

**GALAGO
ENVIRONMENTAL**



Vogelstruisfontein Sand Mine

MINING RIGHT APPLICATION FOR REMAINDER OF PORTION 1 AND A PORTION OF PORTION 6 OF THE FARM VOGELSTRUISFONTEIN 263-IQ

EIA Report

PREPARED FOR:

The Department of Mineral Resources

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Vogelstruisfontein Sand Mine

MINING RIGHT APPLICATION FOR REMAINDER OF PORTION 1 AND A PORTION OF PORTION 6 OF THE FARM VOGELSTRUISFONTEIN 263-IQ

EIA Report

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EXECUTIVE SUMMARY

Introduction and project description:

Lengeo (Pty) Ltd has appointed Galago Environmental CC as independent environmental consultants to identify and assess the potential environmental impacts associated with the proposed Vogelstruisfontein sand mining activities through an Environmental Impact Assessment (EIA) process.

The 368.25 ha study site lies south of, and abuts, the N14 highway west of Brandvlei Agricultural Holdings on portion 1 and a portion of portion 6 of the farm Vogelstruisfontein 263 IQ, Randfontein Local Municipality, West Rand District Municipality.

The landowner farmed with livestock on the farm and planted maize under two pivot irrigation points from about 12 years ago. The groundwater used in the pivot irrigation was unfortunately not sustainable (and could only be used for short periods of time). The costs for electricity from Eskom also escalated tremendously and the farmer therefore stopped using the pivot irrigation approximately 6 years ago.

Lengeo has a mining permit to mine sand on a small portion of the farm and other mining activities took place on the farm in the past that was not rehabilitated. Lengeo applied for a mining right to use a larger portion of the farm to make mining more sustainable and to enable the company to implement rehabilitation measures on un-rehabilitated areas on the farm. The application is for the mining of building and plaster sand and stone aggregate (gravel).

This material is primarily for the domestic market. Based on the available information, the aerial extent of the deposit is estimated to be in the region of 3 283 075 m². The average thickness of the deposit is a very conservative 1.53 m. This thickness was measured from 30cm below ground surface as the upper 30 cm of the profile needs to be stockpiled for future remediation purposes and was thus discounted from the calculation.

The proposed mining method is very simplistic. Very little precession is deemed necessary. As soon as the product is loaded and delivered, the product is ready for use. The bulk of the mining method consists of excavation with a back-actor, loading and hauling.

The proposed sand mining operations requires authorisation from the Department of Mineral Resources (DMR). The proposed mine development and operations requires compliance

with the EIA principles. The proposed mine development and operations further also requires compliance with the National Water Act, 1998 (Act No. 36 of 1998). An application for a water use licence in terms of Section 21 to undertake the following activities will be applied for:

- (a) *Abstraction of water; and*
- (b) *Altering the bed, banks, course or characteristics of a watercourse.*

Alternatives

No location alternatives are applicable to this project since the sand resource is contained in the proposed development area, owned by Markarios Boerdery and rented by LENGEO for mining purposes. Locating the mine to another area will result in the resource not being utilised and the economy and society not benefitting from the mine.

The proposed mining method is very simplistic. Very little processing is deemed necessary. As soon as the product is loaded and delivered, the product is ready for use. The bulk of the mining method consists of excavation with a back-actor, loading and hauling. This is considered the most economic mining method for this resource and no alternatives were thus considered.

Public Participation Process

The Public Participation Process undertaken is in accordance with the requirements of the EIA Regulations (2010) and the DMR guidelines. The scoping phase of the project was advertised on 7 April 2015 in English in the local newspaper the Randfontein Herald. On-site notices in Afrikaans and English were placed at the entrance of the property. The neighbouring landowners were informed about the project at the local auction on the 8th of April and a BID document was distributed in English via email to all I&APs on 8 April 2015. A public meeting was held with surrounding landowners, community members and other I&APs on 17 April 2015. A copy of the Draft Scoping Report was made available to I&APs on 24 April 2015 for their issues and comments.

The EIA report is being made available to all registered interested and affected parties for comments.

Potential Impacts:

Topography

The mining activities will not impact on the Class 1 and 2 ridges on the study site and will occur on the plains.

Geology and soil

There will be a disturbance of soil properties with a loss of soil to wind (dust) and water erosion. This will be caused by the removal of vegetation as well as mining activities and vehicles moving on the site.

Flora and fauna

Mining activities would remove the existing vegetation from the lower lying areas on the site but would not have an impact on the red listed plants found on the rocky ridge.

Mining activities will cause disturbance and displacement of fauna on site, but those adapted to the rocky ridges will not be directly impacted on. The surrounding area also has enough habitats for the displaced fauna to move into and limited impacts would occur to red data species.

Surface and Groundwater

The proposed development of the site can be divided into different periods with different impacts especially on flooding and erosion after development.

Currently the movement of water on site is highly impacted. This affects the in situ ability of the wetland to function as normal.

Two areas of wetland was found on site- one being more natural and the other impacted and degraded with only redoximorphic conditions and some hydrophytes indicating wetland conditions. These wetland systems have been impacted on before 1953 through agriculture with cultivation of most of the site. This has reduced the functional wetland areas and limited them to the south of the site. The more recent mining activities (over the past 10 years) have been done in areas where cultivation took place.

Potential impacts include:

- Potential pollution sources (hydrocarbons etc. that end up in the groundwater) moving with the groundwater and into the wetland;

- Stormwater released from hard surfaces into the wetland;
- Alien vegetation (established and future);
- Siltation and or erosion of the wetlands.

The impact of the extended mining activities on the currently available water in the area is not expected to be significant.

Social economic

There will be positive and negative impacts on the social and cultural structure of the region, as local people will be used on the mine, thus providing jobs and income. As part of the Social and Labour plan for the mine, training is to be done to improve worker skills, such as drivers licence training and handling of specialized vehicle training, this will improve the worker's marketability if the mine closes down.

Land Use

At present the proposed mining area is being utilised for livestock (cattle) farming and crop production. Mining activities will utilise the site, but after rehabilitation it can again be used for grazing by livestock or game.

Air Quality

Mining activities would cause a degradation of the air quality, in terms of vehicular emissions and dust generated from quarrying, raw material handling and haulage activities.

Noise

There would be an increase in noise on site as a result of quarrying and haulage activities.

Visual Aspects

The location of the topsoil heaps and pits could have an impact on the visual environment, especially if mining continues over a long period of time and is not rehabilitated concurrently.

Cultural historical

Since no sites of heritage importance could be identified on site, no further recommendations are necessary. If unmarked graves or any artefacts are uncovered during mining, all activities in this vicinity need to be stopped and a specialist need to be called in to assess the situation.

Cumulative impacts

There would probably be a minimal cumulative visual, dust and noise impact as a result of surrounding activities.

Impact statement:

Due to the current disturbed and degraded nature of the site, the proposed development will not have a significant negative impact on the environment and with proper environmental management and implementation of the suggested mitigation measures the site can be rehabilitated after completion of the mining to restore the land to grazing potential.

LIST OF ABBREVIATIONS:

AIA	Archaeological Impact Assessment
ASAPA	Association of Southern African Professional Archaeologists
BID	Background Information Document
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
CSA	Constitution of South Africa, 1996 (Act No. 108 of 1996)
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism (currently known as DEA)
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GN	Government Notice
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
IWULA	Integrated Water Use License Application
IWWMP	Integrated Water and Waste Management Plan
MPRDA	Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (as amended)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended)
NEMAQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OHSA	Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SR	Scoping Report

GLOSSARY OF TERMS:

Anthropogenic: Change induced by human intervention.

Applicant: Any person who applies for an authorisation to undertake an activity or undertake an Environmental Process in terms of the Environmental Impact Assessment (EIA) Regulations – National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA] as contemplated in the scheduled activities listed in Government Notice (GN) No 543, 544 and 545.

Archaeological resources: This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which South African Heritage Resources Agency (SAHRA) considers to be worthy of conservation; features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Cultural significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Cumulative Impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment: All physical, chemical and biological factors and conditions that influence an object.

Environmental Impact Assessment: In relation to an application, to which Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

Environmental Impact Assessment Report: In-depth assessment of impacts associated with a proposed development. This forms the second phase of an EIA and follows on the Scoping Report (SR).

Heritage resources: This means any place or object of cultural significance. See also archaeological resources above.

Precipitation: Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

Red Data species: All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

Riparian: The area of land adjacent to a stream or river that is influenced by stream induced or related processes.

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1. Introduction

Lengeo (Pty) Ltd has appointed **Galago Environmental CC** as independent environmental consultants to identify and assess the potential environmental impacts associated with the proposed sand mining activities on the remainder of portion 1 and a portion of portion 6 of the farm Vogelstruisfontein 263 IQ through an **Environmental Impact Assessment (EIA)** process. This EIA Report was written as prescribed in regulation 50 of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA) (Act No. 28 of 2002) (as amended) and regulations 31 of the National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998) (as amended). The following Table 1 provides a summary of the content of EIA Report according to the NEMA Regulations (2010) and MPRDA Regulations (2004).

Table 1: Content of EIA Report according to the NEMA Regulations (2010) and MPRDA Regulations (2004)

NEMA Regulations		MPRDA Regulations		Reference in report
Regulation 31 (2)	Description	Section 50 (1)	Description	
31 (2) (a)	Details of the EAP and relevant expertise			
31 (2) (b)	Description of the proposed activity			
31 (2) (c)	Description of the property on which the activity is to be undertaken and location of the activity			
31 (2) (d)	Description of the environment that may be affected and the manner in which the activity may affect the environment	50 (1) a.	An assessment of the environment likely to be affected by the proposed mining operation, including cumulative environmental impacts;	
31 (2) (e)	Public participation process	50 (1) f.	Details of the engagement process of interested and affected persons followed during the course of the assessment and an indication of how the issues raised by interested and affected persons have been addressed;	
31 (2) (f)	Description of the need and desirability of the proposed activity			
31 (2) (g)	Description of identified potential alternatives to the proposed Activity			
		50 (1) b.	An assessment of the environment likely to be affected by the identified alternative land use or development, including cumulative environmental impacts;	
31 (2) (h)	An indication of the methodology used in determining the significance of potential environmental impacts			
31 (2) (i)	A description and comparative assessment of all alternatives identified during the environmental impact assessment process	50 (1) d.	A comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural	

NEMA Regulations		MPRDA Regulations		
Regulation 31 (2)	Description	Section 50 (1)	Description	Reference in report
			impacts;	
31 (2) (j)	A summary of the findings and recommendations of any specialist report or report on a specialised process			
31 (2) (k)	A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures			
31 (2) (l)	An assessment of each identified potentially significant impact, including— (i) cumulative impacts; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated;	50 (1) c.	An assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed mining operation, including the cumulative environmental impacts;	
		50 (1) e.	Determine the appropriate mitigatory measures for each significant impact of the proposed mining operation;	
31 (2) (m)	A description of any assumptions, uncertainties and gaps in knowledge	50 (1) g.	Identify knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and	

NEMA Regulations		MPRDA Regulations		Reference in report
Regulation 31 (2)	Description	Section 50 (1)	Description	
			uncertainties encountered in compiling the required information;	
31 (2) (n)	A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;			
31 (2) (o)	An environmental impact statement which contains— a summary of the key findings of the environmental impact assessment; and a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;			
31 (2) (p)	A draft environmental management programme containing the aspects contemplated in regulation 33;	50 (1) h.	Description of the arrangements for monitoring and management of environmental impacts; and	
31 (2) (q)	Copies of any specialist reports and reports on specialised processes complying with regulation 32;	50 (1) i.	Inclusion of technical and supporting information as appendices, if any.	
31 (2) (r)	Any specific information that may be required by the competent authority; and			
31 (2) (s)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.			

2. Applicant and Environmental practitioner details (NEMA Reg 31 (2) (a))

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THIS PROCESS WAS MANAGED BY:

Vanessa Marais: BL Landscape Architecture (Principal EAP)

Expertise of the EAP:

Vanessa Marais has a BL Degree in Landscape Architecture with more than 12 years relevant experience in reviewing and conducting EIAs at DEAT, Africon and Galago Environmental.

Vanessa Marais has specialized in the development of management processes and guidelines for the review of environmental impact assessments. She has been extensively involved in policy decisions relating to environmental impact management within the ambit of the national context. Her field of expertise is environmental impact management, evaluation and review with analysis of processes used for environmental impact management as well as the mitigation of these impacts within the environmental management plan context.

While working at a big engineering firm, her experience in the field of Environmental Impact Assessments (EIAs) has enabled her to develop mechanisms for determining impacts associated with developments as well as mitigating measures for Environmental Management Plans (EMP). She gained valuable experience in project management while contributing to various projects in the environmental field. She has used the vast experience in EIAs and EMPs to externally audit environmental conditions at various construction projects, notably the Kruger Mpumalanga International Airport, the Development Bank of Southern Africa, Rabali Weir (Limpopo) and wind measuring masts in Port Nolloth.

She has compiled more than 20 Basic Assessment, Scoping or EIA reports in the last 10 years as part of a team, team leader and single Environmental Assessment Practitioner while also working on EMF's, Policies and other IEM related projects.

