infrastructure. Very little natural vegetation remains in this VU.

The vegetation unit is classified as having a low sensitivity due to the transformation and absence of natural vegetation.

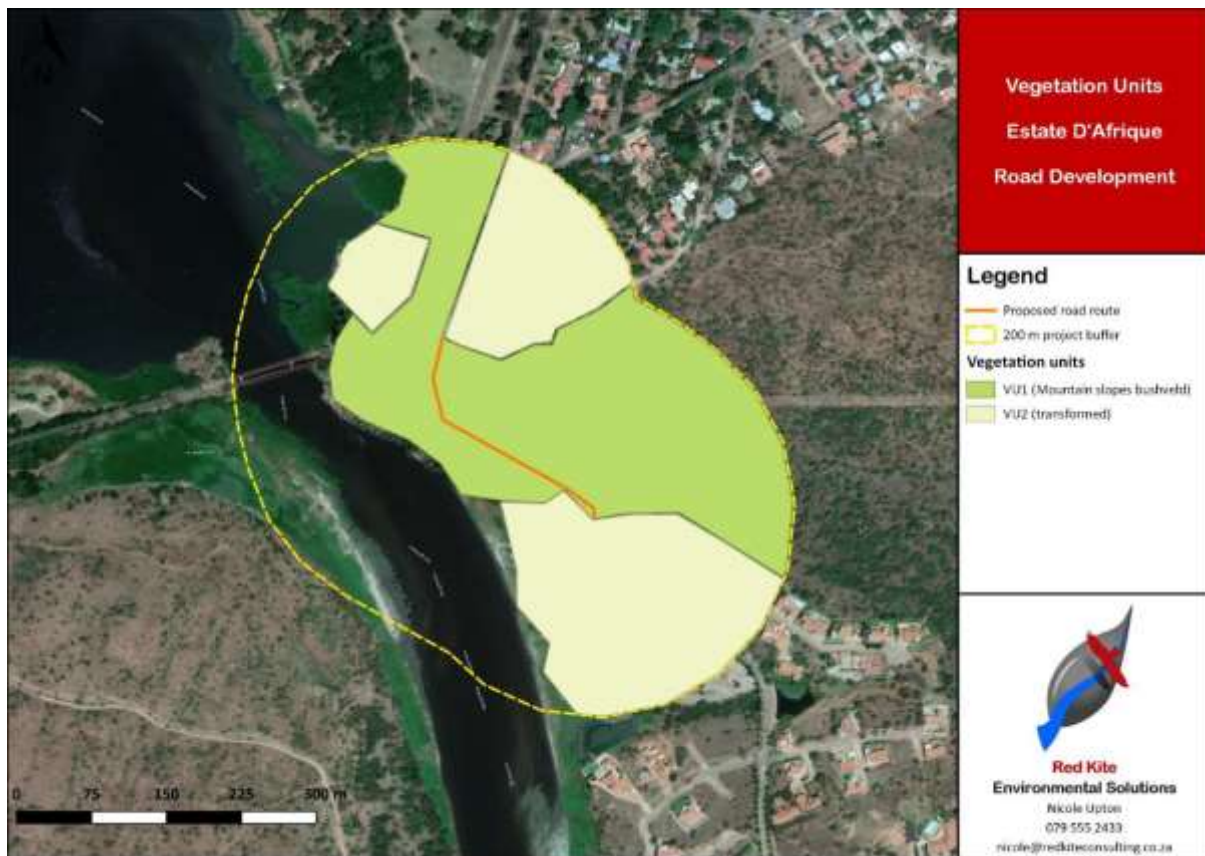


Figure 6-6: Vegetation Units of the project site

6.5.1.5 Species of conservation concern

A total of 50 plant species were recorded in the study area during the site survey, none of which are considered to be of conservation concern. None of the floral species recorded during the site survey are listed in the ToPS list or the Protected tree species list (NFA). All species are classified as Least Concern according to the SANBI Red Data List.

Two endemic species were identified to occur in the projects site, namely *Cussonia paniculata* (Highveld cabbage tree) and *Searsia zeyheri* (Blue crowberry).

6.5.1.6 Invasive species

Only four Alien Invasive Plant (AIP) species, as per the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004), were recorded during the site survey, i.e. *Cereus jamacaru*



(Queen of the night), *Lantana camara* (Lantana), *Melia azedarach* (Seringa) and *Solanum sisymbriifolium* (Dense-thorned bitter apple).

None of the AIP species identified during the site survey occurred in dense clusters, but rather as a few scattered individuals. A few Seringa trees were found to occur closer to the edge of the dam, but the other AIP species occurred as isolated individuals.

It will be important to implement an AIP Management Plan during the life of the development, to maintain and restore the ecological integrity of the remaining natural vegetation.

6.5.1.7 Medicinal species

Some of the species that were encountered during the field survey have cultural and/or medicinal use. Various medicinal books and peer-reviewed articles were used to verify whether the species have any medicinal uses. Ten species were found to occur on site that have medicinal uses – Please refer to Table 7 in Appendix 6.1.

These plants are important from a cultural perspective and are used for traditional/cultural purposes. Traditional medicine in South Africa is an important practice on which seventy two percent of the Black African population relies, that accounts for 26.6 million consumers (Appendix 6.1).

6.5.2 Fauna

A desktop study was conducted to establish whether any potentially sensitive faunal species or species of conservation concern may possibly occur on site. The Virtual Museum and Animal Demography Unit (ADU) was used to compile species lists based on the sightings and data gathering from the South African Biodiversity Institute for the 2527DD QDS. The avifaunal species list was obtained from SABAP2 for the 2555_2900 pentad.

Appendix 6.1 list the faunal species for the 2527DD QDS and Table 8 (Appendix 6.1) lists all fauna species that are of conservation concern which were found during the desktop study. Mammalian, amphibian and avifaunal species with a red listed status are known to occur within the specific area where the new road is located.

