



FINAL EIA Report

12/1/9/2-GS27

Malogeng Demarcation:

Proposed Demarcation of sites at on a portion of the farm
Blauwbloemetjeskloof 428 KS in the Fetakgomo Local Municipality,
Greater Sekhukhune District, Limpopo Province

August 2013

Prepared for:

Mahlogonolo Consulting T/A Rian Beukes Town & Regional Planners on behalf of
**Department of Co-operative Governance, Human
Settlement and Traditional Affairs**
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Compiled by: H von Well



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August 2013

Conducted for:

Mahlogonolo Consulting T/A Rian Beukes Town & Regional Planners on behalf of
Department of Co-operative Governance, Human Settlement and Traditional Affairs

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1. GENERAL INFORMATION

AGES (Pty) Ltd was appointed by **Mahlogonolo Consulting, T/A Rian Beukes Town & Regional Planners on behalf of Limpopo Department of Co-operative Governance, Human Settlement and Traditional Affairs (COGHSTA)** to conduct an Environmental Impact Assessment in order to obtain the necessary environmental authorisation for the proposed demarcation of stands on a portion of the farm Blauwbloemetjeskloof 428 KS within the Fetakgomo Local Municipality, Greater Sekhukhune District of the Limpopo Province.

Application has been made in terms of the Environmental Legislation for the “physical alteration” (Regulation 545: Activity 15) of the property, but this construction will in fact only happen at a later stage. The application is only for the DEMARCATION or planning phase of this development.

The applicant (COGHSTA) will not be the responsible entity for the physical construction of this development – only the planning phase. The Fetakgomo Local Municipality will take responsibility for the construction phase as soon as they have the finances to do so.

The Fetakgomo Local Municipality will in all probability have to re-apply for environmental authorisation as the time span of this development will in all likelihood not be completed within the timeframe of the validity of the environmental authorisation.

The technical details supplied in the EIA report are the details available at the present time. Details will only be finalised by the Fetakgomo Local Municipality as funding becomes available.

Although the planning (Demarcation) is not a listed activity, COGHSTA received a letter from LEDET informing them that a full Environmental Impact Assessment was in fact required.

There are a few houses present on the site. Listed activities were not triggered by these developments.

The Fetakgomo Local Municipality is not yet in a position to commit as to WHEN this development will commence, but certainly not in the next 2 years. The planning stage of this proposed development is required now by COGHSTA as they wish to start the process, so that when funds become available, the groundwork for the demarcation has been completed.

1.1. Environmental Impact Assessment (EIA) Process

The environmental studies can be summarized in a two-phased approach:

- Phase 1: Environmental Scoping Study (ESS)
- Phase 2: Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr)

The scope of the entire EIA process is to provide an assessment of all impacts related to the proposed project in compliance with the EIA Regulations of 2010.

1.2. Scoping Phase

The Scoping Phase entails:

- a description of the proposed activity, the property and the receiving environment;
- the identification of potential significant positive and negative impacts;
- The identification of opportunities, restrictions, alternatives and mitigation measures which need to be further evaluated and investigated during the successive EIA phase. This assessment is particularly important in order to prevent environmental fatal flaws, and avoid sensitive or “no-go” areas.

The Scoping Phase includes the Public Participation Process (PPP). The PPP has the aim to identify concerns and issues by the interested and affected parties (I&AP’s).

In particular, in the case of the proposed development, issues and concerns raised by the I&AP’s and key stakeholders during the Public Participation Process were collected, processed and addressed in the Comments and Response document which formed part of the Scoping Report.

1.3. EIA Phase

The Draft Environmental Impact Assessment Report (Draft EIAR) was submitted to LEDET as made available to all I and A P’s.

In the Draft EIAR all relevant issues considered during the Scoping Phase were further investigated and assessed.

Appropriate mitigation measures were identified and recommended for all significant impacts. These measures are included in the Environmental Management Programme (EMPr) which is attached as an appendix of the Draft EIAR.

Comments from the stakeholders and I&AP’s on the Draft EIAR and the Draft EMPr are incorporated into the Final EIA Report.

The EIA phase includes consultation with relevant authorities at National, Provincial and Local levels.

The stakeholders and I&AP’s will furthermore be informed as to the final decision regarding the Environmental Authorization and the appeal process.

The next step of the EIA process is the compilation of this Final Environmental Impact Assessment Report (Final EIAR).

2. PROJECT OBJECTIVE

This Environmental Impact Assessment Report (EIAR) was done with the objective to supply the Limpopo Department of Economic Development, Environment and Tourism (LEDET) with the necessary environmental information to make a decision regarding the environmental impact assessment process

This Environmental Impact Assessment report was done to comply with the requirements of the environmental regulations promulgated on 18 June 2010. The following listed activities have been applied for under Regulation 544 and 545 of 18 June 2010 of the National Environmental Management Act:

These regulations were promulgated in terms of Chapter 5 of the National Environmental Management Act 107 of 1998.

The following listed activities have been applied for under Regulation 544 and 545 of 18 June 2010 of the National Environmental Management Act:

Regulation 545:

Activity 15: "Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more

This activity requires a scoping phase and EIA to be conducted and authorization from the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

3. LEGAL AND POLICY REQUIREMENTS

The following is a broad overview of the relevant policy and legal requirements, but not limited to, applicable to the proposed project.

Constitution of South Africa (Act 108 of 1996)

Section 24 of this Act recognises not only that everyone has a right to an environment that is not harmful to our health or well-being, but it also recognises the notion of sustainable development and its supporting principles.

National Environmental Management Act (Act no 107 of 1989)

This Act defines the concept of sustainability, to ensure that any social or economic development will take place in such a way as to preserve the Environment for present and future generations. This Act also takes into account the pollution principles.

National Water Act (Act no 36 of 1998)

Section 19 of the National Water Act, Act 36 of 1998 requires that all reasonable measures be taken to prevent any water pollution from occurring, continuing or recurring. The Act further describes a number of water uses and requires that a water use License have to be obtained for the specified water uses.

National Biodiversity Act (Act 10 of 2004)

The National Environmental Management Biodiversity Act (Act No. 10 of 2004), aims to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith.

National Heritage Resources Act (Act 25 of 1999)

The Act makes provision for the undertaking of heritage resources impact assessments for various categories of development as determined by Section 38. It also provides for the grading of heritage resources and the implementation of a three-tier level of responsibilities & functions for heritage resources to be undertaken by the State, Provincial authorities and Local authorities, depending on the grade of the Heritage resources. The Act defines cultural significance, archaeological and paleontological sites & material (Section 35), historical sites and structures (Section 34), graves and burial sites (Section 36) that falls under its jurisdiction. Archaeological sites and material are generally those resources older than a hundred years, while Section 34 also protects structures and cultural landscapes older than 60 years, including gravestones. Procedures for managing grave & burial grounds are clearly set out in Section 36 of the NHRA. Graves older than 100 years old are legislated as archaeological sites & must be dealt with accordingly.

Section 38 of the NHRA makes provision for developers to apply for a permit before any heritage resource may be damaged or destroyed.

National Veld and Forest Fires Act, 1998 (Act 101 of 1998)

This act provides for the control of veld fires. The regulations in terms of this act set certain conditions for the owner of a property for emergency preparedness for the control of veld fires. It also describes the compulsory making of firebreaks to control veld fires that originates on the owner's property as well as on adjacent properties.

Conservation of Agricultural Resources Act (Act 43 of 1983)

This act provide for the control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.

Limpopo Environmental Management Act (Act 7 of 2003)

This act provides for the management and protection of the environment including flora and fauna in Limpopo Province.

National Environmental Management: Waste Act (Act 59 of 2008)

This act has at its core the objective to regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

This act also provides national norms and standards for regulation and management of waste by all spheres of government and specific waste management measures. It also provides for the licensing and control of waste management activities and also a national waste information system, compliance and enforcement.

Some listed activities under the EIA regulations of 2006 have been repealed and have been included in this act. These include activities entailing any waste activities including sewage systems.

Subdivision of Agricultural Land Act (Act 70 of 1970)

This act provides for the control over the subdivision of agricultural land for uses other than agriculture.

Minerals and Petroleum Resources Development Act (Act 28 of 2002)

This act provides for the regulation and management of minerals and also the petroleum industry in the RSA and the Department of Minerals and Energy is the Lead Agent for applying this legislation.

4. DESCRIPTION OF PROPERTY

The farm Blauwbloemetjeskloof 428 KS is within the Fetakgomo Local Municipality in the Greater Sekhukhune District Municipality in the Limpopo Province.

The project area, approximately 53.40 Ha in size, is defined as a triangular parcel of land.

The proposed new demarcation will be an extension of the nearby Malogeng Village.

4.1. Project Locality

The proposed demarcation is located North-east of the existing village of Malogeng and adjacent and to the East of District Road D4190. The nearest Provincial Road is the R37 (Polokwane / Burgersfort Road) which runs approximately 5km north of the proposed property.

The proposed site lies approximately 2km west of the Olifants River.

The centre of the study area is located roughly at the following coordinates:

Latitude: 24° 19' 22.26" S

Longitude: 29° 46' 45.00" E

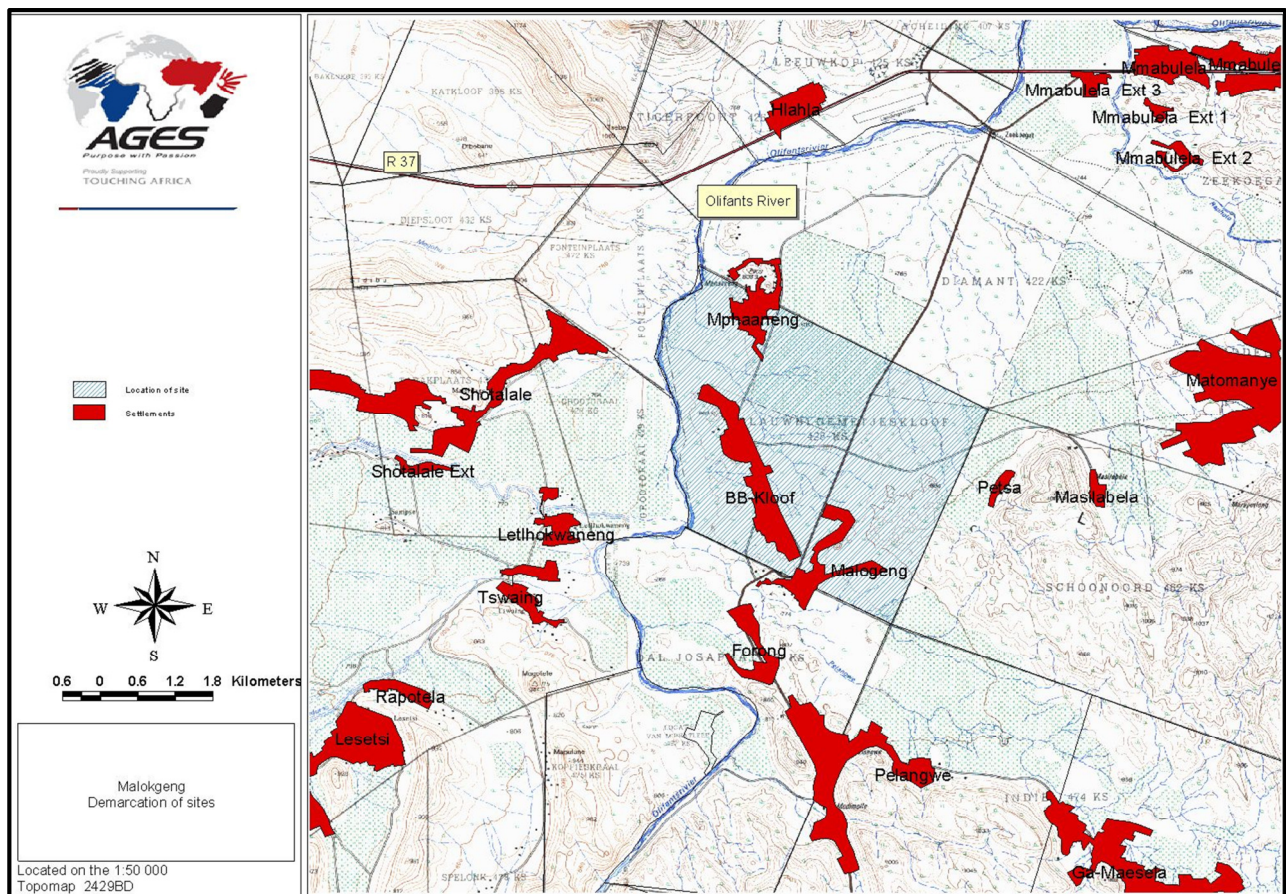


Figure 1: Broad locality map of Blauwbloemetjeskloof

(See larger locality map as attached in Appendix 1)