THIS REPORT WAS PREPARED BY:

Retha Weir: BSc Hon (EAP)

Retha has twenty two years' experience as an environmentalist; she started as an environmental education officer then became an environmental officer in the wetland section of the National Department of Environmental Affairs and Tourism. In 1999 she moved to the EIA section where she evaluated Scoping and EIA reports.

Thereafter, she became an environmental consultant in private practice. Retha has a very good track record and vast experience in conducting environmental impact assessments and drawing up environmental management plans for large and small industries, mines, housing and lodge developments.

Retha holds a BSc (Botany and Zoology) from the University of Port Elizabeth and a BSc Honours from Wits University. Retha's main responsibility is the overall management of the EIA process where her knowledge and experience adds value to the overall team.

3. Description of the proposed activity (NEMA Reg 31 (2) (b))

Mining methods vary widely and depend on the location, type and size of mineral resources. Typical mine infrastructure includes haul roads; spoil dumps; surface facilities (e.g. offices, workshops, car parks and warehouses); waste rock disposal areas; transport and service corridors (e.g. roads, pipelines, conveyers, power and water corridors); product stockpiles; chemicals and fuel storage and housing facilities (AEPA, 1996).

Sand mining is much less complex and usually only need haul roads, water for domestic use and dust suppression and perhaps a small site office.

3.1 Mining design and methodology

3.1.1 Open cast sand mining

The mining method is simplistic. No processing of the mineral is needed after mining and can be sold as is. Topsoil is removed and stockpiled, the sand is excavated and loaded on trucks and taken to the local market. Gravel will also be excavated and loaded on trucks to be sold to contractors.

3.2 Planning and development of proposed sand mine operation

The planning and development of the mining project from prospecting, quarrying, environmental management, rehabilitation through to closure is carried out by in-house specialists (geologists, ceramists and environmentalists) and, where required, recognized outside services (surveyors, quarrying contractors and environmental consultants).

The mining technology applied to extract the sand from the pit consists of two basic unit operations. These are excavating and hauling the sand to the clients. A front end loader and TLB and water cart will be used in the process. A haul road is situated at the side of the pit, forming a ramp up which trucks utilize, carrying the sand from the mine to the clients. The road will be maintained by using road graders and dozers.

The topsoil layer will be removed and stockpiled separately to be used during rehabilitation. Rehabilitation of the worked-out sections of the mine will be carried out concurrently with mining operations, provision have been made for rehabilitation (see Appendix F). The area

to be mined will be in accordance with the Mine works programme (Appendix C) and the Section 2.2. map as indicated in Appendix B.

3.3 Roads

The access road network has already been established during the previous mining permit operation. No rail network is deemed necessary.

3.4 Electricity

The electrical network will not be necessary.

3.5 Water supply

No processing of the mineral will occur and fresh water will only be used for domestic use and to wet the denuded areas and prevent dust pollution.

4. Description of the property and the location of the proposed activity (NEMA Reg 31 (2)(c))

The West Rand District Municipality (WRDM) is a Vuna AWARD winning Local Authority comprising of four local municipalities, namely, Mogale City, which is known for the Cradle of Humankind World Heritage Site, Merafong, Randfontein and Westonaria Local Municipalities (LMs). It is located on the south western edge of the Gauteng Province.

The 368.25 ha study site lies south of, and abuts, the N14 highway west of Brandvlei Agricultural Holdings on the remainder of portion 1 and a portion of portion 6 of the farm Vogelstruisfontein 263 IQ (see Figure 1 and Appendix A), Randfontein Local Municipality, West Rand District Municipality.

The landowner farmed with livestock on the farm and planted maize under two pivot irrigation points from about 12 years ago. The groundwater used in the pivot irrigation was unfortunately not sustainable (and could only be used for short periods of time). The costs for electricity from Eskom also escalated tremendously and the farmer therefore stopped using the pivot irrigation approximately 6 years ago.

Lengeo has a mining permit to mine sand on a small portion of the farm and other mining activities took place on the farm in the past that was not rehabilitated. Lengeo applied for a mining right to use a larger portion of the farm to make mining more sustainable and to enable the company to implement rehabilitation measures on un-rehabilitated areas of the farm (see the Quantum calculation Appendix F). The application is for the mining of building and plaster sand and stone aggregate (gravel) that will go to local markets.

This material is primarily for the domestic market. Based on the available information, the aerial extent of the deposit is estimated to be in the region of 3 283 075 m². The average thickness of the deposit is a very conservative 1.53 m. This thickness was measured from 30 cm below ground surface as the upper 30 cm of the profile, the topsoil, needs to be stockpiled for future remediation purposes and was thus discounted from the calculation.

The proposed mining method is very simplistic. Very little precession is deemed necessary. As soon as the product is loaded and delivered, the product is ready for use. The bulk of the mining method consists of excavation with a back-actor, loading and hauling.

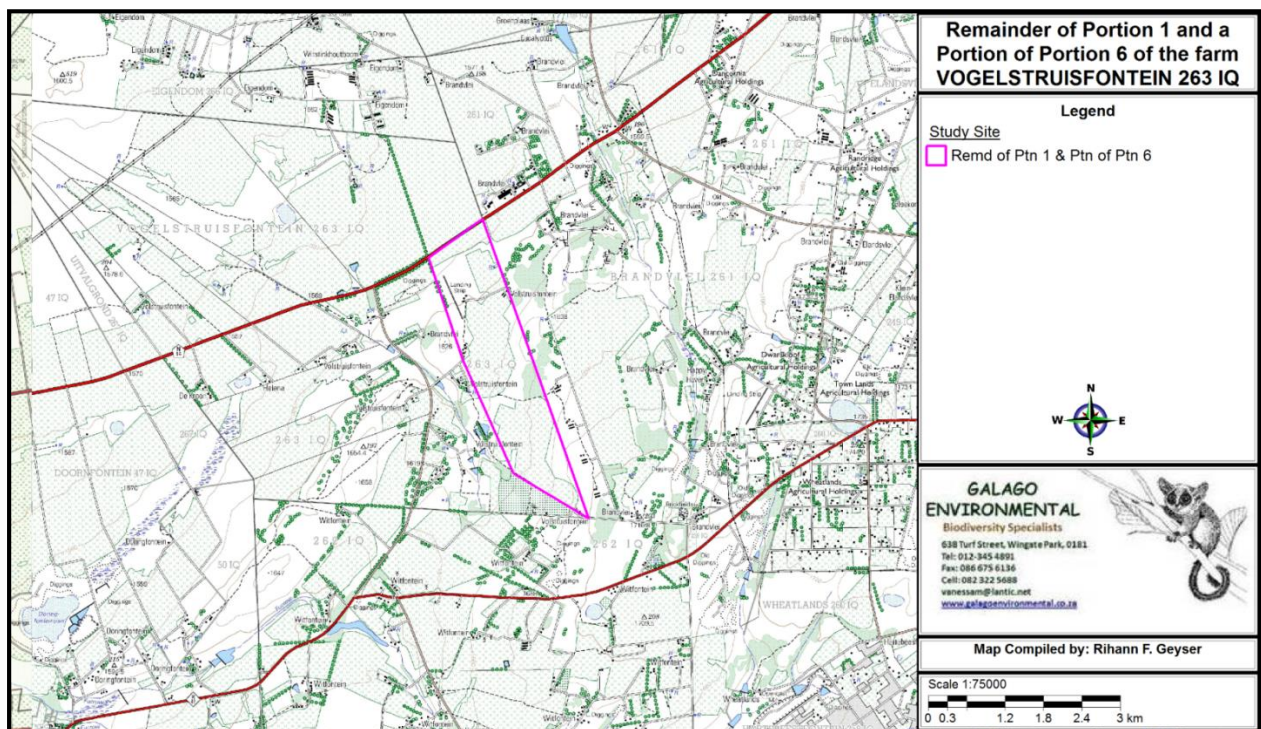


Figure 1: Locality map of the study area

5. Description of the environment that may be affected and an assessment of how it will be affected (NEMA Reg 31 (2) (d) & MPRDA Reg 50 (1) a)

The following section provides a description of the baseline, or status quo assessment of the environmental and socio-economic parameters of the site (see the photo report in Appendix G).

5.1 Climate and rainfall

The climate of the site is typical of the Highveld region. Precipitation is usually in the form of thundershowers, often accompanied by hail in the summer months followed by dry winters. The mean annual precipitation for the area is between 600 and 700 mm, with the dominant precipitation received during the months of October to March.

The area generally receives little rainfall during the months from April to September. The highest monthly temperature of 35.3°C was recorded in January and the lowest monthly temperature of -3.3°C was recorded in July. The area is significantly colder than Pretoria itself, with winter temperatures easily dropping to 4 degrees below freezing point with extensive frost during winter months (Mucina and Rutherford, 2006). It is not expected that the mining activities will have any impact on the climate or rainfall of the area.

5.2 Topography

The topography of the site and the district is typical undulating grassy plains.

Two manmade dams occur on site and water accumulates in the mined areas. Two areas of wetland was observed on site, one being more natural and the other impacted and degraded with only redoximorphic conditions and some hydrophytes indicating wetland conditions. These wetland systems have been impacted on before 1953 through agriculture with cultivation of most of the site, this has reduced the functional wetland areas and limited them to the south of the site. The more recent mining activities (over the past 10 years) have been done in areas where cultivation has taken place. A low ridge is located along the eastern and south-eastern boundaries (see Figure 2). The Class 1 and 2 ridges will not be affected by the mining activities.

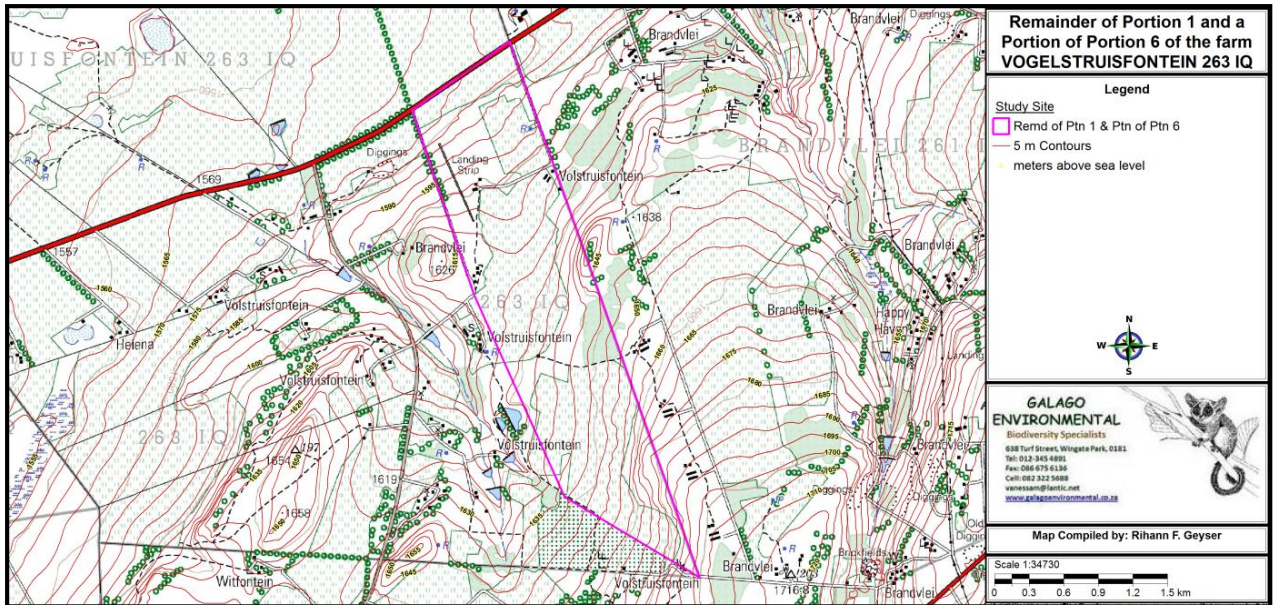


Figure 2: An aerial view of the farm Vogelstruisfontein indicating topographical features

5.3 Geology and land types

The farm occurs within weathered portions of the Hospital Hill Subgroup of the West Rand Group. The West Rand Group forms part of the Witwatersrand Supergroup. The geology of the Witwatersrand Supergroup is well understood and documented as a result of the extensive mining and exploratory drilling in the region (see the Geotechnical mining report in Appendix D1).

The development and preservation of the Witwatersrand Basin is structurally controlled. According to Truswell (1977) the Witwatersrand Basin is a thick sequence of shale, quartzite and conglomerate. The average dip of the strata is 30° south, although localised dips can vary significantly.

There are two main divisions, a lower predominantly argillaceous unit, known as the West Rand Group and an upper unit, composed almost entirely of quartzite and conglomerates, known as the Central Rand Group. The West Rand Group is divided into three subgroups namely the Hospital Hill, Government Reef and Jeppestown subgroups.

These rocks comprise mainly of shale, but quartzite, banded ironstones, tillite and intercalated lava flows are also present. The rocks were subjected to low-grade metamorphism causing the shale to become more slaty. The original sandstone was re-crystallised to quartzite.

The Hospital Hill Subgroup consists of a basal quartzite called the Orange Grove Formation which is made up of two prominent quartzite layers, separated by a schistose shale layer. The next stratigraphic unit overlying the Orange Grove Formation is a shale layer commonly known as the Parktown Shale Formation, The Parktown Shale Formation is subdivided into three units, namely a lower dark brown shale, a central rippled quartzite and an upper speckled red shale (Visser, 1989).