6.5.2.1 Mammals

Eighty-six (86) mammal species were found to possibly occur within the QDS, most of which have a Least Concern Red List Status. Fourteen (14) species is classified within the National Red Data List, but only six (6) of these are expected to potentially occur within the area due to the habitat found within the area, i.e. *Atelerix frontalis* (Southern African Hedgehog), *Leptailurus serval* (Serval), the South African Vlei Rat (*Otomys auratus*), the Percival's short-eared trident bat (*Cloeotis percivali*), *Miniopterus schreibersii* (Schreibers's Long-fingered bat) and African clawless otters (*Aonyx capensis*). Please refer to Section 5.1.1 within Appendix 6.1 for more detailed discussions related to these mammals.

6.5.2.2 Avifaunal

According to data collected during the Southern African Bird Atlas Project 2 (SABAP2) a total of 311 bird species have been recorded in the pentad (2545_2750). Seventeen (17) birds within pentad has a red listed status, either Regional or Global. Please refer to Section 5.1.2 within Appendix 6.1 for a list of these birds.



6.5.2.3 Butterflies

Hundred-thirty-six (136) butterfly species were found for the 2527DD, all of which are categorized as Least Concern by SANBI (Appendix D of Appendix 6.1).

6.5.2.4 Other Invertebrates

Twenty-seven (27) Dung beetle species were provided on the SANBI database, eight (8) Lacewing species. Forty (40) Odonata species, Fourteen (14) Spiders, Six (6) Scorpions. None of which has a listed status (or has not been assessed) according to SANBI.

6.5.2.5 Reptiles

Thirty-five (35) reptile species are recorded for the QDS, the list of species that may possibly occur in the QDS are presented in Appendix D. None of the species have a red listed status.

6.5.2.6 Amphibians

Seventeen (17) species was listed within this QDS (Appendix D) and one species were red listed for the QDS: *Pyxicephalus adspersus* - Giant Bull Frog - Near Threatened

6.5.2.7 Summaries of Site Results and Species Recorded

The site is fairly natural and although patrolled by security personnel, the steep slope of the ridge prevents other activities associated with the residential lodgings to occur here. Habitat availability along the footprint is adequate/good due to the nature of the habitat types found along the ridge/koppie.

Animal communities expected do not likely use the area as breeding and roosting sites as a result of constant movement and human noise and smells in close proximity of the site.

It is unlikely that sensitive species or red listed animal species occur where the road is proposed although they may occur in the wider region and many red listed birds are known to be associated with the Magaliesberg and the Hartbeespoort Dam itself.

Please refer to Table 10 within Appendix 6.1 for a list of species observed around the footprint of the proposed road.

6.5.3 Habitat Sensitivity and Conservation Status

According to the findings of the desktop and field assessment, two broad vegetation units were identified in the study area. The first is bushveld habitat associated with mountain slopes and the second consist of areas transformed by residential developments.

- The mountain slope bushveld vegetation unit (VU1) was rated as having a **High sensitivity**, based on the relatively undisturbed condition of the vegetation and that the vegetation unit is categorised as a Critical Biodiversity Area.
- Transformed areas (VU2) are totally disturbed and cannot be considered sensitive. Therefore, a **low sensitivity** was assigned to this vegetation unit.

Regionally, the area is situated between various formally protected areas (NPAES), such as the Magaliesberg Protected Natural Environment (local nature reserve managed by the North West Parks Board – Formal B) and the Cradle of Humankind World Heritage Site (Formal A) as managed by the Gauteng Provincial Government. The area east of the Cradle of Humankind World Heritage Site is listed as a Focus area for possible expansion due to the importance of Vaal Grasslands which occur within the area earmarked. The area also falls within the Magaliesberg Biosphere Reserve transition zone.



Important Birding Areas (IBAs) occur where the road development is proposed (and Estate d'Afrique is located), namely the Magaliesberg IBA. The Diepsloot Nature Reserve, controlled by the Johannesburg Municipality, lies 10 km south of Hartbeespoort Dam. Other protected areas within the IBA include Rustenburg Nature Reserve, 2 km south-west of the town, Mountain Sanctuary Park and Hartbeespoort Dam Nature Reserve as well as several private reserves and conservancies.

The Vulture Monitoring Project, through the Vulture Study Group, counts nestlings annually as a measure of breeding success, which can fluctuate alarmingly in this population. The Magaliesberg vultures forage quite widely, some travelling to the Pilanesberg (Appendix 6.1) nearly 100 km away. Several vulture restaurants have been established near the colonies to provide a regular food supply to breeding birds.

Locally, in terms of the North West Conservation Plan, the site is categorised as falling areas characterised as Ecological Support Area 1 (ESA1) and Critical Biodiversity Area 2 (CBA2).

6.6 Heritage

A Heritage Impact Assessment was conducted for the proposed development (Appendix 6.2 (Pesler, 2019)). A number of known cultural heritage (archaeological and historical) sites exist in the larger geographical area within which the study area falls. No sites, features or material of cultural heritage (archaeological and/or historical) origin or significance were identified during the assessment in the study area. If any Stone Age material is to be located here it would be single, out of context stone tools scattered across the area. No Iron Age sites, features or cultural material was identified during the assessment of the study area.

6.7 Land use and Land capability

The Meerhof area is characterised by urban (mostly residential estates) development in the area directly around the dam, with more agricultural and rural residential related land uses further away from the dam. Although the development patterns closely follow the dam, there is also a strong link between the development patterns and the regional roads around the dam. (Madibeng Local Municipality, 2014)

6.8 Socio-economy

6.8.1 Demography

Madibeng is classified as a category B Municipality, functioning through the Executive Mayoral System. The Municipality was recently demarcated into 41 wards and the Municipal Council comprises of 82 Councillors, (of which 10 are members of the Mayoral Committee), with a full-time Speaker, Chief Whip and Executive Mayor.