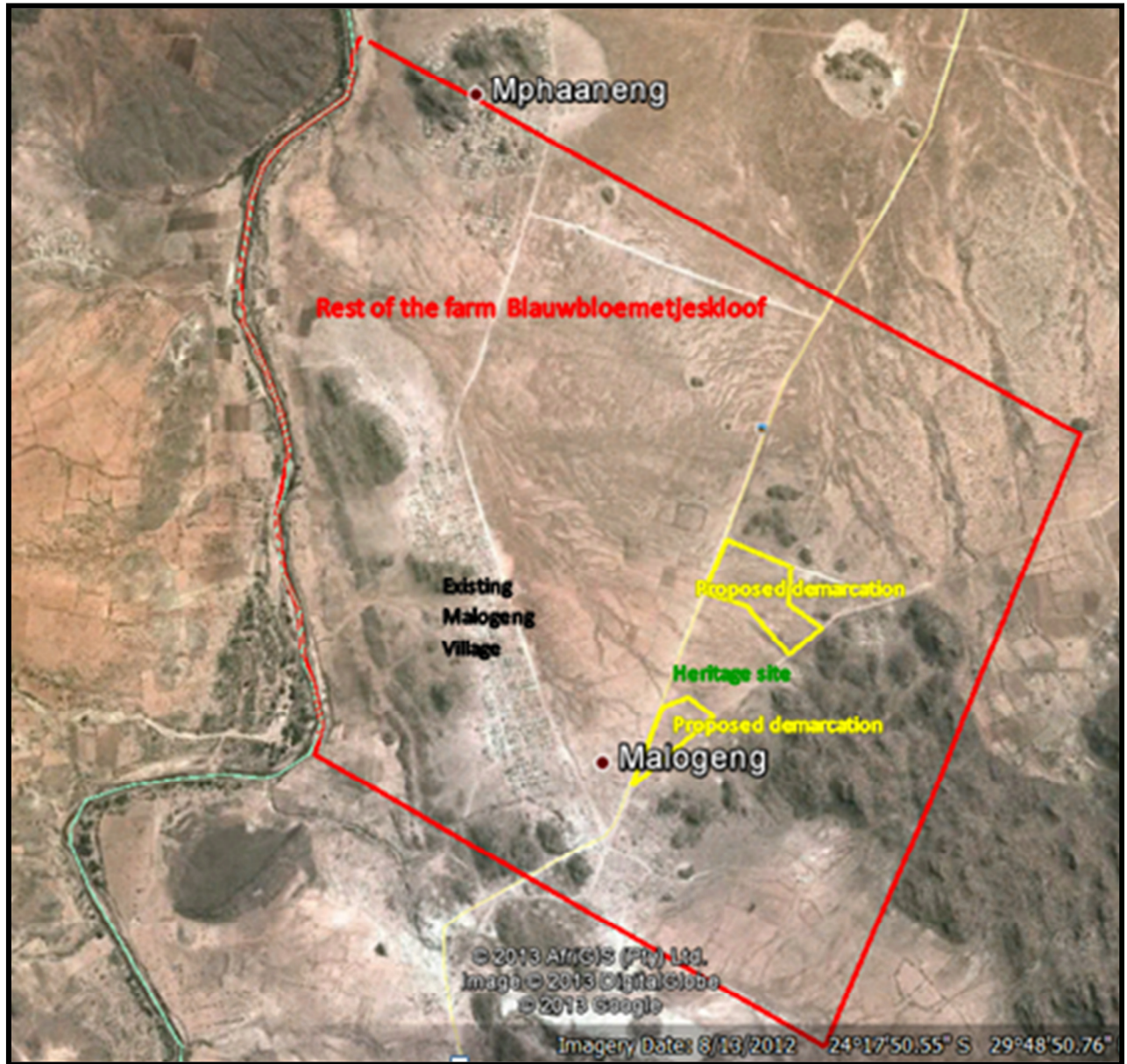


Figure 2: Google image of the proposed site and surrounding village of Malogeng.

5. DESCRIPTION OF ACTIVITY

5.1. Nature of activities

The activity entails the proposed demarcation of approximately 303 stands for a proposed township in the Malogeng area with various land uses including the following:

- 295 Residential sites
- 1 Business site
- 1 Educational site
- 1 site to be zoned as special to be fenced off as a heritage site
- 1 site for municipal use
- 1 church site
- 1 Public Open space site (park)

The total area will be approximately 53.40 Ha. A preliminary layout plan is included in Appendix 2.

6. DESCRIPTION OF THE AFFECTED ENVIRONMENT

6.1. Land Use

- The proposed site for the development is located in an area that is still zoned as agricultural.

Application has been made to change the land-use by the Town and Regional Planner. Proof has been provided in the Public Participation appendices that Department of Agriculture, Forestry and Fisheries acknowledge the application.

- Except for low intensity grazing by cattle, no other agricultural activities take place on the proposed site. The immediate northern, and eastern sides are open areas that are mainly used for grazing.
- There are a few existing houses on the proposed site, that is to be included in the proposed demarcation. No EIA activities were triggered in the construction of these units.
- The existing Malogeng Village is West of the proposed development.



Figure 3: View of the project area

6.2. Geology and soil

According to the Initial Geotechnical Phase 1 Report, and the Geological Map of South Africa, 2428 NYLSTROOM, 1985, Scale 1:250 000;

- the site is underlain by Gabbro, Norite & Anorthosite of the Rustenburg Layered Suite of Bushveld Complex
- The plains within this land type are deemed to be covered predominantly by red-yellow apedal soils, with highly localized pockets of red-coloured, weakly structured clayey soils, and highly localized pockets of moderately structured clayey soils.
- The mountainous area is dominated by shallow, poorly developed soils and the substrate is often completely dominated by bedrock.
- The site is not underlain by dolomitic rock and as far as could be determined no mining activities occur close to the study area.
- The sandy material is permeable and this may lead to contamination of groundwater.
- It is recommended that foundation levels be > 500mm below natural ground level and if not founded on weathered rock, foundation designs should allow for 10mm settlement movement
- There is a perched groundwater table in high precipitation years. Groundwater could be encountered in wet seasons and ground water seepage to be prevented due to permeability of natural soil,

- Excavations could be classified as soft, so deep excavations should be shored to prevent collapsing of trench sides,
- Possible collapsing of excavation side walls of deep excavations could occur,
- According to the Initial Geo-technical assessment, the study area can be regarded as being favourable for the proposed development.
- Geotechnical conditions must be verified by a detailed geotechnical investigation of the area and foundations must be designed by competent Engineer
- The Initial Geo-technical assessment is attached as Appendix 5.

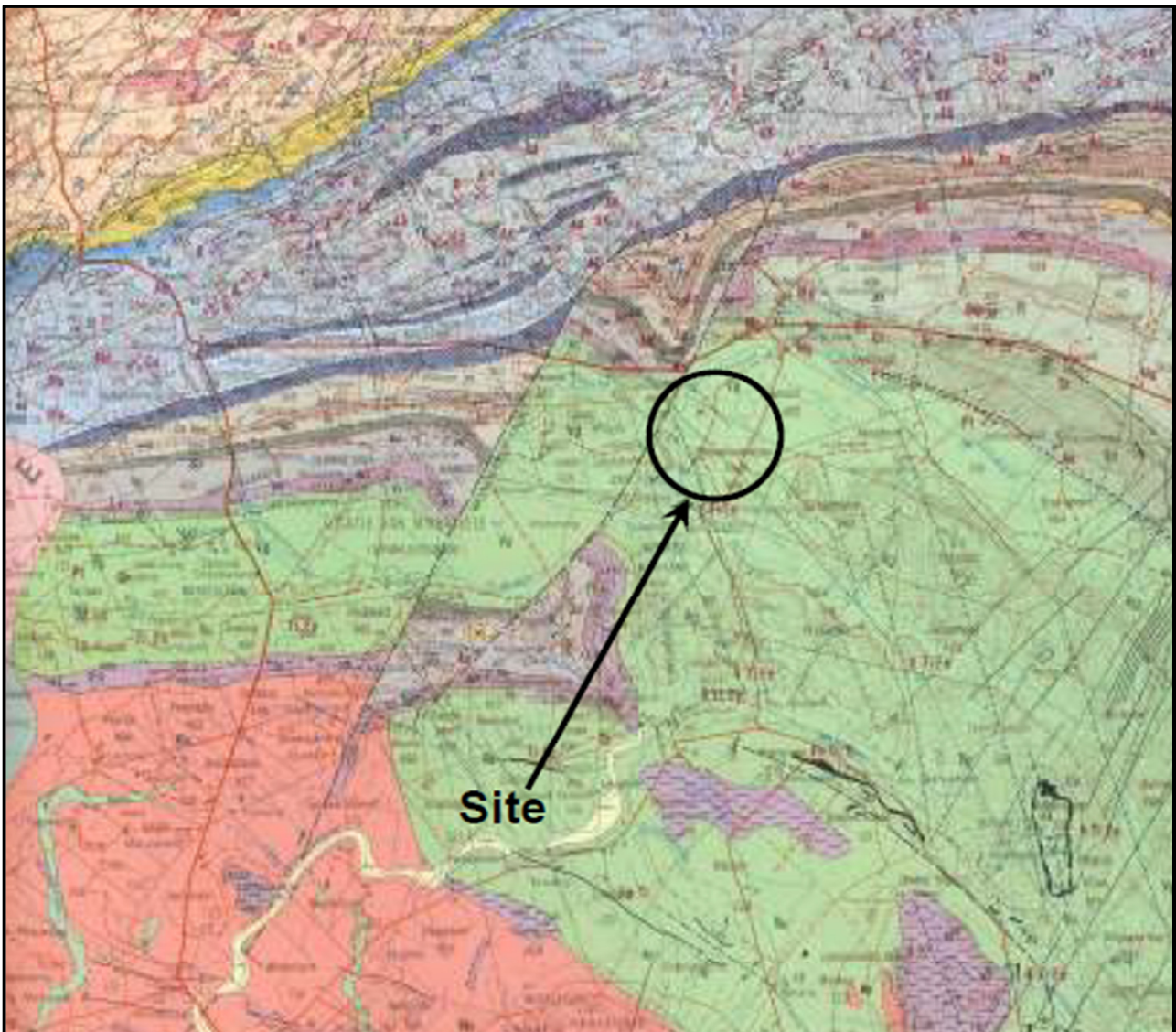


Figure 4: Geological information

6.3. Ground water

According to the Geo-technical study, it is expected that seasonal perched water may prove problematic when building foundations. This may only be a periodical problem on a seasonal basis.

No ground water was encountered.

6.4. Climate and Topography

The proposed development is located in the summer rainfall region of South Africa.

The mean annual precipitation of the study area is approximately 332 mm according to the Excelsior weather station.

The rainy season extends over the summer months from October through to April, with the highest rainfall occurring during December and January

Precipitation is usually associated with thunderstorms. These sudden downpours pose some risk of flooding in low-lying areas

Maximum temperatures for the area can reach 37.3°C in January. Minimum temperature can fall to -2°C in June. The mean daily temperatures averaging from 14 to 30 °C

The topography can be characterized as moderately flat. The average slope is 2.5 % east towards the Olifants River.

The demarcation area could be classified as a Class 2 slope, which is 2° > 4°. According to the Initial Geotechnical assessment, the area is suitable for development and construction.

6.5. Vegetation features

The Ecological Report carried out reflects the following:

The vegetation type for the area according to Mucina & Rutherford (2006) is Sekhukhune Plains Bushveld with elements of Sekhukhune Mountain Bushveld in the mountainous areas. About 25% has been transformed to subsistence cultivation and villages.

There is a high level of degradation by unsustainable utilisation. Portions of the project area have also been transformed to cultivated lands and residential areas in the past.

The project area reflects the following 4 vegetation / ecological units namely;

- Old croplands and degraded area
- Mountain bushveld outcrop
- *Commiphora marlothii* – *Commiphora glandulosa* – *Acacia mellifera* plains bushveld
- Riverine areas, riparian woodland and flood plains

FLORA

Red data Flora Species

According to the SANBI database, there are 5 red data species potentially occurring in the study area, but no red data species were found during the survey.

The rocky habitats represent the most suitable habitat for most of the red data species potentially occurring in the entire study area which will not form part of the proposed demarcation.

Protected tree species

Boschia albitrunca (Shepherds tree) *Combretum imberbe* (Leadwood) are the only protected tree species that were found to occur within the study area

The Shepherds trees should be protected from an ecological point of view.

The Leadwood tree was not found in the proposed development footprint area, and is therefore not threatened by the development.

FAUNA

- The protection of the drainage lines is important to prevent erosion.
- The larger trees should be protected as far as possible and be incorporated into the development.
- Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches.
- No animals may be poached. Many animals are protected by law and poaching or other interference could result in a fine or jail term.
- Do not feed any wild animals on site.
- Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- Waste bins and foodstuffs should be made animal proof.