Land type information for the site was gathered through the Department of Agriculture's Global Information Service (AGIS obtained January 2014). The study site lies on the Ab4 and Ba36 land types (Figure 3). Ab4 is characterised by freely drained, red and yellow, dystrophic/mesotrophic, apedal soils comprise >40% of the land type (yellow soils <10%). Ba364 is characterised by Red and yellow, dystrophic/mesotrophic, apedal soils with plinthic subsoils (plinthic soils comprise >10% of land type, red soils comprise >33% of land type). The soil and geology for the site will be affected to a depth of about 3 meters.

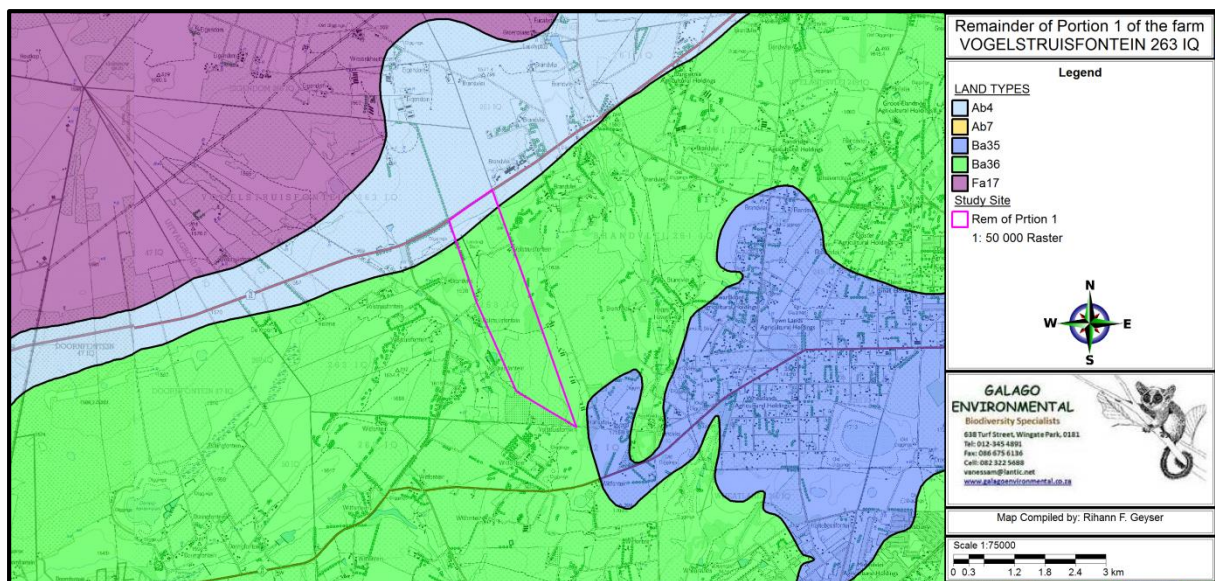


Figure 3: The land types of the study site

5.4 Hydrology

The study site lies in the upper catchment of the Crocodile River (a major tributary into the Hartebeespoort Dam). The study area falls in the Crocodile (West) - Marico Water Management area (no 3), and is located in quaternary catchment A21F. See Figure 4 below for the Google Earth description of the site, as provided by the Department of Water Affairs's Resource Quality Services (RQS) department.

The site falls within the Highveld Ecoregion as described in the Level 1 Ecoregions by the Department of Water Affairs and Forestry (DWAF, 2005).

The Level 1 description of the Water Management Area, as from DWAF, 2005 lists the system as part of the Crocodile (West) River and is characterised by the following:

This is generally a low lying, dry to arid, hot region with virtually no perennial streams originating in the area itself. Perennial rivers that traverse this region include the Crocodile (west), Marico, Mokolo, Lephalala and Mogalakwena.

- Mean annual precipitation: Low to arid.
- Coefficient of variation of annual precipitation: Moderately high to high
- Drainage density: Mostly low but with some areas in the north having a high drainage density.
- Stream frequency: Mostly low to medium, but high in north-eastern areas.
- Slopes <5%: Generally >80% of the area.
- Median annual simulated runoff: Very low to low.
- Mean annual temperature: High to very high

Wetlands in South Africa with its high evapo-transpiration rates depend on catchments to provide runoff and groundwater flows. Catchments of wetlands can be defined as the action of collecting water in an area, from the highest topographical point to the lowest collection point (and in the case of the wetland found on site, a valley bottom wetland and isolated hillslope seepage system) (SANBI, 1999).

¹**Level I:** This level of typing is based on the premise that ecosystems and their components display regional patterns that are reflected in spatially variable combinations of causal factors such as climate, mineral availability (soils and geology), vegetation and physiography. In South Africa physiography, climate, geology, soils and potential natural vegetation have been used as the delineators of Level I (DWAF, 2005).

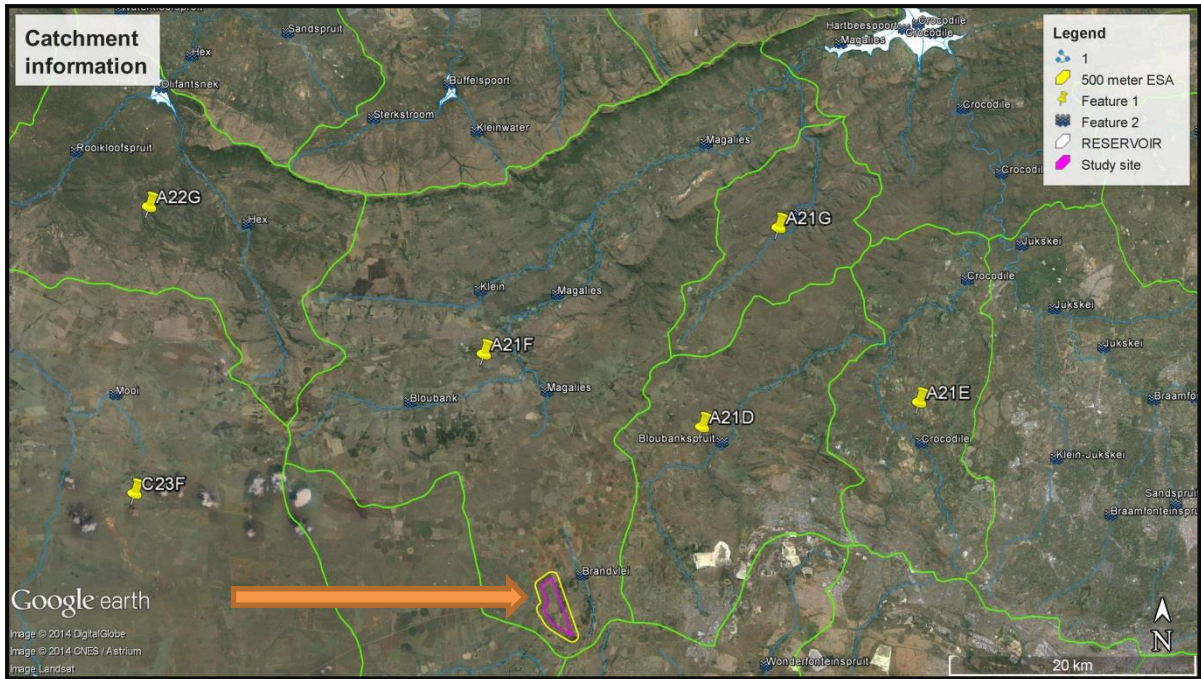


Figure 4: The Catchment and hydrological data for the study site (DWA RQS services)

The condition of a wetland’s catchment thus has a profound impact on the nature of the flows entering the wetland. Therefore the extent of the catchment is determined and its condition assessed by identifying possible impacts and sources of pollution. The wetland and riparian area of the study site forms part of a larger HydroGeomorphic (HGM) drainage network and thus share a larger catchment (see Table 3 for the catchment use descriptions and proportional percentage). The main sources of water feeding the wetland are from the ridges to the north and south.

Two areas of wetlands were observed on site, one being more natural and the other impacted and degraded. These wetland systems have been impacted on before 1953 through agriculture with cultivation of most of the site, this has reduced the functional wetland areas and limited them to the south of the site. The more recent mining activities (over the past 10 years) have been done in areas where cultivation has taken place. A buffer zone has been drawn around the natural wetland and it is not expected that the mining will have a direct impact on this area but could still impact on the drainage patterns to the wetland.

5.5 Biological environment

5.5.1 Flora

According to Mucina & Rutherford (2006) the site is located in two vegetation units (Figure 5). A narrow strip south of, and parallel to the N14, is classified as **Carltonville Dolomite Grassland**, a species-rich grassland with shallow soil and slightly undulating plains on dolomite dissected by prominent rocky chert ridges. This grassland falls within a warm-temperate summer-rainfall region with high summer temperatures and severe frequent winter frosts. The Carltonville Dolomite Grassland vegetation unit is considered vulnerable.

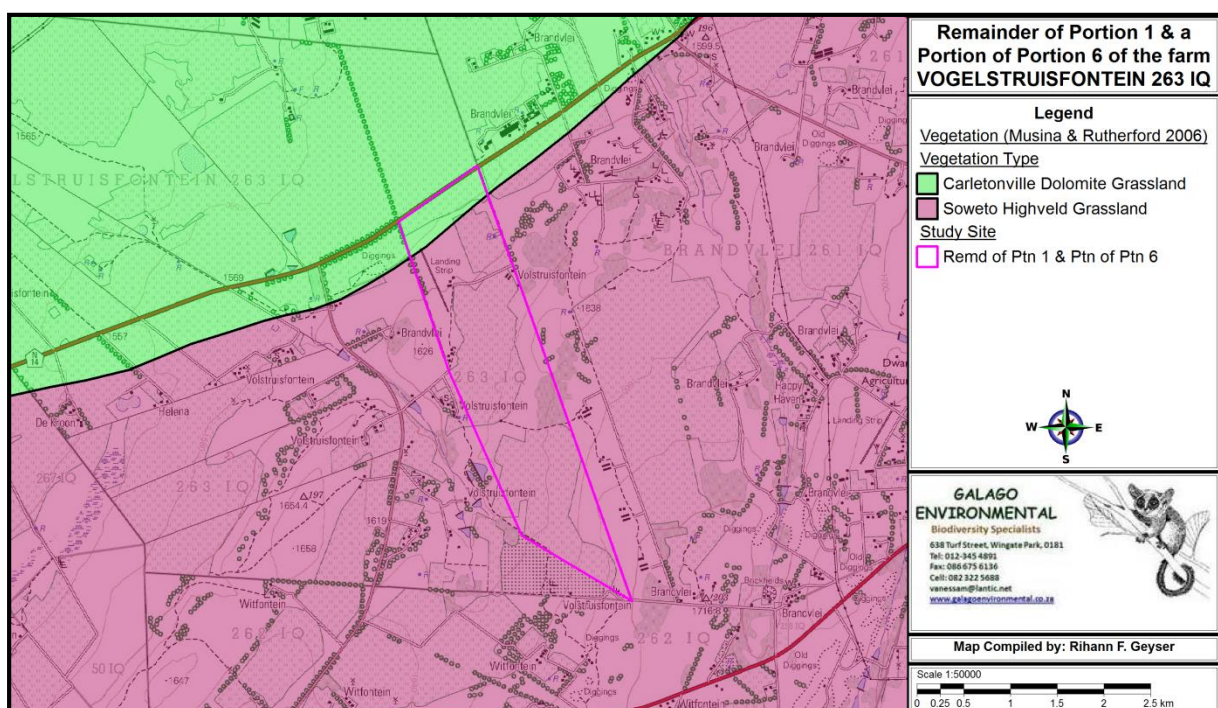


Figure 5: Vegetation map (Mucina & Rutherford, 2006)

The southern, and largest, part of the site is classified by Mucina & Rutherford (2006) as **Soweto Highveld Grassland**, a gently to moderately undulating landscape on the Highveld plateau supporting short to medium high, dense, tufted grassland dominated almost entirely by *Themeda triandra*, and accompanied by a variety of other grasses. It is in places undisturbed, with scattered small wetlands, narrow stream alluvia and pans. Occasional ridges or rocky outcrops interrupt the continuous grassland cover. This vegetation unit comprises shale, sandstone or mudstone, or the intrusive Karoo Suite dolerites which feature prominently. The soil is deep and red on the flat plains. It has summer rainfall and cool-temperate climate with high extremes between maximum summer and minimum winter temperatures, frequent frosts and large thermic diurnal differences, especially in autumn and

spring. The **Soweto Highveld Grassland** vegetation unit is considered endangered. It is expected that all cover vegetation and topsoil will be removed thus having a large impact on the vegetation of the site.

Seven vegetation study units were identified on the study site:

- Mixed alien and indigenous vegetation;
- Excavations;
- *Searsia magalismontana* ridge vegetation;
- *Digitaria – Loudetia* grassland;
- Fallow fields;
- Cultivated fields; and
- Drainage line vegetation.