Table 6-1: Summary of Madibeng Local Municipality (Republic of South Africa, 2019)

Population	2016	2011
	536 110	475 796
Age Structure		
Population under 15	29.40%	25.70%
Population 15 to 64	65.90%	69.30%
Population over 65	4.70%	5.00%
Dependency Ratio		
Per 100 (15-64)	51.8	44.4
Sex Ratio		
Males per 100 females	115.4	113.7
Population Growth		
Per annum	2.71%	n/a

Population	2016	2011
	536 110	475 796
Labour Market		
Unemployment rate (official)	n/a	n/a
Youth unemployment rate (official) 15-34	n/a	n/a
Education (aged 20 +)		
No schooling	5.10%	7.60%
Matric	32.20%	27.10%
Higher education	6.80%	7.20%
Household Dynamics		
Households	193 364	160 041
Average household size	2.8	2.9
Female headed households	29.50%	30.20%
Formal dwellings	63.30%	59.00%
Housing owned	67.70%	54.00%
Household Services		
Flush toilet connected to sewerage	27.30%	27.30%
Weekly refuse removal	35.50%	25.80%
Piped water inside dwelling	16.00%	22.30%
Electricity for lighting	88.00%	80.90%

Table 6-2: Madibeng Local Municipality Demographic Statistical overview, as per Census 2016

Comparative Periods	2011	2016
Black African	424 874	485 639
Coloured	3 910	4 773
Indian Or Asian	2 410	2 946
White	43 556	49 030
TOTAL	474 750	542 388

Table 6-3: Access to basic services

COMPARATIVE PERIODS	2011	2016
Piped water inside dwelling	32 454	41 414
Piped water in yard	74 781	89 962
Communal piped water: less than 200m from dwelling (At RDP-Level)	13 255	19 722
Communal piped water: more than 200m from	10 580	20 647

The most prominent economic activities in Madibeng Local Municipality include manufacturing, mining and agriculture (Madibeng Local Municipality, 2018). Mining is tending to out-perform the agriculture sector. The area is the world's third largest chrome producer and includes the richest Platinum Group Metals Reserve (situated on the Merensky Reef). Manufacturing is the dominant sector, with motor industry related activities predominant.

6.8.2 Hartbeespoort

Hartbeespoort is located on the boundary between Gauteng and North West Province. The Precinct is in close proximity to and with good connectivity to key urban areas in Gauteng such as Pretoria, Sandton, Randburg, Midrand and Krugersdorp and is 65 km from Rustenburg. This area is linked to both Rustenburg and Gauteng urban centres by the N4 Bakwena-Platinum Highway. From a regional tourism perspective, the area is close to Lensaria International Airport which offers both domestic and international flights in Gauteng. This area consists of places around Hartbeespoort Dam in MLM and extends to approximately 180 km².

The number of residents around Hartbeespoort Dam has been growing steadily over the past number of years, with the migration of people from Gauteng being the most prevalent. An additional trend is the

expansion of urbanization in the form of both the conversion of farms to townships as well as densification of existing residential and small holding areas. (Tswelopele Environmental (Pty) Ltd, 2006)

Hartbeespoort is characterised by residential development such as Schoemansville, Ifafi, Meerhof and Kosmos. Residential areas are very distinct from those in Brits. The Magaliesberg Mountain Range topographically separates these two areas. Towards the South of the mountain range there are high income estates and resorts which cater for up-market lifestyles. The residential areas include but are not limited to golf courses, nature reserves, marinas and security control. These areas include the likes of Pecanwood, Key West, Kashane, Mount Kos to mention but a few.

7 IMPACT ASSESSMENT

7.1 Methodology

7.1.1 Specialist Impact Identification and Assessment

The specialists specifically differentiated between the environmental impacts associated with the construction, operation and maintenance of the proposed road. As far as possible, the specialists were required to quantify the suite of potential environmental impacts identified in their studies and assess the significance of the impacts. Each impact was assessed and rated. For the purposes of this Basic Assessment process, the term 'assessment' refers to "the process of collecting, organising, analysing, interpreting and communicating data relevant to some decisions". The assessment of the data was, where possible, based on accepted scientific techniques, failing which, the specialists made judgements based on their professional expertise and experience.

7.1.2 Assessment Criteria

The criteria for the description and assessment of environmental impacts were drawn from the EIA Guidelines (DEAT, 1998) and as amended from time to time (DEAT, 2002).

The level of detail as depicted in the EIA Guidelines (DEAT, 2002) was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

An explanation of the impact assessment criteria is defined below.

Table 7-1: Impact Assessment Criteria

EXTENT	
Classification of the physical and spatial scale of the impact	
Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
Site	The impact could affect the whole, or a significant portion of the site.
Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
National	The impact could have an effect that expands throughout the country (South Africa).
International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
DURATION	
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.	
Short term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.



Short to Medium term	The impact will be relevant through to the end of a construction phase (1.5 years).
Medium term	The impact will last up to the end of the development phases, where after it will be entirely negated.
Long term	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter.
Permanent	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
INTENSITY	
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as	
Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
PROBABILITY	
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:	
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).
Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25 %.
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50 %.
Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

The status of the impacts and degree of confidence with respect to the assessment of the significance must be stated as follows:

- **Status of the impact:** A description as to whether the impact would be positive (a benefit), negative (a cost), or neutral.
- **Degree of confidence in predictions:** The degree of confidence in the predictions, based on the availability of information and specialist knowledge.

Other aspects to take into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full-lifecycle of the proposed development, including construction, operation and decommissioning.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.



- The specialist studies must attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

7.1.3 Mitigation

The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

7.1.4 Determination of Significance-Without Mitigation

Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as "positive". Significance is rated on the following scale:

Table 7-2: Significance-Without Mitigation

NO SIGNIFICANCE	The impact is not substantial and does not require any mitigation action.
LOW	The impact is of little importance, but may require limited mitigation.
MEDIUM	The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
HIGH	The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

7.1.5 Determination of Significance- With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

Table 7-3: Significance- With Mitigation

NO SIGNIFICANCE	The impact will be mitigated to the point where it is regarded as insubstantial.
LOW	The impact will be mitigated to the point where it is of limited importance.
LOW TO MEDIUM	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.
MEDIUM	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
MEDIUM TO HIGH	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.
HIGH	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

7.1.6 Assessment Weighting

Each aspect within an impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined

base upon which it becomes feasible to make an informed decision, it was necessary to weigh and rank all the criteria.