Potential Impacts

DIRECT HABITAT DESTRUCTION

The township establishment will result in loss of and damage to the modified habitats. The impact of the habitat destruction will be on the flora and fauna of the study area:

- **Destruction or loss of floral diversity or vegetation communities**
 - The physical removal of the vegetation;
 - Construction activities can impact on surrounding vegetation by dust and altered surface run-off patterns; and
 - Disturbance of the area could lead to an increase in the growth of alien vegetation.
- **Loss of faunal diversity and decline in animal numbers**
 - Installation of services by heavy vehicles and back-actors could cause fauna mortalities;

- Habitat loss and construction activities will force animals out of the area and animal numbers will decrease. This impact could also take place because of hunting and snaring of animals.

Mitigation measures:

- Damage to large indigenous trees/shrubs should be kept to a minimum. Brushwood can be used by the local community.
- Erosion must be prevented by the correct construction of roads that provide for storm water flow.
- Peripheral impacts around the township on the surrounding vegetation of the area should be avoided and a monitoring programme should be implemented to ensure the impacts

HABITAT FRAGMENTATION

Natural movement patterns will be disrupted and could result in the fragmentation of natural populations.

Mitigation measures:

- Use existing facilities where possible
- Drainage lines must be protected
- Ensure as little disturbance as possible to the hill and natural area during construction.

INCREASED SOIL EROSION AND SEDIMENTATION

According to the geo-technical report, the soils exhibit a high erosion risk. The excavation foundation trenches and most service trenches, is expected to be possible by hand or light mechanical excavator (soft to intermediate excavation). A plan should be implemented to prevent soil erosion.

Mitigation measures:

- Ensure minimal bare soil exposure
- Repair all erosion damage as soon as possible.
- Do not allow surface water or storm water to be concentrated, or to flow down without erosion protection measures being in place.
- Ensure that storm water channels do not discharge straight down the contours.

SOIL AND WATER POLLUTION

There is a risk of soil and water pollution, resulting in probable medium/long-term impacts. During the constructional phase heavy machinery and vehicles as well as sewage and domestic waste from workers would be the main contributors to potential pollution problems.

SPREAD AND ESTABLISHMENT OF ALIEN INVASIVE SPECIES

Opuntia ficus-indica, an alien species has been observed on site.

Habitat disturbance provides an opportunity for alien species to spread.

Mitigation measures:

- Weeds and invader plants must be controlled.
- Rehabilitate disturbed areas as quickly as possible.
- Institute a monitoring programme.
- Institute an eradication/control programme for early intervention.

NEGATIVE EFFECT OF HUMAN ACTIVITIES

An increase in human activity is anticipated.

The risk of snaring, killing and hunting of certain faunal species is increased.

For construction sites, pollution could increase because of litter and inadequate sanitation and the introduction of invasive fauna and flora are increased.

The increase in the number of people will result in increased risk of uncontrolled fires arising from cooking fires, improperly disposed cigarettes etc.

Mitigation measures:

- Maintain proper firebreaks around entire development footprint.
- Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance should occur outside these areas.
- Construction activities should be restricted to working hours.
- Workers should be educated on the importance of conservation issues.
- Camp fires at construction sites must be strictly controlled to ensure that no veld fires are caused.

IMPACT OF TOWNSHIP ON DRAINAGE REGIME OF AREA

Appropriate measures must be taken to manage storm water run-off and potential flooding.

The drainage lines and must be protected.

CONCLUSION

All aspects of the environment, especially living organisms, are vulnerable to disturbance of their habitat.

The development activities will completely modify the ecology of the site where the residential demarcation is proposed.

The proposed site for the development varies from being in a degraded to fairly natural state.

All of the sensitive habitats must be preserved.

Provided that the proposed layout plan for the demarcation is consistent with the sensitivity map and the impact on the sensitive habitats on site are kept to a minimum, the planned development can be supported.

The Ecological Assessment is included in Appendix 4.



Figure 5: Vegetation on the project site

6.6. Visual environment and noise

Visual environment will be in line with the developments in the surrounding area.

All structures and lights will cause a visual impact.

The development will be an extension of the current town of Malogeng.

During the construction and operational phases of the proposed development, noise and dust will be a factor. These impacts and mitigation measures are addressed in this report as well as in the EMPr.

6.7. Surface drainage

The study area is located within the quaternary drainage region B52G and falls into the Olifants River catchment management area.

The area is drained entirely by means of surface flow to the small streams that channels the water to the Olifants River and which later drains to the more significant Limpopo River.

The Olifants River is located approximately 2 km west from the proposed site.

No development will take place on the two eroded drainage channels occurring on the proposed site. The drainage channels will be included in the fenced-off heritage area.

The proposed demarcation will be outside the 1:100 year flood line for the channels and the channels will also not be crossed by roads.

Adequate storm water drainage system and culverts will be designed to control the volume, speed, and location of runoff to avoid soil erosion and damage to structures.

The mean annual runoff is 10 – 20 mm over the total area.

The mean annual evaporation is 1800mm – 2000mm according to the Surface Water Resources of SA 1990.

6.8. Air quality

During the construction and especially when clearing the site, dust particles will be dispersed into the atmosphere which will have an impact to the air quality in the area, similar to other activities in the area.

These impacts and mitigation measures are addressed in the impact table hereunder as well as in the EMPr included in Appendix 8.

6.9. Archaeological and historical attributes

A Phase 1 Archaeological Impact Assessment has been conducted to evaluate the archaeological sensitivity of the study area.

Various archaeological remains were discovered during the assessment:

- Site 1. Historical period hut foundation remains: S24° 18' 56.9" E29° 46' 55.2"
According to the heritage specialists, this historic period site has a low significance although there is a concern that there might be undetected graves in which case the heritage officials should be contacted.



Figure 6: View of historical foundation

• IRON AGE REMAINS

A large Doornkop site was recorded. The significance is medium to high. The *Doornkop facies* belong to the Kalunda Tradition and is part of the Happy Rest Sub-branch. It dates back to between AD 750 to AD 1000.

- The site has significance due to the size of the area and the fact that four hut-floors were recorded. It is not that common to find floors and other features on sites dating to this period in the archaeological past. The site also had a high concentration of ceramic pieces.

- Hut-floors 1: S24° 19' 12.5" E29° 46' 57.6"
2: S24° 19' 12.9" E29° 46' 57.5"
3: S24° 19' 17.4" E29° 46' 55.9"
4: S24° 19' 13.3" E29° 46' 54.9"
- The implications are that the proposed layout plan had to be drastically adapted and moved away from the site.
- The heritage site will be fenced off.
- The Heritage Impact Assessment report is attached as Appendix 6.



Figure 7: Hut floor 4



Figure 8: Hut floor 1



Figure 9: Lower grinding stone



Figure 10: General view

7. PUBLIC PARTICIPATION PROCESS

7.1. PROCESS FOLLOWED

7.1.1. Newspaper Advertisement

The proposed project was advertised in the local newspaper namely the “Steelburger” on the 8th of March 2013 to inform people about the project and request them to identify environmental issues of concern. It also contained an invitation to respond to environmental issues and concerns of the proposed development.

An example of this advert is attached in Appendix 3.

7.1.2. Site Notice

Site advertisements in English and Sepedi (Northern Sotho) were put up at various points around the site.

A site notice was also put up at the local store in the Malogeng Village.

An example of this notice as well as photos of the notices is attached in Appendix 3.

7.1.3. Background Information Notices.

All the directly adjoining property owners were identified by community representatives and a deeds search.

Background information documents were delivered by hand, registered mail, fax or e-mails.

An example of the background information document is included in Appendix 3.

The manner in which Background Information Documents (BID's) were distributed as well as proof thereof is also attached in Appendix 3.

Background Information Documents were also sent to:

- Department of Water Affairs
- Department of Rural Development and Land Reform - State owned land
- Department of Rural Development and Land Reform - Land Claims Commission
- The Ward Councillor – Ward 9 - Fetakgomo Local Municipality
- The Municipal Manager - Fetakgomo Local Municipality
- Town and Regional Planner - Fetakgomo Local Municipality
- Greater Sekhukhune District Municipality

- National Department of Agriculture
- Limpopo Department of Economic Development, Environment and Tourism (LEDET)
- Department of Mineral Resources

7.2. Public Meeting

No public meeting was held specifically regarding the environmental impact assessment process, but various meetings were held with the community regarding the town planning and demarcation processes.

AGES attended a community meeting to inform the Malogeng communities about the Environmental process, **but no significant environmental issues** apart from the usual environmental impacts were identified as being a problem to prevent development from taking place.

7.3. Draft Scoping Report and Plan of Study for EIA

- The draft scoping report and plan of study for EIA was submitted LEDET on 22 April 2013 and acknowledged on 29 April 2013.
- Comments were received by LEDET on 10 June 2013.
- The draft scoping report and PoS for EIA was made available for comments to all registered I&AP's.
- No written comments were received.
- Verbal comments from members of the community were in favour of the proposed development.
- The environmental impact assessment process is based on the actions and findings of the scoping phase as well as the comments and reviews by authorities and from interested and affected parties.
- All documentation lists and proof of Public Participation is included in Appendix 3 of this report.

7.4. Final Scoping Report and Plan of Study for EIA

- The Final scoping report was submitted to LEDET on 4 June 2013, acknowledged and accepted on 13 June 2013.
- This Final scoping report and plan of study for EIA will be made available for comments to all registered I&AP's.
- No written comments were received.
- All comments and responses to comments were included in the Draft EIA report.

- All documentation lists and proof of the Public Participation process is included in Appendix 3 of this report.
- The environmental impact assessment process is based on the actions and findings of the scoping phase as well as the comments and reviews by authorities and from interested and affected parties.

All documentation lists and proof of the Public Participation process are included in Appendix 3 of this report.

7.5. Draft Environmental Impact Report

- The Draft Environmental Impact report (EIAR) was submitted to LEDET on 5 July 2013 and acknowledged on 22 July 2013.
- The Draft Environmental Impact report (EIAR) was made available for comments to all registered I&AP's.
- No written comments were received.
- All documentation and proof of the Public Participation process is included in Appendix 3 of this report.

7.6. Final Environmental Impact Report

- This Final Environmental Impact report (EIAR) will be submitted to LEDET.
- The Final Environmental Impact report (EIAR) will be made available for comments to all registered I&AP's.
- All comments and responses will be sent directly to LEDET.

8. NEED AND DESIRABILITY

- The existing community of Malogeng Bantwana (Baroka Ba Nkwane Tribe) identified the need to expand their existing village. There is a large need for especially residential stands in the existing Malogeng Village which is developing at a fast rate. The need for housing is especially evident in the low-income groups.
- The farm is registered in the name of the National Government of the Republic of South Africa as set out in Certificate T63121/2009 in terms of item 28 (1) of schedule 6 to the Constitution of the Republic of South Africa, 1996. Blauwbloemetjeskloof 428 KS been allocated to the Malogeng Community by the Department of rural Development and Land Reform.
- During the initialization meeting, the traditional leaders and members of the community identified and indicated where on the demarcation should take place. A triangular shaped portion of land, approximately 63 Ha in extent, was indicated IN TOTAL that is available for demarcation. The specific demarcation area will be taken out of this portion of land available, depending on the alternatives and environmental issues encountered in the Scoping phase. The final proposed layout plan is included in the report.
- The community of Malogeng approached the Fetakgomo Local Municipality to expand the current village at Malogeng. The Local Municipality in turn approached the Limpopo Department of COGHSTA.
- Access to the proposed demarcation area is via the D4190 off the R37. No new access roads are necessary as access already exists. There are gravel roads on all 4 sides of the proposed demarcation site.

The development's location is therefore desirable due to its location in terms of:

- The existing gravel roads leading to the Malogeng Village, which will provide access to the proposed demarcation area.
- The Existing R37 tar road linking Lebowakgomo and Burgersfort.
- There will be new crèche facilities, a church site, a municipal site as well as business opportunities, for the residents in the surrounding Malogeng area.
- The residential component will provide a variety of ownership alternatives, which will expand market options and attract wider market appeal making the development more desirable.
- Furthermore, the development will eventually be integrated with the environment, have proper service provision, will be well planned.
- It will create job opportunities (permanent and temporary), ensure social upliftment of the area, create investment opportunities and create a sustainable development environment.
- The proposed development will not have a significant detrimental impact on the surrounding areas and is not in conflict with the adjacent land uses.

9. ADVANTAGES AND DISADVANTAGES OF ALTERNATIVES

In the EIA process, the consideration of alternatives is always important, should the proposed site not fit into the parameters of the EIA framework. The alternatives can be categorised as follows.