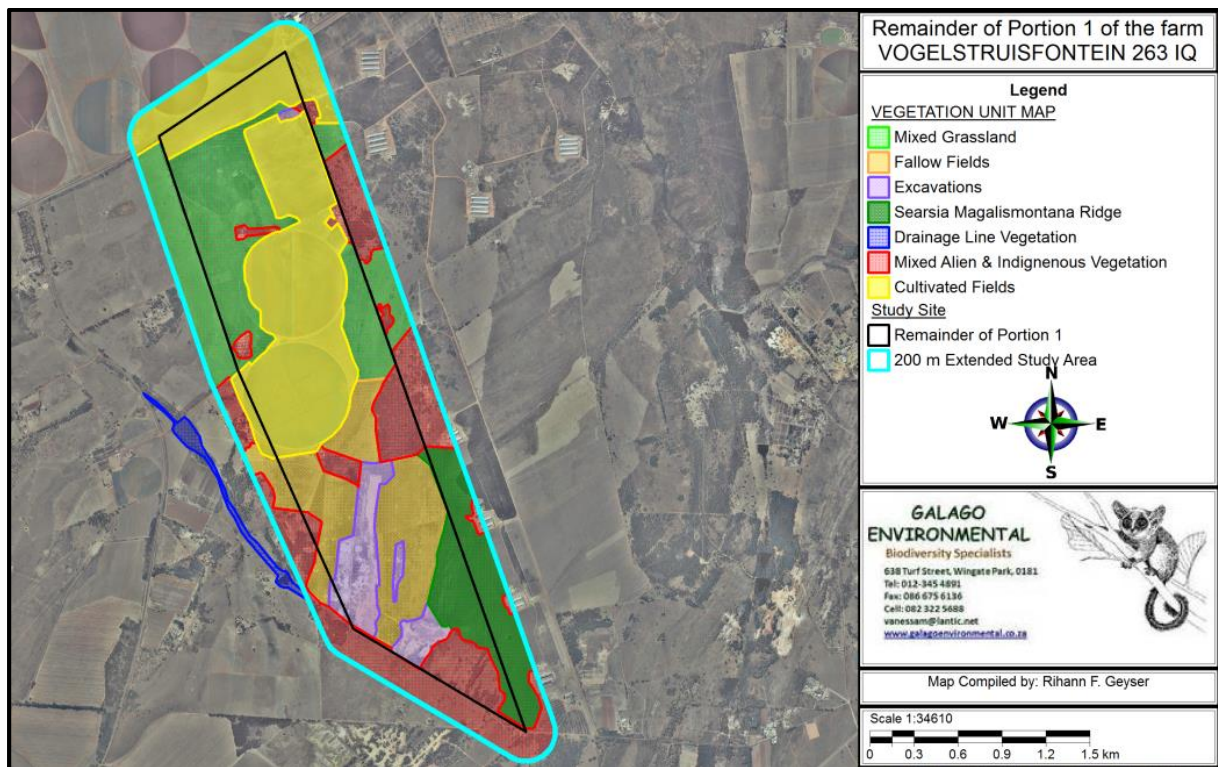


Figure 6: Vegetation study units

The flora study found that the largest part of the study site is degraded. Mixed alien and indigenous vegetation, excavated areas and both cultivated- and fallow fields occur on most of the site. Plants that favour wetland conditions were observed in all the lower-lying excavated areas. A dolerite ridge, in places infested with wattle thickets, but for the most part comprising primary grassland that is considered sensitive, runs along the eastern boundary line of the site. The Red List species *Khadia beswickii* occurs on the plateau of the ridge. According to the GDARD minimum requirements for biodiversity assessments, a protective

buffer of 600 meters must ideally be maintained around the sub-population of Red List plants for areas outside the urban edge. The 600m buffer area has been mined in the past and mining activities will be confined to the valley areas. It is therefore recommended that only a 200m buffer be implemented.

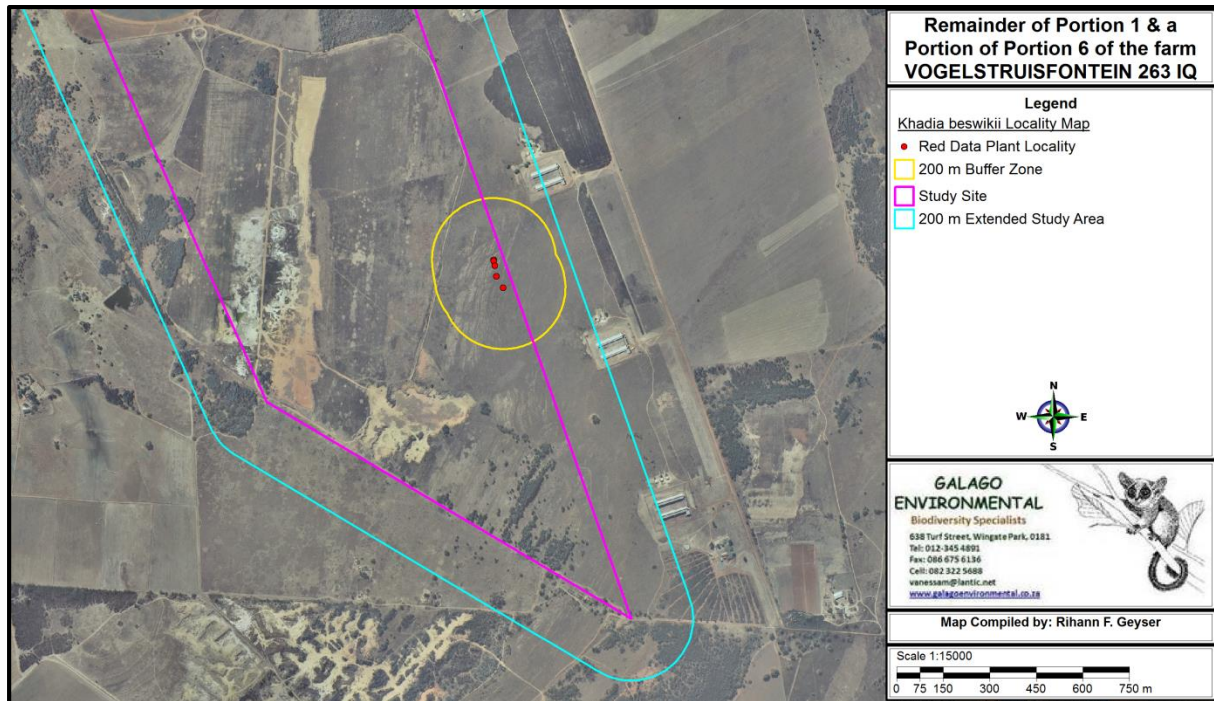


Figure 7: Map showing the location of the red listed plant found on site with a 200m buffer

An area of natural grassland designated *Digitaria – Loudetia* grassland and considered sensitive, occurs in the northwestern quarter of the site. A drainage line with a few weirs runs along the curved western boundary line of the site. A wetland specialist must determine the extent of the wetland on the site and along the drainage line. The protective buffer around the wetland areas prescribed by GDARD must be maintained.

The flora study considers the *Searsia magalismontana* ridge vegetation study unit, the *Digitaria – Loudetia* grassland study unit, the Drainage line vegetation study unit and all wetland areas in the excavations, as determined by the wetland specialist, sensitive. The Mixed alien and indigenous vegetation study unit and both cultivated- and fallow fields study units are not considered sensitive. The excavated areas that are not situated in wetland are likewise not deemed sensitive.

According to the GDARD minimum requirements for biodiversity assessments, a protective buffer of 600 meters must ideally be maintained around the sub-population of Red List plants

for areas outside the urban edge. The 600m buffer area has however been mined in the past and mining activities will be confined to the valley areas. It is therefore recommended that only a 200m buffer be implemented. The protective buffer around the wetland areas prescribed by GDARD must be maintained.

5.5.2 Fauna

The terrestrial habitat predominates on the study site but is ecologically transformed. A scan of the ridges determined that there is a Class 1 and a Class 2 ridge on site (Figure 8). This low rocky ridge towards the east and south-east of the site is ecologically not significantly disturbed but is ecologically poorly developed. It is expected that this habitat will only host common faunal species. A 200 m buffer zone has been drawn around the Class 1 ridge and no development will take place within this area.

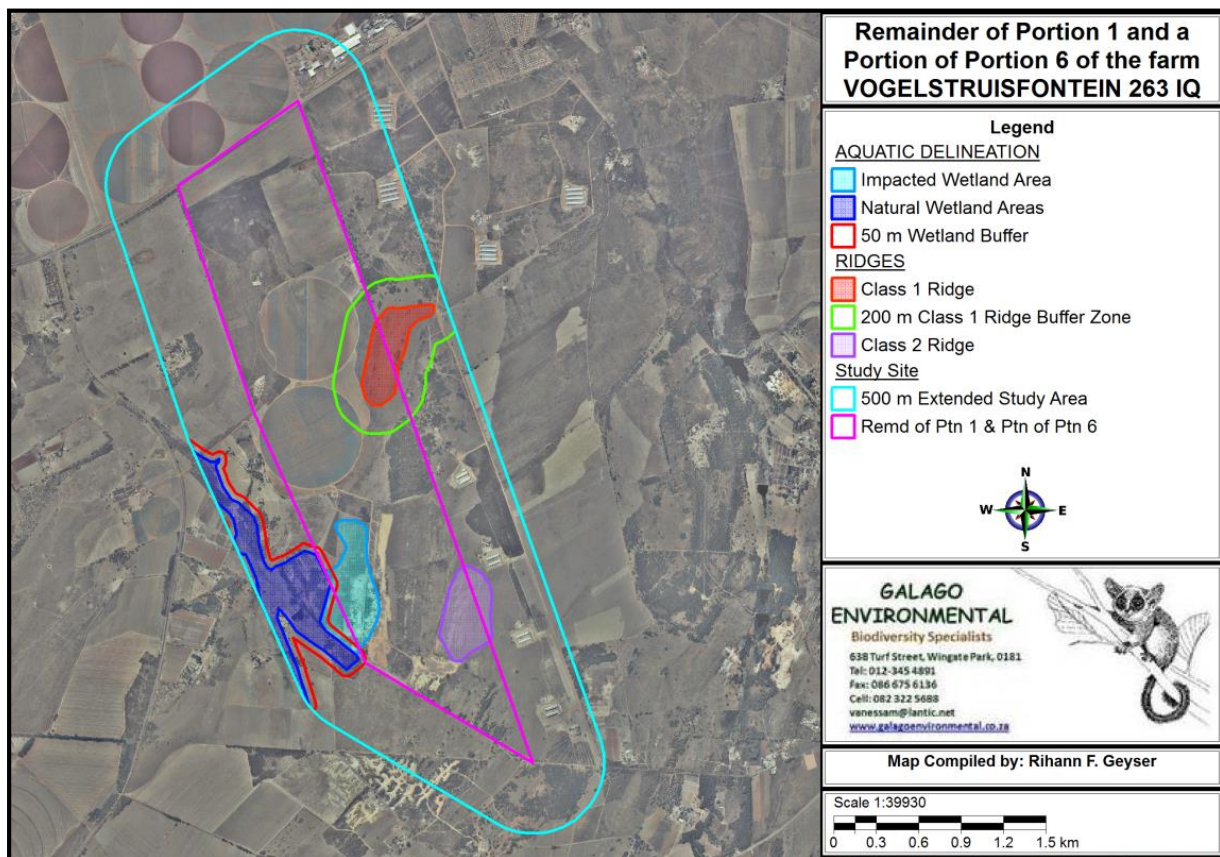


Figure 8: Class 1 and Class 2 ridges and wetlands found on site

The wetland study found that two areas of wetland was found on site- one being more natural and the other impacted and degraded with only redoximorphic conditions and some hydrophytes indicating wetland conditions. These wetland systems have been impacted on before 1953 through agriculture with cultivation of most of the site. This has reduced the

functional wetland areas and limited them to the south of the site. The more recent mining activities (over the past 10 years) have been done in areas where cultivation has taken place.

A buffer of 50 meters (for outside urban edge) must be applied for the natural wetland found on the study site. The impacted wetland does not warrant a buffer as the system is highly degraded. Any activities in this area must however be authorised in terms of the National Water Act (Act No. 36 of 1998). It must be clearly noted that any development on the study site will have an impact on the aquatic ecosystems and must be authorised in terms of section 21 of the National Water Act (Act No. 36 of 1998).

Two manmade dams and water accumulations in the mine areas are deemed too isolated and in some instances lacking riparian zones to support moisture-dependent mammals.

The **mammal** study found that only two mammal habitat types are present on the site. The terrestrial habitat predominates but is ecologically transformed. The rupicolous habitat along the low rocky ridge towards the south-east is ecologically not significantly disturbed but is ecologically poorly developed. Only common species such as the ubiquitous Namaqualand rock rat and rock elephant shrew can be expected.

Yellow and slender mongooses, scrub hares, ground squirrels and steenbok were seen in the terrestrial habitat. The mongooses (and likely genets) will persist in close proximity of disturbed or habituated areas as long as prey densities remain sustainable. Common rodents such as the two multimammate mice and Highveld gerbils are also likely to occur. Common bats such as the Cape serotine, African yellow house bat, Greenish yellow house bat and the Egyptian slit-faced bat can be expected to commute to the two dams on the site to prey on insect swarms that rise during summer dusks.

The 500 meters zone immediately outside the site perimeter is farm land mostly devoted to grazing. It is not mined for sand and is thus in better ecological health.