7.1.7 Ranking, Weighting and Scaling

For each impact under scrutiny, a scaled weighting factor is attached to each respective impact (refer Table 7-4). The purpose of assigning weights serves to highlight those aspects considered the most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspect criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

Table 7-4: Description of assessment parameters with its respective weighting

EXTENT		DURATION		INTENSITY		PROBABILITY		WEIGHTING FACTOR (WF)		SIGNIFICANCE RATING (SR)	
Footprint	1	Short term	1	Low	1	Probable	1	Low	1	Low	0-19
Site	2	Short to Medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39
Regional	3	Medium term	3	Medium	3	Likely	3	Medium	3	Medium	40-59
National	4	Long term	4			Highly Likely	4	Medium to High	4	Medium to High	60-79
International	5	Permanent	5	High	5	Definite	5	High	5	High	80-100
MITIGATION EFFICIENCY (ME)						SIGNIFICANCE FOLLOWING MITIGATION (SFM)					
High			0.2			Low			0 - 19		
Medium to High			0.4			Low to Medium			20 - 39		
Medium			0.6			Medium			40 - 59		
Low to Medium			0.8			Medium to High			60 - 79		
Low			1.0			High			80 - 100		

7.1.8 Identifying the Potential Impacts Without Mitigation Measures (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

$$\text{Significance Rating (WOM)} = (\text{Extent} + \text{Intensity} + \text{Duration} + \text{Probability}) \times \text{Weighting Factor}$$

7.1.9 Identifying the Potential Impacts With Mitigation Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

7.1.9.1 Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation efficiency (ME) rating (refer to Table 7-4). The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional



experience and Empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency

or $WM = WOM \times ME$

7.1.10 Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.



8 IMPACTS IDENTIFIED

The impacts identified for the proposed construction of the roads and associated mitigation measures are provided in **Table 8-1**

Table 8-1: Impacts Identified and associated mitigation measures.

Impact	Description	Mitigation
Soil	<ul style="list-style-type: none">• Potential disturbances include compaction, physical removal and potential pollution;• The exposed soil surfaces have the potential to erode easily if left uncovered;• Potential loss of stockpiled topsoil and other materials if not protected properly;• Insufficient stormwater control measures may result in localised high levels of soil erosion, possibly creating dongas or gullies, which may lead to decreased water quality in surrounding drainage lines;• Drainage line bank instability could cause erosion;• Increased erosion could result in increased sedimentation which could impact on ecological processes;• The additional hardened surfaces created during construction and operation will increase the amount of stormwater runoff, which has the potential to cause erosion;• If not properly managed, there may be damage to surrounding structures, such as existing dwellings etc.;• Physical disturbance of the soil and plant removal may result in soil erosion/loss; and• Erosion and potential soil loss from cut and fill activities.	<ul style="list-style-type: none">• Soil erosion prevention measures should be implemented such as gabions, sand bags etc. whilst energy dissipaters should be constructed at any surface water outflow points. The site should be monitored weekly for any signs of off-site siltation. All areas impacted by earth-moving activities should be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding. All exposed earth should be rehabilitated promptly with suitable vegetation to stabilize the soil;• The area surrounding the drainage lines must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken;• The road alignments are to be surveyed prior to construction to prevent damage to existing infrastructure; and• Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous grasses planted with fertiliser are very effective at covering exposed soil. It is important to note, that the use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into drainage lines, to avoid any possible eutrophication impacts.
Vegetation and fauna	<ul style="list-style-type: none">• Vegetation clearance will likely destroy habitats and lead to possible invasive and/or exotic species establishing in the area and edge-effects occurring surrounding new road;	<ul style="list-style-type: none">• Identify sensitive fauna and flora prior to construction works;



Impact	Description	Mitigation
	<ul style="list-style-type: none">• Sensitive areas may become vulnerable to Alien Invasive species and these may compete with indigenous species, likely leading to the migration of sensitive species from the site to a more favourable habitat.• Fragmentation of habitat areas by the linear development (access road): this activity will fragment ranges that certain animals may need to sustain adequate foraging area and breeding grounds;• During operational phase continuous human activity over a longer-term period may further impact on the faunal communities within the area;• Flora could be damaged by staff, residents and contractors if they are allowed to access certain natural area that should be indicated as no-go zone;• Potential off-site pollution as a result of accidental spillages of petrochemicals or concrete; and• Loss of land which has been identified as Critical Biodiversity Area as part of the Magaliesberg Environmental Management Framework.	<ul style="list-style-type: none">• Site personnel must undergo Environmental Training and be educated on keeping any vegetation disturbance to a minimum;• Ensure adequate stormwater management as to ascertain that potentially polluted water do not enter the natural environment surrounding the footprint area, specifically the Hartbeespoort dam, which is already impacted by various nutrient enrichment impacts;• Alien plant encroachment must be monitored and prevented as outlined in the EMP (Appendix 7);• Appoint an ECO to oversee the activities and ensure that ecological aspects are kept in mind;• Keep activities (transport etc.) to the smallest area possible, as shown on the civil designs approved for the road. This is to prevent other unintended fragmentation that may have irreversible changes to faunal communities. It also increases the invasion of alien/foreign species. At all times keep to the road as approved and prevent unauthorized access into other surrounding areas;• A management plan for the control of invasive and exotic plant species needs to be implemented and since the development likely already has an AIP Programme, this should extend to the area where the road is proposed;• It is vital that if any endemic, rare or vulnerable species occurs on the proposed site that these species should be protected and/or left undisturbed. Only as an exception can these species be relocated to favourable sites with the use of a specialist prior to vegetation and habitat removal. Threatened species are not allowed to be disturbed in any way. If at any point any red listed species is encountered, a specialist should be