- Location alternatives
- Process alternatives
- No-Go alternative

9.1. Location alternative

9.1.1. Advantages

- By conducting **an ecological assessment**, prior to development, the best location will be selected for the different elements of the proposed development.
- The ecological assessment and sensitivity study determined the proposed layout plan according to the sensitivity of the area.

See ecological report in Appendix 4

- By carrying out a **geo-technical study** prior to development, the positioning of certain parts of the development can be based on the ideal or most suitable soil conditions.

An initial geo-technical study was done determine the positioning of certain parts of the development based on the soil conditions.

The initial geo-technical report concluded that although the site was suitable for the development options proposed, a detailed geotechnical investigation must be done before any construction may commence.

See Initial geo-technical report in Appendix 5

- By carrying out a **heritage assessment** prior to development, the re-positioning of certain parts of the development can be based on the occurrence of heritage aspects. Areas can also be avoided if necessary due to the presence of heritage characteristics.

The results of the Heritage assessment indicated that the layout plan had to be adapted to fit in with the discovery of important heritage components.

Alternatives were investigated prior to the submission of the Draft EIAR.

See Phase 1 Heritage report Appendix 6

- The specific area earmarked for development has been chosen as the farm is registered in the

name of The National Government of the Republic of South Africa as set out in Certificate T63121/2009 in terms of item 28 (1) of schedule 6 to the Constitution of Republic of South Africa, 1996.

- The specific location has been chosen because it is adjacent to the existing Malogeng village.
- There is a large need for residential and other new developments in the area which is developing at a fast rate. The Malogeng community identified the need for expansion.
- This site is currently zoned as Agricultural but except for cattle grazing, other agricultural activities do not take place on the proposed site.
- **There is no other property location alternative – the layout plan can only be moved around on the farm Blauwbloemetjeskloof.**
- The socio-economic status of the area will be vastly improved due to the availability of jobs, new housing and properties.

9.1.2. Disadvantages

- The character of the landscape will change.
- Possible loss of heritage components.
- There will be a visual impact.
- Biodiversity and the environment will be affected.
- Possible air, water, soil and noise pollution.

All negative and positive impacts have been evaluated and are detailed on in this report.

9.2. Process Alternative

9.2.1. Advantages

- Process alternatives have been assessed to ensure that the best option for services like water supply and sanitation to minimise pollution are selected.
- There are 3 alternative possibilities regarding the sewage system alternatives. The Municipality has not yet decided on an alternative, as this would come into play as soon as a budget has been approved.
 - Enviro-loo has been selected as the best option and suggestion by AGES regarding the sewage system to be used as it is a waterless process with no pollution to groundwater.
 - Should the Municipality decide to use VIP toilets as suggested by the services report, the conditions would be that they would consist of an 8 to 12m³ pit constructed with brick and

mortar and plastered inside. The inside would have to be sealed with a waterproof paint to prevent any leakages. These toilets will be emptied by the Local Municipality once every 5 years with an application of EM (Effective Micro – organisms).

- The other option would be a 4 Chamber septic tank with 28 day retention period with an application of EM (Effective Micro – organisms).
- The best alternatives regarding all processes and services were considered.

9.2.2. Disadvantages

- Incorrect process followed will result in an undue negative impact to the environment.
- All negative and positive impacts will be evaluated and reported on in the EIAR.

9.3. No go alternative

This option would come into effect if the abovementioned assessments reveal fatal flaws in the process. To date no fatal flaws have been revealed.

The no-go alternative of not developing the proposed stands and township would leave the environment in the current state.

10. ENVIRONMENTAL IMPACT DETERMINATION AND EVALUATION

An environmental impact is defined as a change in the environment, be it the physical/chemical, biological, cultural and or socio-economic environment. Any impact can be related to certain aspects of human activities in this environment and this impact can be either positive or negative. It could also affect the environment directly or indirectly and the effect of it can be cumulative.

10.1. Methodology to assess the impacts

To assess the impacts on the environment, the process has been divided into two main phases namely the Construction phase and the Operational phase. The activities, products and services present in these two phases have been studied to identify and predict all possible impacts.

In any process of identifying and recognising impacts, one must recognise that the determination of impact significance is inherently an anthropocentric concept. Duinker and Beanlands, (1986) in DEAT 2002, Thompson (1988), (1990) in DEAT 2002 stated that the significance of an impact is an expression of the cost or value of an impact to society.

However, the tendency is always towards a system of quantifying the significance of the impacts so that it is a true representation of the existing situation on site. This has been done by using wherever possible, legal and scientific standards which are applicable.

The significance of the aspects/impacts of the process have been rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The *consequence matrix* use parameters like *severity*, *duration* and *extent* of impact as well as *compliance* to standards. Values of 1-5 are assigned to the parameters that are added and averaged to determine the overall consequence. The same process is followed with the *likelihood* that consists of two parameters namely *frequency* and *probability*. The overall consequence and the overall likelihood are then multiplied to give values ranging from 1 to 25. These values as shown in the following table are then used to rank the significance. It must be said however that in the end, a subjective judging of an impact can still be done, but the reasons for doing so must be qualified.

Table 1: Significance ratings (Plomp 2004)

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

Description of the parameters used in the matrixes

SEVERITY:

Low:

Low cost/high potential to mitigate. Impacts easily reversible, non - harmful insignificant change/deterioration or disturbance to natural environments

Low-medium:

Low cost to mitigate Small/ potentially harmful Moderate change/deterioration or disturbance to natural environment.

Medium:

Substantial cost to mitigate. Potential to mitigate and potential to reverse impact. Harmful Significant change/ deterioration or disturbance to natural environment

Medium-high:

High cost to mitigate. Possible to mitigate Great/Very Harmful Very significant change/deterioration or disturbance to natural environment

High:

Prohibitive cost to mitigate. Little or no mechanism to mitigate. Irreversible. Extremely Harmful Disastrous change/deterioration or disturbance to natural environment

DURATION:

Low	Up to one month
Low-medium	One month to three months
Medium	Three months to one year
Medium-high	One to ten years
High	Beyond ten years

EXTENT:

Low	Project area
Low-medium	Surrounding area
Medium	Within Fetakgomo Local Municipality area of jurisdiction
Medium-high	Within Greater Sekhukhune District Municipality area
High	Regional, National and International

FREQUENCY:

Low	Once/more a year or once/more during operation
Low-medium	Once/more in 6 months
Medium	Once/more a month
Medium-high	Once/more a week
High	Daily

PROBABILITY:

Low	Almost never/almost impossible
Low-medium	Very seldom/highly unlikely
Medium	Infrequent/unlikely/seldom
Medium-high	Often/Regularly/Likely/Possible
High	Daily/Highly likely/definitely

COMPLIANCE:

The following criteria are used during the rating of possible impacts.

Low	Best Practise
Low-medium	Compliance
Medium	Non-compliance/conformance to Policies etc. - Internal
Medium-high	Non-compliance/conformance to Legislation etc. - External
High	Directive, prosecution of closure or potential for non-renewal of licences or rights

11. CIVIL SERVICES

11.1. Water Supply



Figure 5: Nearby water supply

The Fetakgomo Local Municipality is responsible to provide this service to the proposed development.

Provision will be made for the construction of these services according to “the Guidelines for Human Settlement Planning and Design (Red Book) and criteria of the Water and Sanitation Department of the Fetakgomo Local Municipality.

The DWAF data basis indicates 7 boreholes in the vicinity of the site of which 3 have a recommendable yield.

H02-3434 – 0.50l/s for 24hrs pumping – class 4

H02-2823 – 0.35l/s for 24hrs pumping – class 3

H02-1322 – 0.50l/s for 2 hrs pumping – class 3.

Details are contained in the Services Report attached in Appendix 7.

The estimated domestic water demand or requirement is calculated as follows:

- Number of erven 300
- Average number of persons per erf 4,5

According to the services report, the required demand for 300 stands @ 300l/stand./day: would be 90kl/day.

Total demand including summer peak and losses = 121.5kl/day.

11.2. Sewer Reticulation

The Fetakgomo Local Municipality will eventually be responsible to provide these services to the proposed development according to the signed services agreement and the engineering services report.

Provision will be made for the construction of these services according to “the Guidelines for Human Settlement Planning and Design (Red Book) and criteria of the Water and Sanitation Department of the Fetakgomo Local Municipality.

There are 3 alternative possibilities regarding the sewage system alternatives. The Municipality has not yet decided on an alternative, as this would come into play as soon as a budget has been approved.

Enviro-loo has been selected as the best option and suggestion by AGES regarding the sewage structure as it is a waterless, on-site, dry sanitation toilet system which functions without water or chemicals.

The Enviro-Loo is designed for the benefit of all communities, and can be installed almost anywhere. It is an effective-solution to the numerous sanitation challenges facing the World. It has been proven that when used correctly, there is no pollution to groundwater.

Should the Municipality decide to use VIP toilets as suggested by the services report, the conditions would be that they would consist of an 8 to 12m³ pit constructed with brick and mortar and plastered inside. The inside would have to be sealed with a waterproof paint to prevent any leakages. These toilets will be emptied by the Local Municipality once every 5 years with an application of EM (Effective Micro – organisms).

The other option suggested in the Services report would be a 4 Chamber septic tank with 28 day retention period with an application of EM (Effective Micro – organisms).

11.3. Roads

The Fetakgomo Local Municipality will eventually be responsible to provide these services to the proposed development according to the signed services agreement and the engineering services report.

Provision will be made for the construction of these services according to “the Guidelines for Human Settlement Planning and Design (Red Book) and criteria and standards for the design of streets by the relevant Department of the Fetakgomo Local Municipality.

Main access will be from road R37 connecting Lebowakgomo and Burfersfort, turning south on road D4190. Road R81. The existing roads consist of a two lane surfaced road with 1 lane in each direction and road D4190 is an 8m gravel road in fair condition.

The existing traffic flow is very low and does not require a traffic impact study. For specifications see the attached Services Report in Appendix 7.

11.4. Storm Water Drainage

The Fetakgomo Local Municipality will eventually be responsible to provide these services to the proposed development according to the signed services agreement and the engineering services report.

Provision will be made for the construction of these services according to “the Guidelines for Human Settlement Planning and Design (Red Book) and criteria of the Fetakgomo Local Municipality.

According to the Services report, the storm water will be channelled on the roads and paving areas with outlets on the low points. The natural ground slopes approximately 2.3% towards the western side, which allow for easy gravity overland drainage.

Hydrological data will be used in the design of the storm water drainage system in case of the storm water pipe network.

Adequate storm water drainage system and culverts will be designed to control the volume, speed, and location of runoff to avoid soil erosion and damage to structures. The services report addresses these issues and is attached in Appendix 7.

No development will take place near the drainage lines. A buffer zone has been included to keep the development away from potential flooding.



Figure 6: Drainage channels and storm water pipes

11.5. Solid Waste Management



Figure 7: Existing Landfill site close to proposed development

An existing solid waste site is located approximately 3km from the site. Permission will be obtained from the Fetakgomo Local Municipality to use this site.

The Fetakgomo Local Municipality is responsible to provide this service to the proposed development.

Provision will be made for the provision of these services according to “the Guidelines for Human Settlement Planning and Design (Red Book) and criteria of the Water and Sanitation Department of the Fetakgomo Local Municipality.

11.6. Electricity

Electricity will be available from Eskom as there is already power available in the immediate area. The electrical power lines are next to road D4190.

Fetakgomo Local Municipality will be responsible to apply for these services.

ESKOM will supply electricity to the proposed Township development. The design will be approved by ESKOM.

Attached in the Public participation documents see proof that application has been made to ESKOM for power.