No ecologically important area(s) or systems were identified. From a mammal perspective, the site has a low sensitivity. The species richness of the site has deteriorated to a level that it has virtually no ecological value.

The **avifaunal** study found that the habitat within the boundaries of the study site is largely disturbed and unlikely to hold a large number of avifaunal species and can be regarded as

low sensitive. The site was revisited during March to April to determine the presence of African Grass-Owls but none were found on site and it was confirmed that the habitat is not optimal for this species.

The **herpetofaunal** study found that the two man-made dams in the drainage line as well as their 50m buffer zones should be considered as ecologically sensitive. The natural rupicolous habitat in the form of the two ridges must also be protected.

The study site contains potential breeding places for the giant bullfrog, which is not a priority species in Gauteng.

5.5.3 Overall biodiversity

From all the biodiversity studies undertaken it is clear that the wetland areas as well as the associated 50m buffer areas are deemed sensitive. The Class 1 ridge together with its proposed 200m buffer as well as the Class 2 ridge with its red listed plant species is also considered sensitive. The rest of the study site is highly disturbed and has been transformed by past and present agricultural and mining activities and does not offer suitable habitat for the Red Data species recorded in that area. The sensitivity map (Figure 9) and table (Table 2) below indicate the areas that will be avoided by the development.

Table 2: Sensitivity mapping rules

BIODIVERSITY ELEMENT	SENSITIVITY MAPPING RULE
Flora communities	Sensitive flora communities, red list species + 200m buffers
Faunal habitat	Sensitive faunal habitat
Ridge	Sensitive Class 1 ridge + 200m buffer & Class 2 ridge
Wetland	Wetland area + 50m buffer

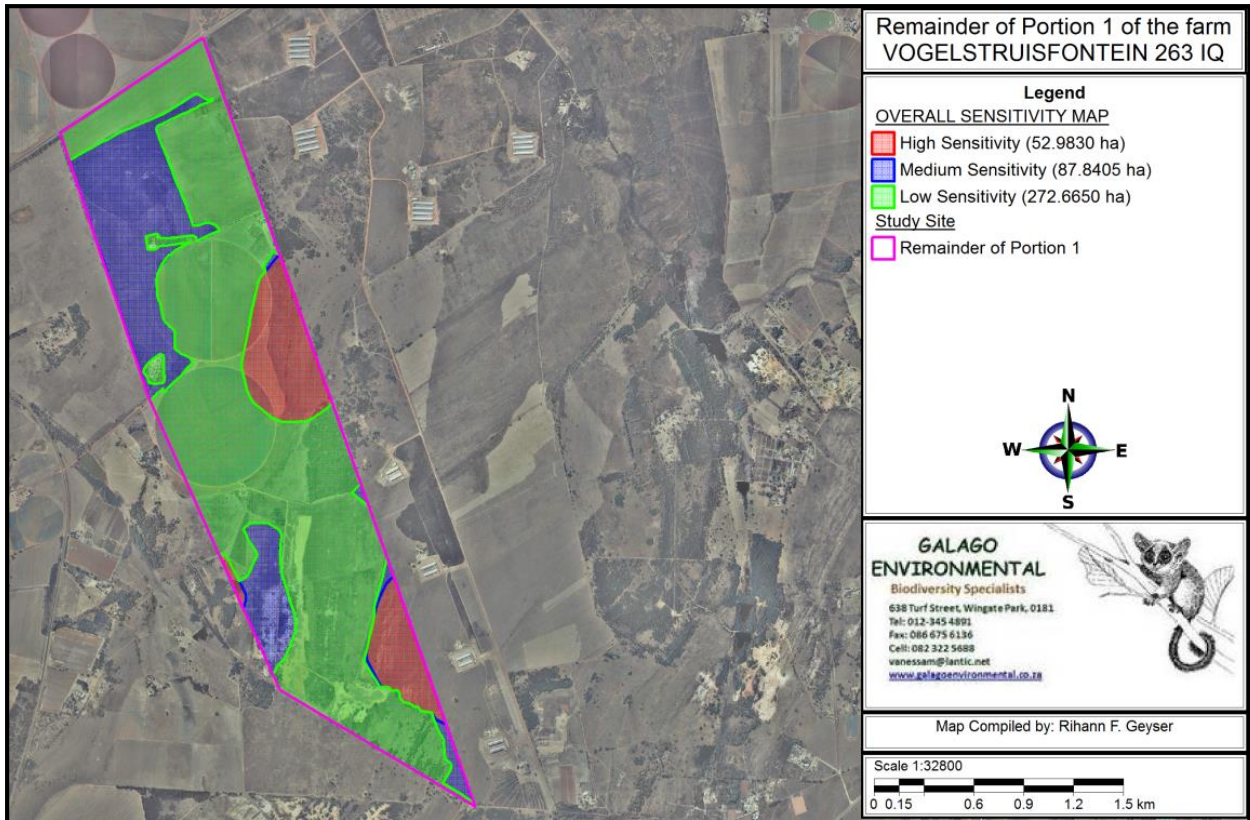


Figure 9: Combined environmental sensitivity map

5.6 Social environment

5.6.1 Land use

Google Earth's imagery from 2003 to early 2014 show that the property has been extensively used for agriculture (cultivation) in the past. Due to the high utilization of the property for cultivation, aerial images from earlier years were accessed and it was determined that cultivation of the area dates back to 1953. More recently, the site has been used for mining activities- mostly in the areas of previous cultivation (Figure 10). Table 3 shows the percentile land use for the catchment of the study site.

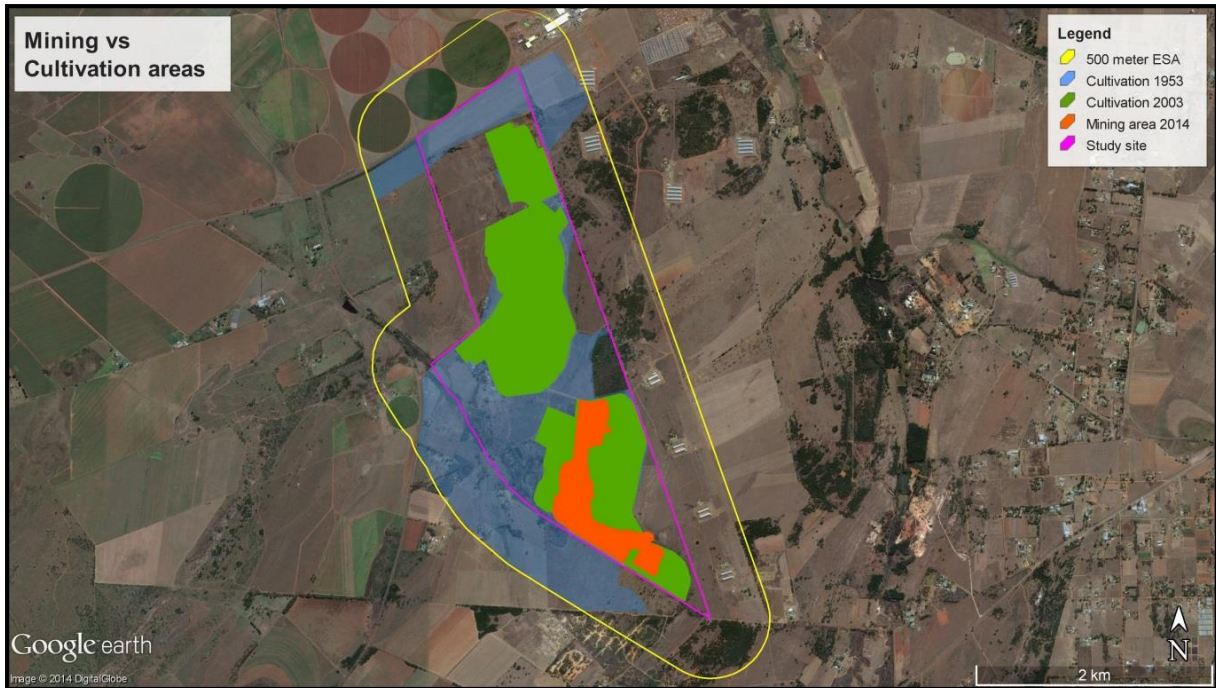


Figure 10: Mining in 2014 is approximately in the same areas as where previous cultivation took place

Table 3: The percentile land use of the catchment of the study site

Catchment land use	Percentage
Agriculture	50
Housing	0
Industrial	0
Roads	10
Natural (disturbed)	30
Natural (reference condition)	10
Total	100

5.6.2 Socio-economic profile

Vogelstruisfontein farm is about 15 km west of Randfontein, Gauteng Province, and falls in the Randfontein Local Municipality of the West Rand District Municipality. The local municipality is about 475 km² in extent. Randfontein's contribution to the province lies within the mining sector and Randfontein also fulfils a residential function for many people working in Johannesburg, Pretoria, Potchefstroom and Van der Bijl Park.

Randfontein's existence dates back to the 1550s when AmaNdebele lived as one nation at Emhlangeni (today's Randfontein area) under King Mhlanga approximately between 1550-1580. The name of EMhlangeni is today being translated to the Sotho language, Mohlakeng.

The total population of Randfontein was estimated at 136 700 in 2006. The population growth from 2006 to 2010 was 5%, with the population estimated for 2011 at 149 286 (Table 4) (Census 2011 – Statistics South Africa).

Formal employment in Randfontein grew from an estimated 27 506 jobs in 2001 to about 29 000 during 2006 (i.e. 0.9% p.a.). During 2001 the unemployment rate was estimated by Statistics South Africa at 24%.

The formal employment opportunities are catered by Governmental Services (34.3%), followed by Trade (17.3%) and Manufacturing (16.0%). Efforts should be made to increase the share of trade and manufacturing in the economy as to provide jobs for the people in the municipality.

Table 4: Demographic information for Randfontein Local Municipality

Demographic Information	
Population	149 286
Age Structure	
Population Under 15	24.90%
Population 15 To 64	70.20%
Population Over 65	4.90%
Dependency Ratio	
Per 100 (15-64)	42.40
Sex Ratio	
Males per 100 females	100.70
Population Growth	
Per annum	1.47%
Labour market	
Unemployment Rate (official)	27.10%
Youth Unemployment Rate (official) 15-34	35.80%
Education (aged 20 +)	
No Schooling	4.00%
Higher Education	11.70%
Matric	32.10%
Household dynamics	
Households	43 299
Average Household Size	3.00

Demographic Information	
Female Headed Households	33.60%
Formal Dwellings	80.00%
Housing Owned	46.60%
Household services	
Flush Toilet Connected To Sewerage	79.30%
Weekly Refuse Removal	78.80%
Piped Water Inside Dwelling	61.90%
Electricity For Lighting	84.50%

The West Rand Region's Gross Domestic Product (GDP-R) in comparison to the Gauteng Province at current prices (R 1000) shows that the West Rand Region is still the poorest region when contributing to the Gauteng GDP (Table 5). This is because the overall economy of the West Rand is relatively smaller in comparison with other economies in the province and as a result a large number of the people reside in the West Rand and work in other areas such as Johannesburg and Pretoria. The average annual growth for the municipality has increased according to Global Insight's future economic predictions by 2.5% in comparison with the annual growth rate of Gauteng GDP.

Table 5: Sector Contribution: 2009/2010 average growth in GDP (source IDP 2014/15)

Average Growth in GDP	2009	2010
Agriculture	1.7%	1.8%
Mining	16.0%	15.6%
Manufacturing	19.6%	18.9%
Electricity	0.4%	0.4%
Construction	4.8%	4.8%
Trade	11.2%	11.3%
Transport	4.7%	4.7%
Finance	24.9%	25.2%
Community Services	16.8%	17.3%
Total Industries	100%	100%

From the information indicated above, it is clear that a decline in the growth of the manufacturing, as well as the mining industries is of great concern. Hence efforts have to be made to ensure that these sectors are stimulated.

5.6.3 Cultural / Historical Heritage

The area is currently used for combined agriculture and mining. It is not anticipated that the mining activities will be bedrock intrusive and as such the paleontological deposits will not be affected. A paleontological analysis of the area indicated that it lies on non-fossiliferous strata.

Since no sites of heritage importance could be identified on site, no further recommendations are necessary. There is a possibility of unmarked graves being uncovered during mining and the relevant steps for the mitigation of such a situation will be investigated in the Cultural Historical specialist study.

6. Public participation process (NEMA Reg 31 (2) (e) and MPRDA Reg 50 (1) f)

Guideline 7 on “Public Participation in the Environmental Impact Assessment Process”, published by Department of Environmental Affairs (DEA) in October 2012, states that public participation is one of the most important aspects of the environmental authorisation process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also facilitates informed decision-making by the Competent Authority and may result in better decisions as the views of all parties are considered.

The benefits of public participation include the following, it:

- Provides an opportunity for I&APs, EAPs and the competent authority (CA) to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
- Provides I&APs with an opportunity to voice their support, concerns and questions regarding the project, application or decision;
- Provides I&APs with the opportunity of suggesting ways of reducing or mitigating negative impacts of an activity and for enhancing positive impacts;
- Enables the applicant to incorporate the needs, preferences and values of affected parties into the application;

- Provides opportunities for clearing up misunderstandings about technical issues, resolving disputes and reconciling conflicting interests;
- It is an important aspect of securing transparency and accountability in decision-making; and
- Contributes toward maintaining a healthy, vibrant democracy.