Impact	Description	Mitigation
		<p>consulted as to determine the best way forward and a permit should be obtained if any intervention is required;</p> <ul style="list-style-type: none">• All exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous grasses planted with fertiliser are very effective at covering exposed soil. Necessary rehabilitation measures (e.g. burning, seeding, removing alien plants etc.) should be introduced to ensure species composition reverts to a more natural state (with regards to affected areas). Indigenous vegetation with deep set root systems is advisable to limit soil loss on site. Alternatively, water dissipating mechanisms such as gabions or reno-mattresses may be implemented on-site to help stabilize the surrounding soil and provide a platform for the growth of vegetation;• No hunting is permitted on-site or the surrounding areas;• No animals required for hunting e.g. dogs, under the supervision of construction workers, should be allowed into the area. All construction personnel on the property should be informed of this ruling; and• Any construction camps or stockyard areas should be located on already impacted areas within the Estate, such as at the beginning of the road footprint. Do not establish additional construction related areas on the ridge.
Air quality and noise pollution and vibrations	<ul style="list-style-type: none">• Potential dust generation from soil stripping, vehicle traffic on the access roads and motor vehicle fumes will have an impact on air quality;• Blasting of large boulders may result in increased vibration, dust and noise during construction.	<ul style="list-style-type: none">• All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum, as per the requirements of the EMPr (Appendix 7); and road dampening should be undertaken to prevent excess dust during construction.



Impact	Description	Mitigation
	<ul style="list-style-type: none"> • Potential increase in noise from the operation of machinery and construction equipment, as well as the construction vehicle traffic; and • Dust and noise will be created during the construction phase, which may impact on the local community. 	<ul style="list-style-type: none"> • Implement blasting using chemical means to reduce dust, noise and vibrations.
Waste	<ul style="list-style-type: none"> • There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil / bitumen spills (not preferred option), litter from personnel on-site, sewage from ablutions etc.); and • Waste generation that could be generated are: <ul style="list-style-type: none"> - Solid waste - plastics, metal, wood, concrete, stone; - Chemical waste - petrochemicals, resins and paints; and - Sewage as may be generated by employees/contractors. 	<ul style="list-style-type: none"> • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials is supported; • All solid wastes should be disposed of at a registered landfill site and records maintained to confirm safe disposal; • Adequate scavenger-proof refuse disposal containers should be supplied to control solid waste on-site; • It should be ensured that existing waste disposal facilities in the Madibeng area are able to accommodate the increased waste generated from the proposed construction; • Chemical waste / material should be stored in appropriate containers and disposed of at a licensed disposal facility; • Portable sanitation facilities should be erected for construction personnel. Use of these facilities should be enforced (these facilities should be kept clean so that they are a desired alternative to the surrounding vegetation). These facilities should also be monitored and serviced regularly so as to prevent contamination of the water resources; • The construction site should be inspected for litter on a daily basis and extra care should be taken on windy days. Precautions should be taken to avoid litter from entering drainage lines; Soil that is contaminated with, e.g. cement, petrochemicals or paint, should be disposed of at a registered waste disposal site and is NOT to be deposited into any drainage lines; and



Impact	Description	Mitigation
		<ul style="list-style-type: none"> • It must be ensured that all hazardous contaminants are stored in designated areas that are sign-posted, lined with an appropriate barrier and bunded to 110% of the volumes of liquid being stored to prevent the bio-physical contamination of the environment (ground and surface water and soil contamination). Hazardous substance storage must not take place within 100 m of the dam or within the 1:100-year floodline; and Any significant spills on-site must be reported to the relevant Authority (e.g. Department of Water and Sanitation / Municipality etc.) and must be remediated. • Construction activities will only take place between 08h00 and 17h00.
Socio-economic	<ul style="list-style-type: none"> • Creation of job opportunities for skilled personnel (e.g. engineers, specialists etc.) and non-skilled personnel (e.g. labourers); • Road construction will improve access in the area and will alleviate congestion; • Social anxiety may arise should the surrounding community not be adequately notified of the proposed activity; and • Possible economic benefits to suppliers of building materials in the surrounding area as goods and services may be purchased from these entities during the construction phase. 	<ul style="list-style-type: none"> • Inform the surrounding communities and general public of the proposed activity as soon as possible. This will serve to ease potential social anxiety. Such notification can be conducted through the Public Participation Process; • Local people should be employed where possible; and • A Community Liaison Officer could assist in raising any concerns / complaints noted by the affected community to the Construction Team.
Safety and security	<ul style="list-style-type: none"> • There is potential for construction labour to trespass onto neighbouring properties (Meerhof and Estate d'Afrique); and • Construction personnel / construction vehicles – movement of construction personnel and vehicles may pose a potential health and safety risk to road users and local residents. • Undulating slope of the proposed site may lead to unsafe working environment during construction if not managed properly. 	<ul style="list-style-type: none"> • Any construction personnel found to be trespassing must be subjected to a disciplinary hearing; • Construction workers / construction vehicles should take heed of normal road safety regulations; thus, all personnel must obey and respect the law of the road. A courteous and respectful driving manner should be enforced and maintained so as not to cause harm to any individual; and • A designated speed limit should be set by the developer to limit possible road strikes.