12. KEY ENVIRONMENTAL IMPACTS

The following possible environmental impacts were identified:

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Air Pollution and noise		
Smoke	<ul style="list-style-type: none"> • Vehicle emissions • Fires 	<ul style="list-style-type: none"> • Health problems • Air pollution • Public nuisance • Noise pollution
Dust	<ul style="list-style-type: none"> • During construction • vehicle operation on roads • Vegetation clearing 	
Fumes	<ul style="list-style-type: none"> • Fumes from vehicles • Fumes from machinery 	
Noise	<ul style="list-style-type: none"> • Construction machinery and vehicles. • Presence of construction camp • Operation noise (music and people) 	
Water quality		
Pollution of water sources	<ul style="list-style-type: none"> • Spillage of fuel & oil from vehicles • Spillage of building material e.g. cement etc • Migration of contaminants off the site • Solid waste in storm water • Littering 	<ul style="list-style-type: none"> • Pollution of surface and groundwater • Health risk • Lower water quality • Soil degradation • Erosion • Siltation
Silt deposition in surface water drainage line	<ul style="list-style-type: none"> • Erosion risk due to increased run-off from built up area • Erosion from cleared areas during construction 	
Pollution from sanitation system	<ul style="list-style-type: none"> • Leakages of system and incorrect management of sanitation system • Inadequate measures to prevent sewage spillages • Overflow of sewage to groundwater 	
Water quantity		
Impact on amount of water resources available	<ul style="list-style-type: none"> • Over-utilisation of available water 	<ul style="list-style-type: none"> • Loss scarce resource • Increased pressure on ground water supply sources
Land/Soil degradation		
Soil contamination and degradation	<ul style="list-style-type: none"> • Spillages of oil, chemicals from Machinery & vehicles • Removal of vegetation during clearing for construction • Sewerage spillages • Erosion due to increased runoff from built-up areas • Increased erosion of drainage channels • Site clearing during construction 	<ul style="list-style-type: none"> • Soil degradation • Loss of topsoil • Dust formation • Erosion
Biodiversity		
Decline in fauna and flora diversity	<ul style="list-style-type: none"> • Cleaning of site for construction • Pollution of soil • Pollution of water resources • Physical establishment of development • Loss of habitat due to establishment of development 	<ul style="list-style-type: none"> • Loss of biodiversity • Loss of habitat • Negative impact on biodiversity • Negative impact on rare / endangered/ endemic species and habitats

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Cultural/Heritage		
Possible loss of heritage sites	<ul style="list-style-type: none"> • Damage / loss during construction • Damage / loss during operation 	<ul style="list-style-type: none"> • Possible loss of cultural heritage
Visual impact		
Impact of the proposed development of sense of place.	<ul style="list-style-type: none"> • The physical existence of the development 	<ul style="list-style-type: none"> • Negative impact on landscape quality character • Negative impact on sense of place.
Visual impact	<ul style="list-style-type: none"> • Construction site, buildings, • Lights at night • Presence of new development • Overhead Power lines 	<ul style="list-style-type: none"> • Obstruction • Visual intrusion • Public nuisance
Health and Safety		
Security	<ul style="list-style-type: none"> • Influx of people to area including construction workers and others after completion. 	<ul style="list-style-type: none"> • Loss of safe and secure environment • Threat to health • Danger to human life
Fires	<ul style="list-style-type: none"> • Accidental fires • Burning of waste • Cooking with fires 	
Socio-economic impacts		
Impact from change of land use from agriculture to township.	<ul style="list-style-type: none"> • Change of land use to residential, business, institutional, educational, public open spaces and streets. 	<ul style="list-style-type: none"> • Impact negatively on agricultural production - land will no longer be used for agriculture
Impact of the residential and other development on adjacent landowners	<ul style="list-style-type: none"> • noise from construction activities, • dust generated by construction vehicles and from site preparation, • the visual impact of lights • The visual impact of residential and other units (business, institutional etc.) located against the skyline. 	<ul style="list-style-type: none"> • Nuisance and disruption • Noise pollution • Air pollution • Negative visual impact
Impacts related to the establishment of a construction camp with accommodation	<ul style="list-style-type: none"> • Location of construction camp. • Environmental impacts of construction activities e.g. spillage of hazardous liquids such as oil and fuel onto the soil surface. • Accommodation of construction teams on site • Littering, accidental fires, collecting of firewood and poaching. • undesirable visitors to the area 	<ul style="list-style-type: none"> • Adverse impact on the environment, • Resentment from neighbouring residents.

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Impact ground and water pollution from littering and waste disposal during construction and operational phases	<ul style="list-style-type: none"> The presence of a large work force and equipment and machinery during construction causing littering and dumping refuse and builder's rubble on site. Construction activities from heavy vehicles and machinery. 	<ul style="list-style-type: none"> Soil and water pollution
	<ul style="list-style-type: none"> The construction of structures such as open trenches and earth heaps might also hold safety risks for people. 	<ul style="list-style-type: none"> safety risks for motorists, passengers, pedestrians and residents of the area
	<ul style="list-style-type: none"> A lack of proper ablution facilities for temporary workers during construction 	<ul style="list-style-type: none"> Soil and water pollution unhygienic conditions Health risk.
Impact from the provision of structures and infrastructure services	<ul style="list-style-type: none"> The development, construction and provision of infrastructure services 	<ul style="list-style-type: none"> pollution from sanitation systems, pollution of water resources, negative visual impact of overhead power lines and electricity supply, waste removal Soil erosion as a result of the construction of internal roads and water reticulation networks.
Impact on archaeological /cultural / social features	<ul style="list-style-type: none"> The development of structures and infrastructure services for residential and other sites Clearing of construction sites construction of access roads Excavation of trenches for the installation of underground pipelines and cables. 	<ul style="list-style-type: none"> Negative impact on cultural or heritage resources
Job creation Ownership	<ul style="list-style-type: none"> Temporary jobs during Construction phase Permanent jobs during operation New housing New businesses New schools 	Positive impact – job creation

These key areas of impacts are further explored and described below to detail the impacts, the impact ratings and mitigation measures.

The following specialist investigations have been conducted and used in assessing the environmental impacts of the different activities that form part of the development:

- Ecological Assessment and sensitivity map.
- Phase 1 Heritage Impact Assessment by Cultural Resource Consultants
- A Geo-technical Investigation.
- A 1:100 year flood line determination.
- Engineering Services (roads, storm water, and sewage).

13. ASPECTS, RELATED IMPACTS, SIGNIFICANCE & PROPOSED MITIGATION MEASURES

In this section, all the possible impacts that can be predicted in both the construction and operational phases are addressed. Specific mitigation measures are proposed and the significance of these impacts given with and without mitigation measures.

Any development will have a profound impact on the environment in that most of the herbaceous and shrub layers will b

e destroyed on the demarcation site.

The vegetation on site has already been modified through anthropogenic influences and overgrazing. The proposed development site is currently used for livestock grazing, firewood collection and houses.

- The site earmarked for the demarcation of erven can be considered as having a moderate or low sensitivity due to the vegetation being in a completely modified or degraded state.
- Existing large (> 3m) indigenous trees should be incorporated into the demarcation area wherever possible, while protected tree species, *Boscia albitrunca* (shepherd's tree) should only be removed after a permit has been obtained from Forestry.
- Existing large indigenous trees should be protected and local people should be informed and educated on the importance of these trees and not to remove them for firewood.
- Have both temporary (during construction) and permanent erosion control plans.

13.1. Air quality

Planning Phase

No impact is envisaged.

Construction Phase

During this phase there will be a concentration of earthmoving equipment and construction vehicles that will level the area, clear vegetation for houses and infrastructure and in the process will create dust and exhaust smoke that will impact on air quality.

Burning of waste and fires at construction sites will also create smoke which will affect the air quality.

Operational phase

The increased traffic volumes and people will lead to increased levels of air pollution.

Project Phase	Environmental aspect: Air quality								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earthworks and vegetation clearance	Air Pollution by excessive dust formation	Low	Low-Medium	Low-Medium	Medium	Medium-high	Low	Medium
	Movement of construction vehicles	Air Pollution by excessive fumes/emissions (smoke and dust)	Low	Low -medium	Low-medium	Medium	Low-Medium	Low	Low-medium
	Burning of cleared vegetation	Air pollution by excessive smoke	Low-Medium	Medium	Medium	Low-Medium	Medium-high	Low	Medium
	Accidental fires	Air pollution by excessive smoke	Low	Low	Low-Medium	Low	Medium	Low	Medium
	The use of fires for cooking	Air pollution by excessive smoke	Low	Medium	Low	Medium	Medium	Low	Medium
Operation	Burning of fossil fuels and waste	Air pollution by excessive smoke	Medium	Low-medium	Low-Medium	Medium	Medium-high	Low	Medium
	Veld fires	Air pollution caused by smoke	High	Low	Medium	Low	Medium-High	Low	Medium

Mitigation measures-Construction Phase

- Construction vehicles and machinery must be well serviced so that they do not produce excessive smoke.
- Construction should only take place during the hours between sunrise and sunset on weekdays and Saturdays.
- Construction personnel must comply with speed restriction of between 30-40 km per hour within the site boundaries as well as on the access road to reduce the generation of dust.
- Where possible, veld fires must be prevented by means of fire breaks according to the National Veld and Forest Fire Act.
- Comply with Provincial noise regulations. Exhaust systems construction machinery must be maintained properly.
- Construction areas can be damped to prevent excessive dust formation. The internal gravel roads must be maintained (grading or watering) on a regular basis during construction.
- The clearing of the construction sites should be done in phases as the construction progresses. The cleared topsoil should be stockpiled in such a way that transportation by wind or rain is limited. This can be done by e.g. restricting the height of stockpiles to 1.2 m, covering it and/or sandbagging.
- Removal of vegetation should be confined to construction sites.
- The solid waste generated by the construction teams may not be burned on site or the surrounding areas.
- The solid waste should be kept in animal proof bins from where it will be removed to the municipal waste disposal site operated by the local municipality on a regular basis e.g. weekly.
- Cleared vegetation may not be burned on site, but removed to a licensed waste disposal site on a regular basis.
- No open fires or cooking fires are allowed at construction sites. Extra care should be taken to ensure to prevent veld fires from occurring. Cooking should preferably be done on gas stoves.

Mitigation Measures-Operational Phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- The solid waste or vegetation may not be burned at their property.
- Solid waste should be kept in waste bins and disposed of or collected once a week to the licensed dumping site.
- Where possible, veld fires should be prevented by means of fire breaks according to the National Veld and Forest Fire Act.

13.2. NOISE

Planning Phase

No impact is envisaged.

Construction Phase

Noise can be expected from the construction vehicles, machines and construction labour during the construction.

Operational phase

The increased traffic volumes and people will lead to an increase in the noise levels.

Project Phase	Environmental aspect: Noise								Significance	
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	With Mitigation	Without Mitigation	
								With Mitigation	Without Mitigation	
Construction	Presence of construction camp and construction workers	Increased noise level, nuisance & disturbance to surrounding public	Low	Medium	Low	Medium	Medium	Low	Low-Medium	
Construction	Operation of construction vehicles and equipment	Disturbance & nuisance to surrounding land owners	Low	Medium	Medium	Medium-High	Medium	Low-Medium	Medium	
Operation	Increased vehicle movement Increased noise levels due to increase in people on developed sites	Disturbance and nuisance to the surrounding residents	Low	High	Medium	High	Medium-Low	Low-Medium	Medium	

Mitigation measures-Construction Phase

- Construction vehicles, machinery and equipment must be well serviced so that they do not produce excessive noise.
- Construction should only take place during daylight hours. No construction on Sundays and public holidays.
- Construction personnel must comply with speed restrictions of 30-40 km per hour within the site boundaries and on the access road to reduce the generation of noise.
- Contractors must comply with Provincial noise regulations.
- The construction machinery must be fitted with noise mufflers and be maintained properly.

Mitigation measures-Operation Phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- The level of noise in a township is governed by Municipal by-laws.
- Speed limits are controlled by law.

13.3. Water quality

Planning Phase

No impact is envisaged.

Construction Phase

During this phase water consumption will be minimal because it will be utilized mainly for dust abatement and construction purposes.

Lack of temporary sanitation facilities and the regular maintenance thereof could result in subsurface- and surface water pollution and associated health risks.

Temporary sanitation facilities must be correctly maintained to prevent spillages.

Spillage of fuel and lubricants from construction vehicles could occur.

Storm water contamination by solid waste could lead to groundwater and surface water pollution.

In this phase the vegetation cover is removed at the construction sites, which intensifies the risk of erosion caused by storm water run-off over these areas. The construction material should be stockpiled in such a way that the risk of transportation into the drainage channels and areas are limited.

Operational Phase

Pollution by sanitation leakages and solid waste may lead to water pollution.

Enviro-loos are the preferred option for sanitation for this project, but there are also VIP toilets and a 4 Chamber septic tank as options. Incorrect operation from any one of these options would result in the pollution of the water resource.

The water needs of the development will be sourced from the municipal water supply lines.

Storm water run-off over open areas can cause erosion as well as the washing of soil into the surface water streams.