The public participation process undertaken is in accordance with the requirements of the EIA Regulations (2010) (See Appendix H).

6.1 (f) Process of engagement of interested and affected parties and comments

The project was advertised on 7 April 2015 in English in the local newspaper the Randfontein Herald. Two A2 - sized on-site notices in Afrikaans and English were placed (Figure 11 and Figure 12), at the entrance of the property. The neighbouring landowners was informed about the project at the local auction on the 8th of April and a BID document was distributed in English via email to all neighbouring landowners on 8 April 2015. A public meeting was held with surrounding landowners, community members and other I&APs on 17 April 2015 (See minutes of the meeting in Appendix H). A copy of the Draft Scoping Report was made available to I&APs on 24 April 2015 for their comments and these were incorporated in the EIA report. See Appendix H for the site notices and advertisements.



Figure 11: View of the legal notices at the entrance to the study site

During the site visit and discussion with surrounding landowners and other I&APs the following potential impacts were listed by the EAP:

- Dust, light and noise pollution impacting on people and livestock
- Water (impact on groundwater and the future availability of water in the area)

- Service road access, maintenance and safety
- Time period before mining activities commence on new proposed mining area
- Informal settlements/township establishment by workers of the mine
- Destruction of crop farming areas – livelihood
- Security in the area with influx of workers
- Job creation in the area

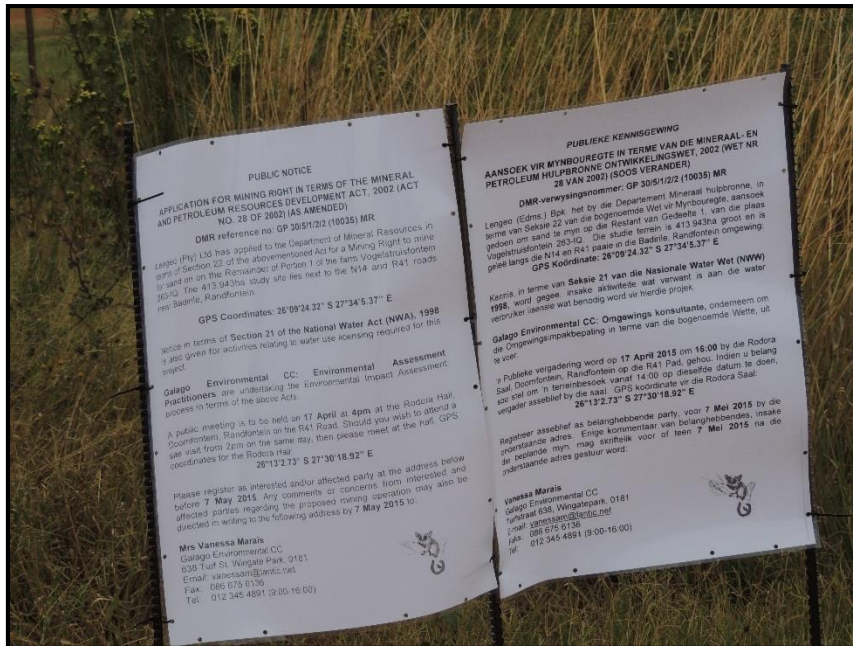


Figure 12: Content of the legal notice as zoomed in on this photo

Issues received during the Scoping phase were listed in the Issues and Concerns Register (See Appendix H) of the Scoping and EIA Report.

The issues report includes:

- The name of the respondent.
- Their comment.
- Date of receipt of their comment.
- Contact numbers and address.
- Responses to the comment.
- Issues identified from comments.

Any issues and representation by interested and affected parties is being dealt with in the Environmental Impact Assessment (EIA) Report and the Environmental Management Programme. The EIA report was made available to all registered I&AP's.

7. Need and desirability of the proposed activity (NEMA Reg 31 (2) f)

According to the Western Cape Department of Environmental Affairs and Development Planning's Guideline on Need and Desirability: EIA Guideline and information Document Series (2011), to describe the need for a development, it must be determined whether it is the right time for locating the type of land use and/or activity being proposed. To describe the desirability for a development, it must be determined whether it is the right place for locating the type of land use and/or activity being proposed. Need and desirability can be equated to the concept of wise use of land which can be determined through the question of what is the most sustainable use of land. In light of the above, the need and desirability of an application must be addressed separately and in detail answering *inter alia* the following questions:

7.1 Project motivation

The landowner farmed with livestock on the farm and planted maize with the help of additional water from two pivot irrigation points from about 12 years ago. The groundwater used in the pivot irrigation is unfortunately not sustainable (and can only be used for short periods of time) and the costs for electricity from Eskom also escalated tremendously and the farmer therefore stopped using the pivot irrigation approximately 6 years ago.

Lengeo has a mining permit to mine sand on a small portion of the mine and other mining activities took place on the farm in the past that was not rehabilitated. With this mining right Lengeo has applied for the larger farm portion to make mining more sustainable and to enable the company to implement rehabilitation measures (see the Quantum calculation in Appendix F).

7.2 Need and desirability

Table 6 summarizes the need and desirability for this project.

Table 6: Need and desirability considerations

NEED (TIMING)		
QUESTION A1: Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority.		
Yes X	Ne	<p>The project is aligned with the objectives of the municipal Spatial Development Framework (SDF) and Integrated Development Plan (IDP) and will not compromise the integrity of these respective forward planning documents. Specific reference is made to the Provincial Strategic Priorities identified for Gauteng and the West Rand District Municipality:</p> <p>Job Creation Investment Creation Rural/Urban Development Infrastructure Development Combating Crime Skills Development Combating the impact of HIV/AIDS Poverty Alleviation</p> <p>The mine development and associated operational activities and impacts are aligned with these provincial priorities and will contribute in achieving the strategic priorities set for the province.</p>
QUESTION A2: Should the development concerned, in terms of the land use (associated with the activity being applied for) occur here at this point in time?		
Yes X	Ne	<p>From the socio-economic information it is clear that a decline in the growth of the manufacturing, as well as the mining industries is of great concern. Hence efforts have to be made to ensure that these sectors are stimulated.</p>
QUESTION A3: Does the community/area need the activity and the associated land use concerned (is it a societal priority)?		
Yes X	Ne	<p>Unemployment is a major problem within the Randfontein Local Municipality and is as high as 27.1%. The proposed sand mine will only employ a small amount of people but subcontractors will be used to transport the products to the market, which will have a significant positive impact on the baseline socio-economic conditions of the local communities involved. The mine will contribute towards the socio-economic development of the region as a whole through social upliftment and job creation as primary agents.</p> <p>The future incomes earned by these employees will translate into spending power, benefiting businesses and entrepreneurs not only in the area surrounding the operation where the employees spend their working week, but also in those economies further away. Besides the positive impact the mine will have on the livelihoods of the households of its future employees in the neighbouring and labour sending communities, the mine will contribute to the upliftment of the local communities surrounding the operation. In addition to a contribution to the economy, the mine will also pay significant amounts in annual taxes, which will be used by the Government for social upliftment.</p> <p>The construction sector will also benefit from more competitive local prices.</p> <p>The proposed Mine human resource development programme will include employee skills development in the form of adult basic education and training, portable skills training and mentorship programmes.</p>
QUESTION A4: Are the necessary services with the adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?		
Yes X	Ne	<p>Current access roads are present, electricity and boreholes for water is available on site.</p>
QUESTION A5: Is this development provided for in the infrastructure planning of the municipality, and if not		

what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?		
Yes	No X	No municipal infrastructure will be required for the proposed development/mine.
QUESTION A6: Is this project part of a national programme to address an issue of national concern or importance?		
Yes	No X	
B) DESIRABILITY (PLACING)		
QUESTION B1: Is the development the best practicable environmental option for this land/site?		
Yes X	No	<p>The study area has been transformed to some degree. Alternative land uses for the site would include grazing and farming activities. Insufficient water is available for irrigation and sustainable crop farming.</p> <p>However, the study area's sand resources will be utilised to improve social and economic environments. Through implementing good practice environmental management measures and mitigation measures, it will ensure that both human and environment benefit from the development. Previously mined areas (legal and illegal) will be rehabilitated. The IDP of Randfontein has approved future development around Randfontein such as the "Droogeheuwel" development and the formalization of informal settlements and all of these will need building sand for construction activities.</p>
QUESTION B2: Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF as agreed to by the relevant authorities?		
Yes	No X	The project is aligned with the objectives of the municipal Spatial Development Framework (SDF) and Integrated Development Plan (IDP) and will not compromise the integrity of these respective forward planning documents.
QUESTION B3: Would the approval of this application compromise the integrity of the existing environmental management priorities of the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?		
Yes	No X	
QUESTION B4: Do location factors favour this land use (associated with the activity applied for) at this place, etc.)?		
Yes X	No	No location alternatives are applicable to this project since the sand resource is contained in the development area. Locating the development to another area will result in the resource not being utilised and the economy and society not benefitting from the mine.
QUESTION B5: Will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?		
Yes	No X	The proposed site for the mine is located within an area which is already severely disturbed as a result of agricultural and mining activities. The proposed mine will be located within the footprint of previous agricultural activities. As a result of the anthropogenic influences evident in the area, it is highly unlikely that any environmental or cultural effects of high significance are existent within the study area. Sensitive areas such as the ridges and wetlands have been excluded from the mining area.
QUESTION B6: Will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?		
Yes X	No	Noise dust and visual impacts will increase but with the proper mitigation measures and good practice environmental management measures, it will result in minimal impacts and it is not expected to reach beyond the property boundary.
QUESTION B7: Will the proposed land use result in unacceptable cumulative impacts?		
Yes	No X	As already mentioned, through the implementation of good practice environmental management measures as well as mitigation measures, all direct and cumulative impacts which may result from the proposed development will be addressed and ensure that the environment is affected to the minimum.

8. Description of identified potential alternatives to the proposed activity (NEMA Reg 31 (2) (g))

In terms of the NEMA EIA Regulations one of the criteria to be taken into account by the competent authority when considering an application is “any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment”. Alternatives are defined in the Regulations as “different means of meeting the general purpose and requirements of the activity”. It is therefore necessary to provide a description of the need and desirability of the proposed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity. The “feasibility” and “reasonability” of an alternative will therefore be measured against the general purpose, requirements and need of the activity and how it impacts on the environment and on the community that may be affected by the activity. It is therefore vital that the identification, investigation and assessment of alternatives address the issues/impacts of a proposed development.

8.1 Location Alternative

The location of the development is determined by the position of the resource and can thus not be moved, however during the investigation sensitive areas such as the wetlands and ridges have been excluded to protect these areas, see the Section 2.2 map in Appendix B.

8.2 Alternative Development

No alternative development has been considered as the site is to be used for expansion of the existing mining on a small portion of the study site and the irrigation farming is no longer viable with the cost of electricity and the unreliability of the water source.

8.3 Alternative Quarrying Operation

The mineral processing method is determined by various factors, including the nature and the depth of the mineral mined and the availability of proven technology.

With the mining depth extending on average to about 3 meters below surface, opencast mining utilizing truck-and-shovel principles remains the most cost effective and most efficient mining method for sand.

8.4 Demand alternatives

Building sand and G5 is currently not available locally and is thus brought in from other areas at a cost. To provide building and plaster sand to local markets will benefit the region. The underlying product, stone aggregate (gravel) can be used in road construction.

8.5 No-Project Option

8.5.1 No-go alternative and consequences of not proceeding with the proposed operation

The study site consists of old degraded agricultural lands, mined areas and small pockets of natural vegetation used for grazing of livestock. Irrigation cultivation is no longer viable in the area, due to the unreliability of groundwater in the area. The study site has proven to be rich in sand, a resource that is currently in high demand.

Sand is currently mined on a small portion of the farm. In order to extend the viability of the mining on the farm, it is proposed that sand be mined on the larger study site.

8.5.2 Consequences of not proceeding with proposed operation

The consequences of not proceeding with the proposed operation would be no additional job opportunities being created (estimated 4 jobs). In addition, the degraded old land and wetland will be left as is. Illegal mining might continue on the farm and the areas which were already mined and disturbed will not be rehabilitated. The local markets will also have to obtain sand from other sources much further away, which will increase the price of the sand in the local area.

9. An assessment of the environment likely to be affected by the identified alternative land use or development, including cumulative impacts (MPRDA Reg 50 (1) b)

9.1 Anticipated environmental, social and cultural impacts

9.1.1 Topography

The mining activities will not impact on the Class 1 and 2 ridges on the eastern boundary of the study site and will occur on the plains. The wetland areas will be avoided and a buffer zone will be established around the more natural wetland to avoid further impacts on it.

9.1.2 Geology and soil

There will be a disturbance of soil properties with a loss of soil to wind (dust) and water erosion. This will be caused by the removal of vegetation as well as mining activities and vehicles moving on the site.

9.1.3 Surface and Groundwater

The proposed development of the site can be divided into different periods with different impacts especially on flooding and erosion after development.

Currently the movement of water on site is highly impacted. This affects the in situ ability of the wetland to function as normal.

Two areas of wetland was found on site- one being more natural and the other impacted and degraded with only redoximorphic conditions and some hydrophytes indicating wetland conditions. These wetland systems have been impacted on before 1953 through agriculture with cultivation of most of the site. This has reduced the functional wetland areas and limited them to the south of the site. The more recent mining activities (over the past 10 years) have been done in areas where cultivation has taken place.