Impact	Description	Mitigation
Noise	<ul style="list-style-type: none">• Disruption to residents through increased activity and noise in the area.	<ul style="list-style-type: none">• All construction machinery and equipment must be regularly serviced and maintained to keep noise, dust and possible leaks to a minimum, as per the requirements of the EMPr (Appendix 7);• Operational Hours: No works shall be executed between sunset and sunrise and on the non-working and special non-working days as stated in the Contract Data unless otherwise agreed between the Engineer and Contractor; and• Construction personnel should be made aware of the need to prevent unnecessary noise such as hooting and shouting.
Water resource	<ul style="list-style-type: none">• Contamination of ground and surface water and soil;• Drainage lines may be polluted due to accidental spillages of petrochemicals from vehicles and equipment, or concrete from road construction; and• The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion and create turbidity in surrounding drainage lines.	<ul style="list-style-type: none">• Appropriate stormwater / surface water management measures must be put in place before construction commences and maintained throughout the lifetime of the development;• An appropriate number of toilets (1 toilet for every 20 workers) must be provided for labourers during the Construction Phase. These must be maintained in a satisfactory condition and a minimum of 100 m away from any water resources and outside of the 1:100-year floodline;• Any contaminated water associated with construction activities must be contained in separate areas or receptacles such as Jo-Jo tanks or waterproof drums, and must not be allowed to enter into drainage lines;• The Construction Camp should be positioned on previously disturbed areas (if possible);• Soil erosion prevention measures must be implemented such as gabions, sand bags etc. whilst energy dissipaters must be constructed at any surface water outflow points. The site should be monitored by the Contractor weekly for any signs of off-site siltation.



Impact	Description	Mitigation
		<p>All areas impacted by earth-moving activities must be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding;</p> <ul style="list-style-type: none">• Appropriate silt control mechanisms must be installed around all soil excavations to prevent silt from entering drainage lines;• Should any excavations require dewatering, this is to occur through an adequately designed silt trap prior to discharge. All silt traps are to be regularly monitored and maintained to ensure efficient and effective use; and• All recommendations noted in the fauna and flora assessment and Heritage Impact Assessment (Appendix 6.2) must be adhered to.



9 IMPACT ASSESSMENT

Table 9-1 presents the impact assessment findings in relation to the proposed construction activities of the proposed Estate d'Afrique access road.

Table 9-1: Assessment of Impacts

Impact	Description	Phase	Significance		Mitigation efficiency		Significance with mitigation	
			Significance	Value	Efficiency	Value	Significance	Value
Soil	Potential disturbances include compaction, physical removal and potential pollution;	C	Medium	42	Medium to High	0,4	Low	16,8
	The exposed soil surfaces have the potential to erode easily if left uncovered;	C, O	Low to Medium	24	Medium	0,6	Low	14,4
	Potential loss of stockpiled topsoil and other materials if not protected properly;	O	Low	4	Low	1	Low	4
	Insufficient stormwater control measures may result in localised high levels of soil erosion, possibly creating dongas or gullies, which may lead to decreased water quality in surrounding drainage lines;	O	Low	18	Low to Medium	0,8	Low	14,4
	Drainage line bank instability could cause erosion;	C, O	Low	8	Low to Medium	0,8	Low	6,4
	Increased erosion could result in increased sedimentation which could impact on ecological processes;	C, O	Low to Medium	36	Low to Medium	0,8	Low to Medium	28,8
	The additional hardened surfaces created during construction and operation will increase the amount of stormwater runoff, which has the potential to cause erosion;	C, O	Low	10	Medium to High	0,4	Low	4
	If not properly managed, there may be damage to surrounding structures, such as existing dwellings etc;	C	Low	8	Low to Medium	0,8	Low	6,4
	Physical disturbance of the soil and plant removal may result in soil erosion/loss;	C	Low to Medium	22	Medium	0,6	Low	13,2
	Erosion and potential soil loss from cut and fill activities;	C	Low to Medium	24	Medium	0,6	Low	14,4
Vegetation and fauna	Vegetation clearance will likely destroy habitats and lead to possible invasive and/or exotic species establishing in the area and edge-effects occurring surrounding new road;	C	Medium	52	Low	1	Medium	52
	Sensitive areas may become vulnerable to Alien Invasive species and these may compete with indigenous species, likely leading to the migration of sensitive species from the site to a more favourable habitat	C, O	Low to Medium	27	Medium to High	0,4	Low	10,8
	Fragmentation of habitat areas by the linear development (access road): this activity will fragment ranges that certain animals may need to sustain adequate foraging area and breeding grounds;	C, O	Low	18	Medium	0,6	Low	10,8
	Continuous human activity over a longer-term period may further impact on the faunal communities within the area;	O	Low	10	Medium to High	0,4	Low	4



Impact	Description	Phase	Significance		Mitigation efficiency		Significance with mitigation	
			Significance	Score	Efficiency	Score	Significance	Score
	Flora could be damaged by staff, residents and contractors if they are allowed to access certain natural area that should be indicated as no-go zone;	O	Low	7	Medium to High	0,4	Low	2,8
	Potential off-site pollution as a result of accidental spillages of petrochemicals or concrete;	C	Low	8	Medium	0,6	Low	4,8
	Loss of land which has been identified as Critical Biodiversity Area as part of the Magaliesberg Environmental Management Framework;	C,O	Low to Medium	33	Low to Medium	0,8	Low to Medium	26,4
Air quality and noise pollution and vibrations	Potential dust generation from soil stripping, vehicle traffic on the access roads and motor vehicle fumes will have an impact on air quality;	C	Low	9	Medium to High	0,4	Low	3,6
	Blasting of large boulders may result in increased vibration, dust and noise during construction;	C	Medium	39	Low to Medium	0,8	Low to Medium	31,2
	Potential increase in noise from the operation of machinery and equipment, as well as the construction vehicle traffic;	C,O	Low	14	Medium to High	0,4	Low	5,6
	Dust and noise will be created during the construction phase, which may impact on the local community;	C	Low	8	Medium to High	0,4	Low	3,2
Waste	There is potential for the site and surrounding areas to become polluted if construction activities are not properly managed (e.g. oil / bitumen spills, litter from personnel on-site, sewage from ablutions etc);	C	Low	8	Medium to High	0,4	Low	3,2
	Waste generation could be created by the following: - Solid waste - plastics, metal, wood, concrete, stone; - Chemical waste- petrochemicals, resins and paints; and - Sewage as may be generated by employees;	C	Low	7	Low to Medium	0,8	Low	5,6
Socio-economic	Creation of job opportunities for skilled personnel (e.g. engineers, specialists etc) and non-skilled personnel (e.g. labourers);	C	Low to Medium	30	high	0,2	Low	6
	Road construction will improve access in the area and will alleviate congestion;	O	Low to Medium	26	High	0,2	Low	5,2
	Social anxiety may arise should the surrounding community not be adequately notified of the proposed activity;	C,O	Low	16	Medium	0,6	Low	9,6
	ossible economic benefits to suppliers of building materials in the surrounding area as goods and services may be purchased from these entities during the construction phase;	C	Low to Medium	27	High	0,2	Low	5,4
Safety and security	There is potential for construction labour to trespass onto neighbouring properties (Meerhof and Estate d'Afrique);	C, O	Low	7	Low to Medium	0,8	Low	5,6
	Construction personnel / construction vehicles – movement of construction personnel and vehicles may pose a potential health and safety risk to road users; and local residents;	C	Low	7	Low to Medium	0,8	Low	5,6