Project Phase	Environmental Aspect: Water quality									
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance		
								With Mitigation	Without Mitigation	
Construction	Spillage of fuel & lubricants from construction vehicles Spillage from temporary storage of fuel, oil & other chemicals	Chemical pollution of water resources Impact on the health of humans & bio-diversity	Medium	Medium	Medium	Low-Medium	Medium	Low-Medium	Medium	
	The storage and disposal of building rubble, domestic waste and littering on site	Pollution of water resources Impact on the health of humans & bio-diversity	Low-medium	Medium	Medium	Medium	Medium	Low	Medium	
	Sanitation seepage and spillage from temporary toilets	Pollution of water resources Impact on the health of humans & bio-diversity	Medium	Medium	Medium	Medium	Low-Medium	Low	Medium	
	Storm water run-off over cleared areas , roads and trenches	Increased turbidity and decrease in water quality	Low-Medium	Medium	Medium	Low-Medium	Medium	Low-Medium	Medium	
	Stockpiling of construction & cleared material. Transportation of stockpiled material (construction & infill) by means of wind or rain.	Pollution of water resources Increased turbidity and decrease in water quality	Low-Medium	Medium	Medium	Low-Medium	Medium	Low-Medium	Medium	
	Spillages and leaks from construction activities (e.g. bitumen, mixing of concrete, cement, paints etc.).	Pollution of water resources	Medium	Medium	Medium	Low-Medium	Medium	Low-Medium	Medium	
Operation	The disposal and storage of domestic waste	Pollution of water resources Impact on the health of humans & bio-diversity	Low-Medium	High	Medium	High	Low-Medium	Low-Medium	Medium	
	Domestic use of water	Depletion of water resources: Water consumption	Low-medium	High	Low-medium	High	High	Low-Medium	Medium-high	
	Watering of Gardens	Depletion of water resources: Water consumption	Low	High	Low	Low	Low	Low	Low-Medium	
	Leaks from the VIP sanitation system	Biological pollution of water resources Impact on the health of humans & bio-diversity	High	High	Medium	Medium	Medium	Medium	Medium	Medium-High
	Leaks from Enviro-loo sanitation system		Medium high	High	Medium	Low	Low	Low	Low	Medium
	Increased run-off contaminated with surface pollution being washed into streams	Pollution of water resources Degradation of aquatic eco-systems	Low-Medium	High	Medium	Low-Medium	Medium	Low-Medium	Low-Medium	Medium

Mitigation measures-Construction Phase

- Removal of vegetation must be limited to the construction areas.
- Cleared areas should be rehabilitated by reintroducing indigenous vegetation or paved as soon as possible to limit the occurrence of erosion.
- Slopes produced by removing of soil must be kept to a minimum to reduce the chances of erosion damage to the area.
- Trenches for pipes or cables must where possible be dug next to roads where it will have the smallest impact. Any trenches that are dug for the supply of services to the stands must be filled up and compacted well and slightly higher than the areas around it. This would allow for settling of the soil without trenches or erosion gullies forming again.
- Construction vehicles should be serviced on a regular basis to prevent or minimize the risk of spills or leakages. Vehicles should preferably be serviced at another location as opposed to the proposed development site.
- Drip pans should be used during re-fuelling and servicing of construction vehicles. Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products.
- Drip pans can also be placed underneath stationary construction vehicles and equipment. The used or spilled oil should be taken to the nearest oil refiner or recycling plant for recycling.
- The temporary vehicle maintenance yard and storage area should be fenced off and placed at least 100 m away from wetlands areas or surface streams.
- The mixing of cement, concrete, paints etc. must be done at designated areas within concrete aprons or on protected plastic linings to contain any possible spillages into surface or groundwater resources.
- The solid waste generated by the construction teams may not be burned on site or the surrounding areas. The solid waste should be kept in animal-proof bins at the construction camp and construction sites and be removed to the nearest available municipal waste disposal site on a regular basis e.g. weekly.
- Building rubble should also be removed to the licensed dumping site as the development progresses.
- Regular clean-up programs should be put into effect throughout the premises to limit the impact of littering caused by construction activities.
- Temporary sanitation facilities should not be placed along steep slopes or closer than 100 m from surface streams.
- It should be ensured that the ratio of one toilet for every 15 workers on site be maintained.
- Temporary sanitation systems must be maintained and serviced by a licenced operator.
- Promote the use of indigenous plants to be planted in gardens in order to minimize the use of water.

- Water consumption for construction and domestic purposes is a given, but care must be taken not to waste any water.

Mitigation measures-Operational Phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- The solid waste or garden refuse may not be burned on site.
- Solid waste should be kept in waste bins and disposed of or collected once a week to the licensed dumping site
- The storm water capacity of the development area should be well designed to ensure that the surface pollution being washed into the streams are limited.
- The detection of any leakages or malfunctioning of the sanitation system should be reported and repaired immediately.

13.4. Water quantity

Planning Phase

No impact is envisaged.

Construction phase

During this phase, water consumption will be minimal because it will be utilised for construction purposes only. It is envisaged that the water needs of the development will be sourced from the existing water sources.

Operational phase

By using the rainwater harvested from the roofs of houses for gardening purposes, pressure on the water resource can be reduced.

Project Phase	Environmental Aspect: Water quantity								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Over-use of water during Construction activities and dust abatement along internal roads and at construction sites	Depletion of water resources used for domestic purposes	Low	Medium	Medium	Medium	Medium-High	Low-Medium	Medium
	Excessive Water use by exotic invasive plant species	Depletion of surface and groundwater water resources	Low	Medium-High	Low-Medium	Low-Medium	Low-Medium	Low	Low-Medium
Operation	Excessive use of water for Domestic purposes Excessive gardening	Reduction of water reserve necessary for functioning	Medium	Medium	Medium	Medium	Medium	Medium	Medium - high

Mitigation measures – Construction Phase

- Water should be used sparingly and it should be ensured that no water is wasted e.g. regular inspection of pipes to ensure that no leaks occur.
- If applicable, water tanks should be regularly inspected to ensure that no leaks occur.
- If applicable, any exotic weed / plant species should be eradicated. They increase water absorption of the surface and groundwater resources.

Mitigation measures-Operational Phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- Water consumption for domestic purposes is a given, but care must be taken not to waste any water.
- The gutters (if applicable) of the houses can be designed in such a way that rainwater could be diverted to water storage tanks/containers, from where the water can be re-used in the gardens. This could minimize storm water runoff and pressure on water supply.
- The residents should be educated on the value of water and how to use it sparingly.
- The cleared areas around the houses and infrastructure should be re-vegetated or paved as soon as possible to limit erosion. The planting of vegetation indigenous to the area will minimize the impact on water resources.
- Indigenous grass species should be established at and around the different households and lawns should be limited.

13.5. Geology and soil

Planning Phase

No impact is envisaged.

Construction phase

Clearing of the site will result in opening of previously inaccessible areas and topsoil being vulnerable to erosion by wind or runoff water.

During construction, the vehicles and equipment used have the potential to spill fuel and lubricants that can pollute the soil. The improper handling of hazardous materials can cause contamination to the soil and surface water bodies.

The storage of solid waste before it can be disposed of, has the potential to pollute the soil and be a public nuisance.

Lack of temporary sanitation facilities and the regular maintenance thereof could result in subsurface- and surface water pollution and associated health risks.

Temporary sanitation facilities must be correctly maintained to prevent spillages.

Digging and trenching for the installation of water pipes and cables expose topsoil to erosion.

Temporary erosion control plans should include:

- silt fencing
- temporary silt trap basins
- short term seeding or mulching of exposed soil areas
- Limitations on access for heavy machinery and the storage of materials to avoid soil compaction.

Permanent erosion control plans should focus on the establishment of stable native vegetation communities.

Other mitigation measures needed to prevent soil erosion include:

- Ensure the amount of bare soil exposed, is minimized by staging earthworks in phases and leaving as much ground cover intact as possible during construction.
- Protect all areas susceptible to erosion and ensure that there is no undue soil erosion from activities within and adjacent to the construction camp and work areas.
- Repair all erosion damage as soon as possible and in any case not later than six months before the termination of the maintenance period to allow for sufficient rehabilitation growth.

- Do not allow surface water or storm water to be concentrated, or to flow down cut or fill slopes or along pipeline routes without erosion protection measures being in place.
- Conservation of topsoil during construction should be prioritized on site and done as follows:
 - Topsoil should be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.
 - Stockpile topsoil separately from subsoil.
 - Stockpile in an area that is protected from storm water runoff and wind.
 - Topsoil stockpiles should not exceed 2.0 m in height and should be protected by a mulch cover where possible.
 - Maintain topsoil stockpiles in a weed free condition.
 - Topsoil should not be compacted in any way, nor should any object be placed or stockpiled on top of it.
 - Stockpile topsoil for the minimum time period possible i.e. strip just before the relevant activity commences and replace as soon as it is completed.

Operational phase

Inadequate installation and management of storm water drainage systems can cause soil erosion.

The potential spillage of oil and diesel from vehicles has the potential to pollute/degrade the soil.

Solid waste can be a nuisance and has the potential to pollute the soil before disposal.

The use of herbicides and insecticides at the site should be limited as far as possible.

Enviro-loos are the preferred option for sanitation for this project, but there are also VIP toilets and a 4 Chamber septic tank as options. Incorrect operation from any one of these options would result in the pollution of the water resource.

Project Phase	Environmental Aspect: Geology and soils								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Leaks or spills from construction vehicles Spills from temporary storage area of fuel/oil/chemical	Contamination / pollution of soil	Low-medium	Medium	Low-Medium	Medium	Medium-high	Low	Low-Medium
	Spillage from temporary sanitation system	Contamination / pollution of soil	High	Low	Low	Medium	Low-Medium	Low-Medium	Medium
	Inadequate storage and disposal of building rubble, domestic waste and littering on site	Soil pollution + nuisance	Low-medium	Low-Medium	Low-Medium	Medium	Medium	Low	Low-Medium
	Excessive Storm water run-off on site, especially along slopes, roads & cleared areas.	Soil degradation / erosion and dongas forming along roads and steep slopes	Low-Medium	Medium	Low-Medium	Low-Medium	Medium	Low	Low-Medium
	Excessive damage during excavation for service trenches and foundations	Soil degradation / Erosion	Low-Medium	Low-Medium	Low	Low-Medium	Medium-High	Low	Low
	Specific adverse Geo-technical characteristics of soils at sites	Damage to structures and infrastructure	Medium-High	High	Low	Low	Medium-High	Low-Medium	Medium
Operation	Incorrect disposal and storage of domestic waste and littering	Soil pollution + nuisance	Medium	Medium-high	Medium-high	Medium-high	Medium-high	Low-Medium	Medium
	Leaks from the VIP sanitation system	Contamination / pollution of soil	High	High	Medium	Medium	Medium	Medium	Medium-High
	Leaks from Enviro-loo sanitation system	Contamination / pollution of soil	Medium high	High	Medium	Low	Low	Low	Medium
	Increased run-off after heavy precipitation events	Erosion of topsoil and damage to structures, especially along the steeper slopes	Medium	Low-medium	Low-medium	Low-Medium	Medium	Low-Medium	Medium

Mitigation measures-Construction Phase

- Clearing of vegetation must be restricted to the proposed site; unnecessary clearance of vegetation must be avoided to reduce the soil erosion.
- Trenches must be rehabilitated immediately after construction to avoid more loss of topsoil by wind or runoff waters.
- Construction vehicles must be well maintained and serviced to minimize leaks and spills. If any spills occur, spill sorbs should be applied.
- Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products.
- Drip pans should be used when refuelling and servicing construction vehicles or equipment.
- Ideally refuelling and servicing of vehicles and equipment should take place at the building contractor's workshops and not on site.
- Drip pans must be placed underneath stationary construction vehicles and equipment.
- The used or spilled oil should be taken to the nearest oil refiner or recycling plant for recycling.
- The temporary vehicle maintenance yard and storage area should be fenced off and placed at least 100 m away from wetlands, sponges or surface streams.
- Solid waste must be kept in adequate animal proof waste bins at the construction camp and at the construction sites.
- Building rubble and domestic waste should be removed on a regular basis to the closest available landfill site.
- Regular clean-up programs should be put into effect through-out the premises to limit the impact of littering caused by construction activities.
- Any building rubble must be removed to a licensed disposal site after construction.
- Storm water channels should be designed to prevent erosion on the roads and cleared areas.
- Temporary sanitation facilities must regularly be serviced by appropriate companies to ensure that no spills or leaks from toilets to surface- and groundwater take place.
- Temporary toilets should not be placed closer than 100 m from surface streams.
- It should be ensured that the ratio of one toilet for every 15 workers on site be maintained.

- Trenches for pipes or cables must where possible be dug next to roads where it will have the smallest impact. Any trenches that are dug for the supply of services to the stands must be filled up and compacted well and slightly higher than the areas around it.
- Cleared areas should be re-vegetated or paved as soon as possible to limit erosion. Berms to limit the flow of water over cleared areas will limit erosion.
- Indigenous vegetation must be used during the rehabilitation of cleared areas and around houses.
- The gravel roads used during construction must be constructed with storm water diversion channels to slow down the movement of water over the road surface. This will reduce erosion along steep slopes and the ponding of water at low lying areas.
- The clearing of the site should be done in phases as the construction progresses.
- It is proposed that a site specific engineering geological investigation be conducted prior to any construction in order to determine and assess the precise geo-technical character of the materials underlying these areas with regard to the design and the construction foundations and access roads, and the suitability of the underlying soil material as construction materials (Initial Geo-technical Report Appendix 5).