The impact of the mining activities on the wetland areas was determined in the EIA phase (see Appendix D6).

Potential impacts include:

- Potential pollution sources (hydrocarbons etc. that end up in the groundwater) moving with the groundwater and into the wetland;
- Stormwater released from hard surfaces into the wetland;
- Alien vegetation (established and future).
- Siltation of the wetlands

The impact of the extended mining activities on the currently available water in the area was determined through a geohydrological study (see Appendix D7).

The feasibility of securing the required water supply of 200m³/d for the sand mine on Vogelstruisfontein from groundwater resources are assessed as favourable. The assessment is based on the following information:

- The two boreholes, BH 1 and BH 2 were yield tested and earmarked to serve as production boreholes for the proposed development and are capable to deliver 242m³/d which is more than the needed 200m³/d if utilized at a cycle of 12 hours per day.
- The groundwater recharge volume on the development area is 635.9m³/d which is more than three times the water demand for the sand mine.
- The groundwater contours show that the aquifer is not under stress of the current groundwater use in the region.

9.1.4 Flora and fauna

Mining activities would remove the existing vegetation from the lower lying areas on site and would not have an impact on the presence of the red listed plant species found on the class 2 ridge on the site (see Appendix D2).

Mining activities will cause disturbance and displacement of fauna on site, but those adapted to the rocky ridges will not be directly impacted on. The surrounding area also has enough habitats for the displaced fauna to move into and limited impacts would occur to red data species (see Appendix D3, 4, 5).

9.1.5 Social economic

There will be a positive impact on the social and cultural structure of the region, as local people will be used on the mine, thus providing jobs and income. As part of the Social and

Labour plan for the mine (see Appendix E), training is to be done to improve worker's skills such as drivers licence training and handling of specialized vehicle training, that will improve the workers marketability if the mine close down.

9.1.6 Land use

At present the proposed mining area is being utilised for livestock (cattle) farming and crop production. Mining activities will utilise the site, but after rehabilitation it can again be used for grazing and the cultivation of crops.

9.1.7 Air Quality

Mining activities would cause a degradation of the air quality, in terms of vehicular emissions and dust generated from quarrying, raw material handling and haulage activities. A monthly dust monitoring and dust suppression programme will be implemented to ensure dust levels stay within the acceptable levels.

9.1.8 Noise

There would be an increase in noise on site as a result of quarrying and haulage activities, but only during the day time. It is however not expected that noise levels will be so high that it will be heard beyond the property boundary.

9.1.9 Visual Aspects

The location of the topsoil heaps and pits could have an impact on the visual environment, especially if mining continues over a long period of time and is not rehabilitated concurrently.

9.1.10 Cultural historical heritage

Mining activities could impact on potential heritage resources, graves or buildings older than 60 years. A cultural historical study was conducted to determine the impact of mining activities on the cultural historical resources, but concluded that no cultural historical sites or resources was observed. Unidentified graves might be found during quarrying, should such sites be found, operations should be halted and a Heritage specialist should be called in.

9.1.11 Cumulative impacts

There would probably be a minimal cumulative visual, dust and noise impact as a result of surrounding activities.

10. An indication of the methodology used in determining the significance of potential environmental impacts

10.1 Approach to EIA

An EIA is a good planning tool. It identifies the environmental impacts of a proposed development and assists in ensuring that a project will be environmentally acceptable and integrated into the surrounding environment in a sustainable way. The EIA for this project complies with the NEMA (as amended) and the NEMA EIA Regulations (2010) of the DEA. The guiding principles of an EIA are listed below.

The following methodology was applied in compiling this EIA Report:

- Evaluation of the Environmental Management Programme Report for the prospecting of sand on the study site.
- Evaluation of the Mining Work Programme for the study site.
- Evaluation of the Social and Labour Plan for the study site (see Appendix E).
- Consultation with Interested and Affected Parties:
 - Property owners.
 - Identified interested and affected parties.
 - Surrounding landowners.
 - Mines in the vicinity.
- Description of the existing environment and identification and description of potential environmental, social and cultural impacts.

10.2 Guiding principles for an EIA

The EIA must take an open participatory approach throughout. This means that there should be no hidden agendas, no restrictions on the information collected during the process and an open-door policy by the applicant.

Technical information must be communicated to stakeholders in a way that is understood by them and that enables them to meaningfully comment on the project. There should be ongoing consultation with interested and affected parties representing all walks of life. Sufficient time for comment must be allowed. The opportunity for comment should be announced on an on-going basis. There should be opportunities for input by specialists and members of the public. Their contributions and issues should be considered when technical specialist studies are conducted and when decisions are made. An EIA process comprises of 4 phases, which are set out and described in Figure 13. Each phase consists of its own objectives and timeframes as set out in the NEMA.

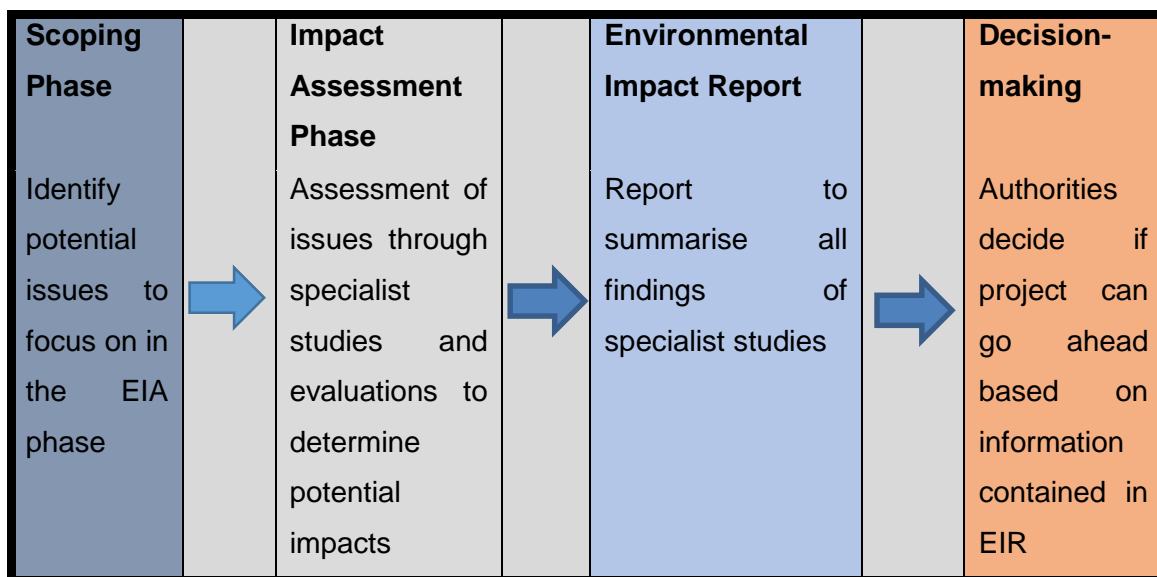


Figure 13: The four project specific phases of an EIA

The figure above shows the various phases of an Environmental Impact Assessment. This EIA is in the EIA Phase, during which interested and affected parties comment on the proposed project. These comments once received will be presented in the Comment and Response Report, appended to the Final EIA Report.

10.3 Information gathering

Early in the EIA process, the Environmental Assessment Practitioner (EAP) identified the information that would be required for the impact assessment and the relevant data were obtained. In addition, available information about the receiving environment was gathered from reliable sources and specialist studies. The project team then visited the site to gain an understanding of the proposed project.

The following methodology describes the methods used to identify the potential environmental, social and cultural impacts:

Several purposes are served by impact analysis methods. One is to ensure that all environmental factors that need to be addressed are considered in the analysis. Methods, which have a systematic approach to considering environmental factors, are desirable. Another purpose of methods of impact analysis is the evaluation of alternatives and mitigation measures. Attention will be directed towards measures that will minimise the impact of alternatives and the proposed action. Assessment methodologies will provide information in a summary form for adequate participation. The methods of impact analysis adopted will ensure compliance with the spirit and intent of current environmental legislation.

Although environmental assessment has been extensively developed in South Africa, the usage and development of methodologies has remained relatively static and has not undergone extensive development and experimentation as experienced internationally. The approach to assessment considers three analytical functions associated with the assessments: identification, prediction and evaluation. These methods will assist in specifying the range of impacts that may occur, including their spatial dimensions and the time period.

A hybrid system of checklists, matrices and overlays are proposed for the evaluation process. Checklists contain environmental factors that need to be addressed relative to the impact of alternatives. Matrices are a two-dimensional checklist that identifies various types of project actions and their potential impact on environmental items, emphasising interrelationships between affected environmental items.

10.4 Activity impact

Two phases of the project can be expected to impact on the environment in varying degrees. These are the mining phase and the long-term rehabilitation phase of the proposed development. Various activities take part in the mining and rehabilitation phases of the proposed development. These activities will be identified and listed in a matrix, which will be assessed in terms of the environmental issues identified.

10.5 Methodology in determination of significance

In determining what the impact of each phase of the project life cycle would be, the phases are broken down into associated activities or also referred to as aspects. As per the ISO 14001 definition an environmental aspect is an element of an organization's activities, products and/or services that can interact with the environment to cause an environmental

impact, that is, a positive or negative change to the environment.

Furthermore, the methodology used is that each activity is related to each aspect individually and a rating is attributed to the associated impacts. Each impact is then finally evaluated according to certain parameters that are characteristic of that aspect.

The potential significance of every environmental impact identified is being determined by using a ranking scale as discussed below. The terminology has been taken from the Guideline Documentation on EIA Regulations, of the Department of Environmental Affairs and Tourism, April 1998.

Significance of Environmental Impact = Consequence (C) x Probability (P)

The Consequence of impacts can be derived by considering the:

- Magnitude (M);
- Duration (D);
- Spatial extent (S).

Magnitude relates to the severity of the impact. Duration relates to how long the impact may be prevalent for and spatial extent relates to the physical area, which would be affected by the impact. Having ranked the magnitude (severity), duration and spatial extent using the criteria outlined in Table 7 the overall consequence of impacts can be determined by adding the individual scores assigned to the magnitude, duration and spatial scale together. Overall probability of the impacts must then be determined. Probability refers to how likely it is that the impact may occur. Table 7 outlines how to determine the probability.

Table 7: Consequence and probability ranking

Magnitude	Duration	Spatial extent	Probability
10 – Very high / don't know	5 – Permanent	5 – International	5 - Definite/don't know
8 - High	4 - Long term (impact ceases after operational life)	4 - National	4 - Highly probability
6 - Moderate	3 - Medium-term (5-15 years)	3 - Regional	3 - Medium probability
4 - Low	2 - Short term (0-5 years)	2 - Local	2 - Low probability
2 - Minor	1 – Immediate	1 - Site only	1 - Improbable
0 – None			0 – None

Consequence (magnitude + duration + spatial extent) x probability = significance points (SP).

These ratings are adjudicated by judging each activity according to magnitude, duration, spatial extent and probability.

The maximum value, which can be obtained, is 100 significance points (SP). Environmental significance is rated as either High, Moderate or Low significance on the following basis:

Combining the consequence of the impact and the probability of occurrence, the overall risk (significance) of impacts will be arrived at, thus

Accordingly a rating is attributed to each of these categories and a total significance is generated (see Table 8). That significance is defined as follows:

- More than 60 significance points indicate High environmental significance;
- Between 30 and 60 significance points indicates Moderate environmental significance;
- Less than 30 significance points indicates Low environmental significance.

Table 8: Impact Ratings

Low impact	1 → 30	The impact doesn't influence the decision making process.
Moderate impact	31 → 60	The impact influences the decision making process if not mitigated.
High impact	61 → 100	The impact influences the decision-making process even if mitigated.

If it is determined that the activity has a low significance then the decision can be made that the development should proceed without the need to put measures in place to manage the cause of the impact, or the effect of the impact itself. However if the significance rating is medium or high then that impact and the associated activity has to be thoroughly managed so as not to leave a lasting effect on the environment and to support the strategic intent of mine closure which inter alia seeks land optimisation in a sustainable manner.

“**Cumulative impact**”, in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Each impact is thus re-evaluated in terms of its cumulative impact, taking into account the similar or other activities with similar impacts which will in combination with this activity have a significant impact in the area.

NB: Although this system, like all others, is subjective, it aims to assess impacts in as systematic a manner as possible. This system has been successfully applied by many consultants for impacts associated with many large developments countrywide, and in the broader southern African context.

11. A summary of the findings and recommendations of any specialist report or report on a specialised process (NEMA Reg 31 (2) (j))

11.1 Geotechnical report

A Geotechnical study was undertaken to quantify the volume of building and /or plaster sand (see Appendix D1). A desktop study was undertaken to describe the geological setting. The deposit occurs within weathered portions of the Hospital Hill Subgroup of the West Rand Group. The West Rand Group forms part of the Witwatersrand Supergroup. The geology of the Witwatersrand Supergroup is well understood and documented as a result of the extensive mining and exploratory drilling in the region.

At the time of the previous investigation very limited data was available in comparison with that currently available. In order to quantify the volume of building/plaster sand available, a total of 14 test pits were dug with a backhoe over the property.