Impact	Description	Phase	Significance		Mitigation efficiency		Significance with mitigation	
			Significance	Value	Mitigation efficiency	Value	Significance	Value
	Undulating slope of the proposed site may lead to unsafe working environment during construction if not managed properly;	C	Low	6	Medium	0,6	Low	3,6
Noise	Disruption to residents through increased activity and noise in the area;	C	Low	6	Medium to High	0,4	Low	2,4
Water resource	Contamination of ground and surface water and soil;	C	Low to Medium	24	Low	1	Low	24
	Drainage lines may be polluted due to accidental spillages of petrochemicals from vehicles and equipment, or concrete from road construction;;	C	Low	9	Medium to High	0,4	Low	3,6
	The additional hardened surfaces created during construction will increase the amount of stormwater runoff, which has the potential to cause erosion and create turbidity in surrounding drainage lines	C	Low to Medium	33	Low to Medium	0,8	Low to Medium	26,4



9.1 Significance

Based on the outcome of the significance noted in Table 9-1, the overall significant impact without mitigation is considered to be LOW with an average of 20, With mitigation, the overall significance impact is considered to be LOW with an average score of 12.3.

The greatest impact of significance is considered to be the potential impacts relating to soil erosion and hardening and compaction of the ground. However, with the correct mitigation measures employed as noted in Table 9-1 and as per EMPr (Appendix 7), these impacts can be significantly reduced. As such, the preferred site alternative and preferred technology alternative should be adopted.

10 ENVIRONMENTAL IMPACT STATEMENT.

Assuming all phases of the project adhere to the conditions stated in the EMPr (Appendix 7) it is believed that the impacts associated with the proposed construction will have no significant, adverse, long term environmental impact on the surrounding environment. Positive impacts associated with construction include:

- Provision of formal infrastructure in the form of roads;
- Safe transportation medium (vehicles);
- Economic growth and development; and
- Employment opportunities and skills development.

It is perceived that these impacts will be medium to long term and have sustainable benefits. It must be ensured that the construction phase, in no way, hampers the health of any of the ecological systems identified on site, and that post-construction rehabilitation leaves the surrounding environments in an as good, if not better, state. Further, should any privately owned infrastructure (e.g. fencing) be damaged during construction, it is to be replaced in the same condition, if not better, by the contractor. After the construction phase of the project, the contractors must ensure that all hazardous materials are removed from the site and that site is rehabilitated as per the requirements of the EMPr (Appendix 7). Any alien plant management programmes that are implemented during the construction phase must be maintained during the construction defects liability period.

11 RECOMMENDATIONS OF THE EAP

The proposed development should not result in impacts on the natural or social environment that are highly detrimental, nor result in undue risks to the natural environment. The nature and types of negative impacts do not outweigh the potential benefits of this project, provided that the short-term localised impacts of the construction phase are adequately mitigated. In this regard, an EMPr has been compiled and is attached to this report (see Appendix 7). It is recommended that external monthly EMPr monitoring takes place by an independent Environmental Control Officer (ECO) to ensure that the requirements of the EMPr are being correctly implemented, thus ensuring the protection of the surrounding environment during construction.

It is the recommendation of the EAP that the following management and mitigation measures be incorporated into any project approvals which may be issued:

- Prior to construction the appointed road construction contractor must produce a method statement indicating how the construction process will be undertaken.
- Ideally, the construction work should be done in the dry season when plants are senescent and stream flows are at their lowest;



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- All conditions and requirements of the project Environmental Management Programme (EMP) (Appendix 7) must be adhered to; and
 - All recommendations noted in the Fauna and Flora Impact Assessment and Heritage Impact Assessment (Appendix 6) must be adopted and followed by the contractor, these include:
 - Maintain the integrity and drainage of the road proposed as to ensure no additional sediment or erosional effects impact on the Hartbeespoort Dam and maintain suitable buffers;
 - Ensure adequate stormwater management as to ascertain that potentially polluted water does not enter the natural environment surrounding the footprint area;
 - To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees;
 - Activities on site must comply with the regulations of the Animal Protection Act 1962 (Act No. 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act;
 - Appoint an ECO to oversee the activities and ensure that ecological aspects are kept in mind; Priority species, specifically nests if encountered, should be identified first and a management plan should be established for each of the priority species if these are encountered during any phase of the activity;
 - Continuous rehabilitation and clean-up of the area should be implemented during both the construction and operational phase;
 - Keep activities (transport etc.) to the smallest area possible. This is to prevent other unintended fragmentation that may have irreversible changes to fauna and flora communities. It also increases the invasion of alien/foreign species. No vehicles or personnel are permitted outside of these demarcated roads;
 - If areas adjacent to the road suffers impacts during construction, these should be rehabilitated immediately and completely where required;
 - A management plan for the control of invasive and exotic plant species needs to be implemented and since the Estate likely already has an AIP Programme, this should extend to the road;
 - It is vital that if any endemic, rare or vulnerable species occurs on the proposed site that these species should be protected and/or left undisturbed. Only as an exception can these species be relocated to favourable sites with the use of a specialist prior to vegetation and habitat removal. If at any point any red listed species is encountered, a specialist should be consulted as to determine the best way forward and a permit should be obtained if any intervention is required;
 - Staff/Contractors are prohibited from entering and disturbing the surrounding natural areas. Management systems should be set in place to prevent any form of additional disturbance from occurring;
 - All noisy equipment utilized to construct the road should be mitigated to lessen the sound levels as well as vibration levels should be controlled to limit impact on biodiversity and sensitive species;
 - Avoid night time movement or activities associated the construction of the road. If possible, keep construction activities during the day-time hours to avoid impacts on nocturnal animals and to prevent 24-hour human activity in a short, intensified space;
 - Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits; and
 - From a Cultural Heritage perspective: It is important to note 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..