Mitigation measures-Operational Phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- Cleared areas should be re-vegetated with indigenous vegetation after the construction phase to prevent possible erosion.
- Solid waste should be kept in waste bins and disposed of or collected once a week to the licensed dumping site.
- Storm water drainage systems must be well maintained regularly during the operation phase.
- There should be an active program to separate the metals, bottles and plastics in the solid waste and send it to a reputable recycling program. This has the effect of reducing soil pollution while at the same time promotes the preservation of valuable resources by recycling and/or reusing the materials.
- The gutters of all building structures can be designed in such a way (if possible) for the rainwater to be diverted to water storage tanks/containers, from where the water can be reused in the gardens. This will minimize storm water runoff and the added pressure on the water supply.
- The detection of any leakages or malfunctioning of the sanitation system should be reported and repaired immediately.

13.6. Ecology (Fauna and Flora)

Planning Phase

No impact is envisaged.

Construction phase

Any removal of natural vegetation and destruction of habitat will have a negative effect on the bio-diversity.

Clearing of the site for construction purposes will result in the destruction of faunal habitats, removal of indigenous, endangered or rare protected plant species.

The specific mitigation measures included in the Ecological report should be adhered to, to insure that the impact on the vegetation and habitats are kept to the minimum.

Veld fires caused by negligence on the part of the construction workers could have various negative impacts on the indigenous fauna and flora.

The stockpiling of cleared exotic invasive vegetation species close to drainage areas could promote the spreading of these species.

Lack of temporary sanitation facilities and the regular maintenance thereof could result in subsurface- and surface water pollution and associated health risks.

Temporary sanitation facilities must be correctly maintained to prevent spillages.

Operational phase

The operation of the development can have a negative impact on the bio-diversity if it is not managed correctly.

Introduction of alien invasive vegetation will have a negative impact on the indigenous vegetation.

Veld fires especially can have a major negative impact on fauna and flora as well as on the safety of people.

The possible presence of any solid waste or toxic substances can be the cause of unnecessary animal deaths.

Poisoning of problem animals can lead to deaths of birds of prey and other prey animals in the area.

Pesticides and herbicides used during operation can cause pollution if not handled and applied correctly.

Enviro-loos are the preferred option for sanitation for this project, but there are also VIP toilets and a 4 Chamber septic tank as options. Incorrect operation from any one of these options would result in the pollution of the water resource.

Project Phase	Environmental Aspect: Ecology (Fauna and Flora)									
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance		
								With Mitigation	Without Mitigation	
Construction	Irresponsible vegetation clearance & earthworks at construction site	Loss of indigenous plant & animal species. Disturbance to sensitive habitat	Medium	Medium	Low-Medium	Medium	Medium-High	Low-medium	Medium	
	The occurrence of veld fires on site	Destruction of flora / habitats Loss of indigenous fauna	Medium-High	Medium	Medium-high	Low-Medium	Low-medium	low	Medium	
	Spillage from temporary sanitation system	Destruction of flora / habitats Loss of indigenous fauna Public nuisance	High	Low	Low	Medium	Low-Medium	Low-Medium	Medium	
	Littering along roads & construction sites	Public nuisance Loss/death of indigenous fauna and flora	Low-Medium	Medium	Medium	Medium-High	Medium	Low	Medium	
Operation	Planting indigenous vegetation in gardens	Improve bio-diversity	Medium +	High +	Medium +	High +	High +	Positive Medium High	Positive Medium-High	
	Rehabilitation of cleared areas (indigenous)	Improve bio-diversity, supply habitat for indigenous species.	Medium +	High +	Medium +	High +	High +	Positive Medium High	Positive Medium-High	
	Rehabilitation of cleared areas (incorrect flora)	The spreading of exotic invasive plant species Loss of habitat & indigenous flora	Medium	High	Medium	Low-Medium	Medium	Low-Medium	Medium	

Project Phase	Environmental Aspect: Ecology (Fauna and Flora)									
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance		
								With Mitigation	Without Mitigation	
	Leaks from the VIP sanitation system	Destruction of flora / habitats Loss of indigenous fauna Public nuisance	High	High	Medium	Medium	Medium	Medium	Medium-High	
	Leaks from Enviro-loo sanitation system		Medium high	High	Medium	Low	Low	Low	Medium-high	
	The occurrence of veld fires	The loss of indigenous fauna & flora	Medium-High	Medium	Medium	Low-Medium	Medium High	Low-Medium	Medium	
	Irresponsible control of pests and vermin in buildings	Killing & poisoning of fauna feeding on the poisoned vermin or pests	Low-Medium	High	Low-Medium	Medium-High	Medium	Low-Medium	Medium	
	The erection of walls or fences	Fragmentation of available habitat Restriction of movement of small mammals, reptiles & amphibians	Low-Medium	High	Low-Medium	High	Medium	Low-Medium	Medium	

Mitigation measures – Construction phase

- High sensitivity areas must be avoided.
- Removal of vegetation should be confined to construction areas.
- Care must be taken that unnecessary clearance of vegetation does not take place. Natural vegetation must be retained where possible; large trees must not be removed but be incorporated into the design plan.
- Cleared vegetation should be composted where possible to preserve nutrients in it and returned to the soil.
- If applicable, the herbicides used to control the invasive plant species should be chosen in consultation with an ecologist, as some of the agents might be detrimental to the surrounding indigenous fauna and flora.
- Fires should only be allowed in designated places within the construction camp and extra care should be taken to prevent veld fires of occurring.
- Firebreaks should comply with the National Veld and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks).
- Cleared vegetation should not be burned on site.
- The cleared vegetation should be stockpiled and taken to the closest available landfill site.
- Solid waste must be kept in adequate animal-proof waste bins at the construction camp and sites.
- Regular clean-up programs to be put into effect along the access road and through-out premises to limit impact of littering caused by construction activities.
- Building rubble and domestic waste should be removed on a regular basis to the closest landfill site.
- No animals may be killed, captured or hunted on site by construction workers.
- No poison should be used to control any animals without the input of an ecologist/zoologist.
- Temporary sanitation facilities must regularly be serviced by appropriate companies to ensure that no spills or leaks from toilets to surface- and groundwater take place.
- Temporary toilets should not be placed closer than 100 m from surface streams.
- It should be ensured that the ratio of one toilet for every 15 workers on site be maintained.

Mitigation measures – Operational phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- No trees may be cut or wood collected for firewood, unless permitted by the relevant authority.
- No snaring or hunting of animals unless permitted by the relevant authority.
- The use of eco-friendly products to control pests/vermin at buildings should be promoted and if necessary an ecologist/zoologist be consulted before use.
- Fires should only be allowed in designated places and extra care should be taken to prevent veld fires. If applicable
- Firebreaks should comply with the National Veld and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks).
- Residents should be encouraged to plant indigenous vegetation at and around their houses.
- Solid waste should be kept in waste bins & disposed of /collected once a week to the licensed dumping site.
- If utilized, the rain harvesting tanks should be covered with a mesh or similar material to prevent vultures and raptors of falling in and injuring themselves.
- The sewage treatment system should be regularly inspected to ensure that no spills or leaks from sanitation system to ground- or surface water take place.

13.7. Archaeological, Cultural and Social Features

Planning Phase

No impact is envisaged.

Construction phase

The clearing of the site may have a negative impact on the archaeological features of the site.

Care must be taken in the excavations and moving of soil to observe any archaeological feature or heritage remains of importance, which were not observed during the survey and assessment of the site.

These finds must be left and reported to the archaeological consultant for comments.

Operational phase

Landowners may find/dig out some of this attributes during gardening, landscaping or extensions of their houses or buildings. These finds must be left and reported to the archaeological consultant.

Project Phase	Environmental Aspect: Social and Heritage								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Irresponsible earth moving and soil clearance	Destruction of archaeological and heritage remains	Medium-High	medium	Low	low	Low Medium	Low	Medium
	Temporary job creation	Social upliftment for community to be able to get jobs	Medium high	short	medium	medium	high	N/A	Positive high
Operation	Incorrect functioning and operational activities of the development	Destruction of archaeological and heritage remains	Medium-High	High	Low	Low	Low	Low	Low-Medium
	permanent job creation and housing and new business	Social upliftment for community to be able to get jobs	Medium high	short	medium	medium	high	N/A	Positive high

Mitigation measures – Construction phase

- Care must be taken during the construction process that anything of heritage value that is unearthed must be recorded and the Heritage specialist or SAHRA informed of the find.

Mitigation measures – Operational phase

- During operation any finds of archaeological importance must be reported to the Heritage specialist. See Phase 1 Heritage Impact Assessment, Appendix 6.

13.8. Aesthetics

Planning Phase

No impact is envisaged.

Construction phase

Buildings of different colours, lights, electric and telephone lines are the major causes of visual impacts for residential developments.

The visual characteristics of the area will undergo changes through the added buildings and associated structures on the site. Buildings have a potential *visual impact* and lights at night can become a nuisance.

Operational phase

Buildings have a visual impact and lights at night can be a nuisance.

Project Phase	Environmental Aspect: Visual								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Irresponsible construction activities and temporary construction structures. Removal of vegetation	Visual disturbance	Low	Medium	low	High	high	Medium	Low-medium
	Presence of Security lights	Visual disturbance and Nuisance	Low	Medium	Low	medium	Medium	Low	Low
Operation	Presence of buildings and infrastructure associated with the proposed development	Visual disturbance	Medium	High	Medium	High	High	Medium	Medium
	Luminescence caused by lights	Nuisance to surrounding residents	Low	High	Low-medium	High	High	Low-medium	Low-medium

Mitigation measures – Construction and Operation phases

- Cleared areas must be re-vegetated after construction to reduce the visual impact.
- Security lights (if applicable) during the construction phase should shine directly down and directed towards the site away from the surrounding land owners and residences. No external floodlights/spotlights should be allowed. All external lighting should be covered to regulate the area of luminance.
- As far as feasible, the electricity must be distributed from existing power lines to the different development areas by means of underground cables.
- The Operation phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.

13.9. Safety and Security

Planning Phase

No impact is envisaged.

Construction phase

Construction activities such as excavating of trenches, movement of construction vehicles, the use of equipment and the congregation of workers and staff on site increase the risk of injury.

The activities of construction personnel on site may contribute to an increase in the level of crime in the area and may also contribute to an increase in the risk for fires.

Lack of temporary sanitation facilities and the regular maintenance thereof could result in subsurface- and surface water pollution and associated health risks.

Temporary sanitation facilities must be correctly maintained to prevent spillages and harm to people.

Operational phase

Movement of unauthorized individuals in the area could cause the increase in the crime rate.

Where people are present, there is an increase in the potential for veld fires during the operation of the development.

Enviro-loos are the preferred option for sanitation for this project, but there are also VIP toilets and a 4 Chamber septic tank as options. Incorrect operation from any one of these options would result in injuries to people.

Project phase	Environmental Aspect: Safety and Security								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Irresponsible construction activities – <ul style="list-style-type: none"> Excavation of trenches etc. construction vehicles storage of poisonous goods 	Loss or injury to human life accidents	Medium-High	low	Low	Medium-High	Medium	Low	Medium
	Unauthorized entrance to construction areas	Elevated crime levels	Low-Medium	low	Low-Medium	Medium-High	Medium	Low	Low-Medium
	Use of security lights	Reduce criminal activities	Low-Medium	Low	low	Low	Low	Positive Medium	N/A
	Sanitation seepage and spillage from temporary toilets	Safety threat Threat to health of humans & bio-diversity	Medium-high	Low	Medium	Low	Low-Medium	Low	Medium-high
	The occurrence of veld fires caused by the negligence of construction workers	Loss of human life, biodiversity and construction equipment etc.	High	Low	Medium	Medium	Medium	Low-Medium	Medium
Operation	Irresponsible functioning of the proposed development	Elevated crime levels	Medium-High	High	Medium	Low-Medium	Low-Medium	Low-Medium	Medium
	Leaks from the VIP sanitation system	Impact on the health Safety of people	High	High	Medium	Medium	Medium	Medium	Medium-High
	Leaks from Enviro-loo sanitation system Incorrect operating procedure		Medium high	High	Medium	Low	Low	Low	Medium-high
	The increased movement of vehicles towards the site and at the proposed development	Increased safety risk	Medium	High	Medium	High	Low-Medium	Low-Medium	Medium
	The risk of veld fires caused by natural or human induced negligence	Loss of human life, bio-diversity, houses, infrastructure etc.	High	Medium	Medium	Medium	Medium	Medium	Medium

Mitigation measures – Construction phase

- The Contractor shall conform to all the stipulations of the Occupational Health and Safety act (Act 85 of 1993) and the Regulations applicable at the time of the tender. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Only appointed personnel and security workers will be allowed to stay on site overnight.
- Proper access control (I.D. cards) should be enforced at the entrance gate to ensure that no unauthorised persons enter the site.
- Transportation should be pre-arranged for the construction workers. This should be done to ensure that the workers from the surrounding local communities have daily transportation available to and from the site.
- A temporary fence / barrier should be erected around the construction camp and storage area. The vegetation on and around the construction camp should be maintained to limit the risk of veld fires.
- If applicable, security lights installed at a construction site and storage area should be in such a manner that it does not become a nuisance to adjacent landowners.
- Emergency plans to be in place in case of accidents or fires.
- Fire extinguishers to be available at construction camps.
- No solid waste or vegetation may be burnt on the premises or surrounding areas. No fires will be allowed outside designated areas (construction camp).
- It must be ensured that the development complies with the requirements of the National Veld and Forest Fire Act, 1998 (Chapter 2: Fire Protection Associations and Chapter 4: Duty to Prepare and maintain firebreaks). The construction workers should be educated surrounding the risk of fires in the area and how to prevent it.
- Temporary sanitation facilities must regularly be serviced by appropriate companies to ensure that no spills or leaks from toilets to surface- and groundwater take place. Temporary toilets should not be placed closer than 100 m from surface streams.
- It should be ensured that the ratio of one toilet for every 15 workers on site be maintained.