Furthermore, in terms of Environmental Monitoring, the following is recommended:

- Monitoring of the ecological aspects should be done on a continual basis to assess whether there are any concerns regarding the flora. Monitoring of the biodiversity should start as soon as the construction phase of the development commences. Monitoring should be undertaken annually.

The monitoring of biodiversity should include the following:

- Annual visual assessment of surrounding areas to determine if vegetation in undisturbed areas is being impacted. The visual assessment can be undertaken by the ECO.
- Continue with alien invasive monitoring, eradication and control programme.
- Implement an Observe and Report approach which will enable employees to report any disturbance of fauna or degradation that they encounter during the operational phase.

It is proposed that the environmental authorisation be valid for a period of 5 years from the date of issuance to allow for any problems accounted during the construction and procurement of contractors.

11.1 Assumption, Uncertainties and Gaps in knowledge relating to the assessment and Mitigation measures

Fauna and flora assessment study (Appendix 6.1) (Red Kite Environmental Solutions, 2019) mentioned the following assumptions and limitations: Since the development is closely associated with the Hartbeespoort Dam, a large amount of water birds of various degrees of sensitivity may be associated with the water body. The water birds will not be affected significantly due to the road development and therefore a survey of the biota of the dam itself is not relevant or included within this survey.

The desktop study was conducted with up to date resources. It might however be possible that additional information become available in time, because environmental impact assessments deal with dynamic natural ecosystems. It is therefore important that the report be viewed and acted upon with these limitations in mind. Red Kite Environmental Solutions (Pty) Ltd cannot be held responsible for conclusions and pro-active mitigation measures that are made in good faith based on the available resources and information provided at the time of the study.

In order to obtain a comprehensive understanding of the dynamics of the ecology of the study area, surveys should ideally have been replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible and this fauna and flora survey was conducted in one season.

Species flowering only during specific times of the year could be confused with a very similar species of the same genus and some plant species that emerge and bloom during another time of the year or under very specific circumstances may have been missed entirely.

The results, typical herpetofauna, avifauna and mammalian communities found within the study should/can therefore only be used as a general guideline.

No scientific data was collected or analysed for the calculation of ecological veld condition. Any comments or observations made in this regard are based on observations, the expert knowledge and relevant professional experience of the specialist investigator.



Limitations should always be kept in mind and therefore management should focus on pro-active measures and the implementation of the precautionary principle.

The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

This EIA report was drafted using the available information as provided by the applicant and Prescali can not be held responsible for the applicant deviating from the scope as provided.

It is assumed that chemical blasting will be an effective measure in breaking up the larger boulders that will need to be removed during the construction phase of the road.

12 PERIOD OF AUTHORISATION

Environmental Authorisation is required for the construction of the road in 2020 or 2021, therefore the authorisation would need to be valid for a period of five years, within which time for construction would need to commence. This extended timeframe is requested to allow for any unforeseen problems accounted during procurement and construction.

Given the nature of this project, it is recommended that monthly ECO audits be carried out for the duration of the construction phase of this project. One post construction audit should be conducted once construction is complete.

Rehabilitation of the site must be undertaken by the appointed contractor and must be concluded once week prior to the contractor vacating the site. This will ensure that any outstanding items identified by the ECO and/or Engineer can be suitable addressed.

The EMPr details the post construction, rehabilitation, and closure objectives which will be monitored by the ECO and compliance authorities.

13 SUBMISSION AND CONSIDERATION OF DOCUMENTATION BY THE COMPETENT AUTHORITY.

All comments that will be received in response to the proposed development will be attached to, summarised and responded to in the Final BA Report. This report will be submitted to the Competent Authority, (i.e. READ) for consideration in terms of issuing Environmental Authorisation.



14 UNDERTAKING

The EAP, Prescali Environmental Consultants (Pty) Ltd, herewith confirms

- a) The correctness of the information provided in the reports;
- b) The inclusion of comments and inputs from stakeholders and I&APs;
- c) The inclusion of inputs and recommendations from the specialist reports where relevant; and
- d) The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signed at.....on this..... day

Signature of EAP _____

Designation Environmental Consultant

COMMITMENT/UNDERTAKING BY THE APPLICANT

I,, the undersigned and duly authorised thereto by the Estate d'Afrique undertake to adhere to the requirements and to the conditions as set out in the EMPr submitted to the Director: Environmental Quality Management and approved on

Signed at.....on this..... day

Signature of applicant _____

Designation _____

15 APPENDICES

Appendix 1: Qualifications of EAP

Appendix 2: C.V of EAP

Appendix 3: Locality Map

Appendix 4: Layout Map & Design Drawings

Appendix 5: Public Participation Report

Appendix 6: Specialist studies

Appendix 6.1: Ecological Assessment Report

Appendix 6.2: Phase 1 Heritage Impact Assessment Report

Appendix 7: EMPr



16 References

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