Mitigation measures – Operational Phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- The community should be educated on the dangers and risks of fires.
- Information should be available regarding the prevention of fires, how to fight them and where to report them or get assistance.
- Information about measures to prevent crime should be available as well as where to report crime.

13.10. Socio-economic aspects

Planning Phase

No impact is envisaged.

Construction phase and Operational phase

The construction and operation phases of the development will have a positive impact on the socio-economic environment of beneficiary communities through employment opportunities and training and skills development.

A number of temporary jobs will be created for local people during the construction phase.

During the operational phase of this project it is intended to improve the local community morally, culturally and socially.

Project phase	Environmental Aspect: Socio-Economic								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	The employment of workers both long-term and short-term	Job creation both direct and indirect Skills development of local workforce	High Positive	Medium-High Positive	High Positive	High Positive	High Positive	N/A	High positive
Operation	Indirect impact of more people having a property to live on	Community security and social upliftment	High Positive	High Positive	Medium Positive	High Positive	High Positive	N/A	High positive
	Presence of Business and Educational stands and related business and infrastructure	Community security and social upliftment	High Positive	High Positive	High Positive	High Positive	High Positive	N/A	High positive

Management measures – Construction Phase

- The Contractor's must adhere to the District & Local Municipality's guidelines, principles and policies.
- During construction jobs must be created for unemployed local people and skills must be transferred to them.
- Where viable, the work must be executed in a labour intensive manner to create as many jobs possible.

Management measures – Operation Phase

- This phase cannot be controlled by the developer, but each individual household is responsible to see that the environment is not adversely affected.
- During operational phase jobs can be created for unemployed local people & skills must be transferred to them.
- Where viable, the work must be executed in a labour intensive manner to create as many jobs possible.

14. POTENTIALLY SIGNIFICANT IMPACTS

Impacts with a rating of **Medium-high or High** are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment, the following impacts were regarded as potentially significant impacts:

- i. Impact of sewage spillage on environment.
- ii. Increased water use for domestic purposes
- iii. planting indigenous, rare and endangered species and rehabilitation
- iv. The socio-economic impact for creating temporary and permanent jobs.
- v. The socio-economic impact of new housing and new business and educational opportunities

CUMULATIVE IMPACTS

- i. This impact is cumulative if the proposed mitigation measures in this report are not implemented
- ii. This impact is cumulative if the proposed mitigation measures in this report are not implemented.
- iii. This impact is positive and will be cumulative as more indigenous plants will seed new plants in the area.
- iv. This impact is positive and will be cumulative as communities will be uplifted and jobs will be created as well as skills development implemented.
- v. This impact is positive and will be cumulative as communities will be uplifted and jobs will be created as well as skills development implemented.

14.1. Nature of impact

- i. This is a water-use soil, safety and health impact
- ii. This is a water-use impact.
- iii. This is a biodiversity impact.
- iv. This is a socio-economic impact.
- v. This is a socio-economic impact.

14.2. Extent and duration of impact

- i. The extent could potentially be within the locality of the proposed development. The duration will be for the life of the development
- ii. The extent could potentially be within the locality of the proposed development. The duration will be for the life of the development.
- iii. The extent could potentially be within the locality of the proposed development and the area of Malogeng. The duration is long term ongoing.
- iv. The extent could be with the local municipal area and is likely to occur from time to time.
- v. The extent could be with the local municipal area and is likely to occur in the beginning of the project where properties can be allocated.

14.3. Probability of occurrence

- i. The probability is likely without mitigation.
- ii. The probability is definite.
- iii. The probability is likely.

- iv. The probability is definite.
- v. The probability is definite.

14.4. Degree to which impact can be reversed

- i. The impact (sewage spill) can be treated
- ii. The depletion of water cannot be reversed.
- iii. If this impact takes place over a very long time, the natural biodiversity will improve.
- iv. N/A.
- v. N/A.

14.5. Degree to which impact can cause irreplaceable loss of resources

- i. If not mitigated the water and soil resources will be permanently affected. Human health can be affected permanently and can cause death.
- ii. If not mitigated the water resources will be irreplaceable.
- iii. If this impact takes place over a very long time, the natural biodiversity will improve.
- iv. N/A.
- v. N/A.

14.6. Degree to which impact can be mitigated

- i. Successful mitigation is possible.
- ii. Successful mitigation is possible.
- iii. N/A.
- iv. Successful mitigation possible.
- v. N/A.

15. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

- In this report it is assumed that the developer will act responsibly taking the environment into consideration at all times.
- It is assumed that the applicant will ensure that the mitigation measures in this report are complied with and that all monitoring and maintenance requirements will be followed closely.
- It is assumed that the development will stay within the ambit of the design of the development - it may be smaller with the result of fewer impacts.
- It is also assumed that this EIA Report will be sufficient to make an informed decision with regard to granting environmental authorization.
- All issues identified during the EIA process are addressed in the EIA Report and specialist studies.

16. AUTHORISATION OF ACTIVITY AND CONDITIONS

The purpose of this report is to provide the relevant authority with sufficient information regarding the potential impacts of the development to make an informed decision regarding the approval of the Environmental Impact Assessment report. Potential impacts were identified in consultation with I&AP's and technical specialists (where applicable) and were assessed using a matrix and by applying professional knowledge.

The potentially significant negative and positive impacts that have been identified should be mitigated through the implementation of the mitigation measures contained in Section 13 of this report.

Impacts with a rating of *Medium-high* or *High* are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment, the following impacts were regarded as potentially significant impacts:

- i. Impact of sewage spillage on environment.
- ii. Increased water use for domestic purposes.
- iii. Planting indigenous, rare and endangered species and rehabilitation (POSITIVE).
- iv. The socio-economic impact for creating temporary and permanent jobs (POSITIVE).
- v. The socio-economic impact of new housing and new business and educational opportunities (POSITIVE).

It is submitted that the proposed mitigation measures, will effectively diminish the impacts to acceptable levels. Given the socio-economic imperatives of the development, the residual impacts are not of sufficient import to thwart the development.

It is the professional opinion of AGES that the proposed development does not present any fatal flaws in terms of negative impacts to the environment and therefore will not have any significant detrimental impacts to render the project unfeasible.

The Department is therefore respectfully requested to evaluate this Impact Assessment Report, as part of an application that has been lodged in terms of Chapter 5 of the National Environment Management Act, 1998(Act no 107 of 1998), in respect of the activities identified in Government Notices R544 and R545.

It is proposed that the following conditions must be included in the Environmental Authorisation if the project is authorised:

- The mitigation measures contained in Section 13 of this report must be implemented.
- The management and or mitigation measures contained in the Environmental Management Programme must be implemented.
- A detailed engineering geological investigation must be conducted at the sites of buildings PRIOR, to any construction activities on site.
- The responsibilities to obtain any further authorisations and/or licenses will rest on the proponent of the project, PRIOR to any activities on site.

17. ENVIRONMENTAL IMPACT STATEMENT

Summary of key findings

Ecology:

The area for the proposed demarcation of erven occurs on land varying from degraded to completely modified, with overgrazing and erosion being evident in the area.

The rocky hill and drainage channels should be preserved to protect the ecological integrity of the area.

The incorporation and protection of the existing large indigenous trees will be important factors to consider during the site layout.

The proposed demarcation of 300 stands at Malogeng on the farm Blauwbloemetjeskloof 428 KS **can be supported** if the above mentioned recommendations are adhered to.

Heritage aspects:

The Heritage Impact Assessment confirmed that there is a large area containing a significant heritage area comprising Iron Age remains.

The discovery is a large Doornkop site with a medium to high significance. The *Doornkop facies* belong to the Kalunda Tradition and is part of the Happy Rest Sub-branch. It dates back to between AD 750 and AD 1000.

The site has significance due to the size of the area and the fact that four hut-floors were recorded. It is not that common to find floors and other features on sites dating to this period in the archaeological past. The site also had a high concentration of ceramic pieces.

The implications were that the proposed layout plan had to be drastically adapted and moved away from the site. The Heritage site will be incorporated into the Town plan, but will be fenced off and NO DEVELOPMENT will take place within the demarcated heritage site

Any new discovery of previously undetected subterranean heritage remains on the terrain must be reported to the archaeologist and SAHRA and may require further mitigation measures.

Visual:

There would be a significant visual impact that could be mitigated effectively by following the mitigation measures set out in the report.

Large positive socio-economic impacts are expected from this development, but an increase in human activity on the site and surrounding areas is anticipated.

Technical:

According to the "Services Report"- the design criteria, materials and methods of construction will all be based on the "Guidelines for Human Settlement planning and design" Redbook, as well as "SABS Standard specifications and Codes of Practice" as applicable.

The Fetakgomo Local Municipality will eventually be responsible for the construction and implementation of the proposed development.

According to the PHASE 1 Geo-technical investigation; the area is regarded as being favourable for the proposed establishment of approximately 300 sites provided that:

- A detailed geotechnical site investigation is undertaken in order to determine and assess the precise geotechnical character of the materials underlying the study area with regard to the design and construction of foundations and access roads, and the suitability of the underlying soil material as construction material, based on the requirements of the National Department of Housing.
- It is clear from the investigation that the following constraints must be noted by the Developer:
 - Ground water seepage to be prevented due to permeability of natural soil,
 - Deep excavations should be shored to prevent collapsing of trench sides,
 - Groundwater could be encountered in wet seasons,

Comparative assessment of the implications of proposed activity and identified alternatives

- **Advantages of the proposed activity and alternatives**
 - The proposed development will provide housing and services for the local community who are in need of these facilities.
 - The development will provide direct and indirect job opportunities.
 - The development will have direct benefits to the local economy during the construction and operation phases.
- **Disadvantages of the proposed activity and alternatives**
 - The development may cause marginally productive cattle farming land to be converted.
 - The cumulative impacts that the development will have in terms of water use, waste, sanitation and other impacts can lead to extra environmental degradation, especially if not managed correctly.
 - The cumulative impacts that the development will have in terms of pollution and other impacts can lead to extra environmental degradation, especially if not managed correctly.

18. CONCLUDING RECOMMENDATION BY EAP

The purpose of this report is to provide LEDET with sufficient information regarding the potential impacts of the development to make an informed decision regarding the approval of the Environmental Impact Assessment report.

The potentially significant negative impacts that have been identified should be mitigated through the implementation of the mitigation measures highlighted in this report. AGES believes that the proposed mitigation measures will effectively reduce the impacts to acceptable levels. Given the socio-economic advantages of the development, the remaining impacts are not enough to put a stop to the development.

Potential impacts were identified in consultation with I&AP's and technical specialists (where applicable) and were assessed using a matrix and by applying professional knowledge.

All aspects of the environment are vulnerable to disturbance. Disturbance should be restricted to the proposed site only. The recommendation of all specialists' reports must be strictly implemented.

It is the professional opinion of AGES that the proposed development does not present any fatal flaws in terms of negative impacts to the environment and therefore will not have any significant detrimental impacts to render the project unfeasible.

The Department is therefore respectfully requested to evaluate this Impact Assessment Report, as part of an application that has been lodged in terms of Chapter 5 of the National Environment Management Act, 1998(Act no 107 of 1998), in respect of the activities identified in Government Notices R544 and R545.

It is proposed that the following conditions must be included in the Record of Decision if the project is authorised:

- The mitigation measures contained in this report must be implemented.
- The management and or mitigation measures contained in the Environmental Management Plan must be implemented.
- The responsibilities to obtain any further authorisations and/or licenses will rest on the proponent of the project, PRIOR to any activities on site.

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