The thickness of the deposit was measured in each of the test pits as well as in the three existing quarries and other exposed sources. A brief mapping exercise was undertaken during the visit where the boundary of the deposit was defined by competent outcrop. The geometry of the deposit is elongated in a northwest-southeast direction and forms a saddle in the centre where it narrows in an east-west direction.

Depth of the deposit varies laterally and is possible structurally controlled. In some test pits pebble layers were identified. Such a layer is classified as a geological unconformity which

marks a period of erosion that occurred historically. Erosion surfaces are known to be laterally extensive and irregular.

The majority of the test pits dug did not expose the full thickness of the deposit and must therefore be considered to be conservative estimates of thickness. Depth of test pits was either limited by the depth that the backhoe could reach or by reaching a point of refusal (hard consolidated bedrock).

Based on the available information, the aerial extent of the deposit is estimated to be in the region of 3 283 075 m². The average thickness of the deposit is a very conservative 1.53m. this thickness was measured from 30cm below ground surface as the upper 30 cm of the profile needs to be stockpiled for future remediation purposes and was thus discounted from the calculation.

11.1.1 Recommendations

The underlying bedrock (quartzite) could be used to produce crusher stone.

11.2 Geohydrological study

A geohydrological study was conducted and was used (together with data sourced for the water use license assessment (WULA) process) to determine the impact of mining activities on the groundwater on site.

Groundwater will be abstracted at a rate of 200m³/d for dust suppression of the existing roads on the farm. One high yielding production borehole is earmarked to be used for this purpose. The Geohydrological Study report (Appendix D7) aims to be the supportive document for a water use licence application (WULA).

A desk study was performed to gather relevant geological and geohydrological information.

A hydro - census followed the desk study to establish information such as water levels and borehole depths on all existing boreholes in the region of Remaining Extent of the farm Vogelstruisfontein. The purpose of this survey was to gather relevant geohydrological information of current groundwater use in the area.

The geology was studied by using the geological series 1:250 000, 2626 Wes Rand. Two boreholes were submitted to borehole yield testing procedures. The constant discharge data of the two boreholes were analysed by accepted mathematical curve fitting methods to be able to calculate the aquifer parameters and to calculate safe abstraction volumes for the two boreholes. The Flow Characteristic method developed by the University of the Free State was used to calculate the aquifer parameters.

A ground water resource evaluation was done by studying the groundwater drainage, extent of the catchment area, aquifer parameters, groundwater in storage, recharge and groundwater utilisation.

The feasibility of securing the required water supply of 200m³/d for the sand mine on Vogelstruisfontein from groundwater resources are assessed as favourable.

The assessment is based on the following information:

- The two boreholes, BH 1 and BH 2 yield tested and earmarked to serve as production boreholes for the development are capable to deliver 242m³/d which is more than the needed 200m³/d if utilized at a cycle of 12 hours per day.
- The groundwater recharge volume on the development area is 635.9m³/d which is more than three times the water demand for the sand mine.
- The groundwater contours show that the aquifer is not under stress of the current groundwater use in the region.

11.2.1 Recommendations

- Routine monitoring of water levels, abstraction volumes, rainfall figures and water quality is recommended and should be adhered to. This data will form the basis from which any changes in the groundwater regime are recognised.
- Groundwater level monitoring in all boreholes on the farm on a monthly basis is advised for the duration of water abstraction for the development. The information gathered during such a monitoring programme can be used to manage future abstraction figures.
- Hydrogeological monitoring data (above described) should be evaluated bi-annually by a qualified hydrogeologist.
- The Groundwater Management Plan with relevant Groundwater Monitoring and Reporting protocol, should be established by the client and calibrated annually. This means that the bi-annual report must evaluate the data and that the groundwater regime must be evaluated at least annually.

- BH1 at water level 16.83(mbgl) is recommended to serve as backup (mechanical stand by borehole) water supply borehole for dust suppression for the mine.
- BH2 at water level 17.23(mbgl) is recommended to serve as water supply borehole for dust suppression for the mine.

11.3 Flora study

A specialist flora study (Appendix D2) was undertaken to determine the potential impact of the mining operation on protected species and any sensitive or red listed species on site. Sensitivity mapping was undertaken (see Figure 9).

11.3.1 Recommendations

- The class 2 ridge and the area where the red listed plant was found together with a 200m buffer around these plants must be conserved.
- Dumping of mining materials, other waste and top soil in the areas earmarked for exclusion must be prevented, through fencing or other management measures. These areas must be properly managed throughout the lifespan of the project in terms of fire, eradication of exotics etc. to ensure continuous biodiversity.
- An appropriate management authority (e.g. the body corporate) that must be contractually bound to implement the Environmental Management Plan (EMP) and Record of Decision (ROD) during the operational phase of the development should be identified and informed of their responsibilities in terms of the EMP and ROD.
- All areas designated as sensitive in a sensitivity mapping exercise should be incorporated into an open space system. Development should be located on the areas of lowest sensitivity.
- The open space system should be managed in accordance with an Ecological Management Plan that complies with the *Minimum Requirements for Ecological Management Plans* and forms part of the EMP.

11.4 Wetland study

A wetland study (Appendix D6) was conducted to delineate possible edges of aquatic ecosystems (including riparian and wetland areas).

Two areas of wetland was found on site- one being more natural and the other impacted and degraded with only redoximorphic conditions and some hydrophytes indicating wetland conditions. The wetlands were classified as a seepage wetland system and a channelled valley bottom wetland system, with the seepage system feeding into the valley bottom system. The valley bottom wetland system was considered more natural than the seepage wetland system.

The areas were possibly historically connected but due to mining and cultivation activities in the wetland, the hydrogeomorphology was altered to such an extent that it is considered a separate system. Both wetland systems are highly impacted by alien vegetation and alteration due to mining, dam construction, grazing, and abstraction for irrigation. The areas under exotic trees are bare and denuded and signs of erosion in these areas were observed. This is important as it indicates sediment pollution into the wetland. Increased flows from the catchment use and surface hardening are of concern. The alien invasive trees were being removed during the site visit.

Both wetlands found on site can be considered to be of moderate ecological management class. The REMC was calculated to be in moderate condition (D): "Floodplains that is not ecologically important and sensitive at any scale. The biodiversity of these floodplains is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers."

It must be clearly noted that any development on the study site will have an impact on the aquatic ecosystems and must be authorised in terms of section 21 of the National Water Act (Act 36 of 1998). The GDARD minimum requirements (Gauteng Department of Agriculture Rural Development, June 2012) were used for this project as guide. A buffer of 50 meters (for outside urban edge) must be applied for the natural wetland found on the study site. The impacted wetland does not warrant a buffer as the system is highly degraded.

11.4.1 Recommendations

- A buffer of 50 meters (for outside urban edge) must be applied for the natural wetland found on the study site.
- The impacted wetland does not warrant a buffer as the system is highly degraded.
- Any activities in this area must however be authorised in terms of the National Water Act, 1998 (Act No. 36 of 1998).
- Fencing of the aquatic areas.
- Environmental control officer specializing in wetlands need to be appointed for the duration of construction.
- A WULA process need to be applied for.
- Wetland rehabilitation planning need to be drawn up.
- Post development monitoring of impacts need to be conducted.

11.5 Fauna studies

Specialist fauna studies (Appendix D3, 4, 5) were undertaken to determine the potential impact of the mining operation on protected species and any sensitive or red listed species on site. Sensitivity mapping was undertaken (see Figure 9).

The **mammal study** (Appendix D3) found that only two mammal habitat types are present on the site. The terrestrial habitat predominates but is ecologically transformed. The rupicolous habitat along the low rocky ridge towards the south-east is ecologically not significantly disturbed but is ecologically poorly developed. Only common species such as the ubiquitous Namaqualand rock rat and rock elephant shrew can be expected.

Yellow and slender mongooses, scrub hares, ground squirrels and steenbok were seen in the terrestrial habitat. The mongooses (and likely genets) will persist in close proximity of disturbed or habituated areas as long as prey densities remain sustainable. Common rodents such as the two multimammate mice and Highveld gerbils are also likely to occur. Common bats such as the Cape serotine, African yellow house bat, Greenish yellow house bat and the Egyptian slit-faced bat can be expected to commute to the two dams on the site to prey on insect swarms that rise during summer dusks.

The 500 meters zone immediately outside the site perimeter is farm land mostly devoted to grazing. It is not mined for sand and is thus in better ecological health.

No ecologically important area(s) or systems were identified. From a mammal perspective, the site has a low sensitivity. The species richness of the site has deteriorated to a level that it has virtually no ecological value.

The **avifaunal study** (Appendix D4) found that the habitat within the boundaries of the study site is largely disturbed and unlikely to hold a large number of avifaunal species and can be regarded as low sensitive. The site does not have suitable habitat for African Grass-Owls.

The **herpetofaunal study** (Appendix D5) found that the two man-made dams in the drainage line as well as their 50m buffer zones should be considered as ecologically sensitive. The natural rupicolous habitat in the form of the two ridges must also be protected.

The study site contains potential breeding places for the giant bullfrog, which is not a priority species in Gauteng.

From all the biodiversity studies undertaken it is clear that the wetland areas as well as the associated 50m buffer areas are deemed sensitive. The Class 1 ridge together with its proposed 200m buffer as well as the Class 2 ridge is also considered sensitive. The rest of the study site is highly disturbed and has been transformed by past and present agricultural and mining activities and does not offer suitable habitat for the Red Data species recorded in that area.

11.5.1 Recommendations

- The open space system should be fenced off prior to mining operations commencing (including site clearing and pegging). All mining-related impacts (including service roads, temporary housing, temporary ablution, disturbance of natural habitat, storing of equipment/building materials/vehicles or any other activity) should be excluded from the open space system. Access of vehicles to the open space system should be prevented and access of people should be controlled. Movement of indigenous fauna should however be allowed (i.e. no solid walls, e.g. through the erection of palisade fencing).
- Every effort should be made to retain the linear integrity, flow dynamics and water quality of the two man-made dams in the drainage line and the ridge connectivity with other natural areas.
- If the Giant Bullfrog or any herpetological species are encountered or exposed during the mining activities, they should be removed and relocated to natural areas in the vicinity.

- The contractors must ensure that no faunal species are disturbed, trapped, hunted or killed during the mining activities. Conservation-orientated clauses should be built into contracts for mining personnel, complete with penalty clauses for non-compliance.
- It is suggested that where work is to be done close to the drainage lines, these areas be fenced off during construction, to prevent heavy machines and trucks from trampling the plants, compacting the soil and dumping in the system.
- The crossing of natural drainage systems should be minimized and only constructed at the shortest possible route, perpendicular to the natural drainage system. Where possible, bridge crossings should span the entire stretch of the buffer zone.

11.6 Cultural historical study

A specialist cultural and historical study (Appendix D8) was undertaken to determine whether there are any archaeological or heritage sites on site of cultural importance and whether they would be impacted on by the mining operations.

The area is currently used for combined agriculture and mining. It is not anticipated that the development will be bedrock intrusive and as such a paleontological deposits will not be affected. A paleontological analysis of the area indicated that it lies on non-fossiliferous strata.

11.6.1 Recommendations

- Since no sites of heritage importance could be identified on site, no further recommendations are necessary.
- There is a possibility of unmarked graves being uncovered during mining and the relevant steps for the mitigation of such a situation is given in the Heritage Impact Assessment report (see Appendix D8).

12. An assessment of the nature (magnitude), extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed mining operation, including the cumulative environmental impacts (NEMA Reg 31 (2) k & l and MPRDA 50 (1) c)

This section looks at the environmental impact and cumulative impact that could occur during the operational and closure phase of the project. No construction phase will be discussed since all the construction took place at the existing portion of the mine. This section should be read with the impact table as seen in Appendix J.

12.1 Operational phase

12.1.1 Topography

Since the mining activities will take place on the plains, the mining activities will not impact on the Class 1 and 2 ridges on the study site. Topsoil stockpiles might form high points on the plains area, thus changing the topography.

Table 9: Topographic impact assessment table and mitigation measures summary

Topography			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a low severity	Low (4)	Low (4)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the mining site.	Site only (1)	Local (2)
Probability	The impact will be highly probable during the mining phase.	High probability (4)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a low significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Medium (36)	Low (20)
Mitigation measures: <ul style="list-style-type: none"> • Ensure sloped rehabilitated areas do not erode by using appropriate erosion control such as berms and stakes. • Rehabilitate slope areas to 33° and cover with topsoil, revegetate and water regularly. • Rehabilitate worked-out pit areas by transporting overburden stripped from subsequent mining areas on portion 1 and a portion of portion 6 of Vogelstruisfontein and backfilling into worked-out areas. • Rehabilitation with stockpiled topsoil to occur as soon as possible. 		Cost implications: R1000/m.	

12.1.2 Geology and soil

There will be a disturbance of soil properties with a loss of soil to wind (dust) and water erosion. This will be caused by the removal of vegetation as well as mining activities and vehicles moving on the site.

Table 10: Geology and soil impact assessment table and mitigation measures summary

Geology and soil			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a moderate severity	Moderate (6)	Low (4)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the mining site.	Site only (1)	Local (2)
Probability	The impact will be highly probable during the mining phase.	High probability (4)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a medium significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Medium (44)	Low (20)
Mitigation measures: TOPSOIL: (Includes stripping, stockpiling and rehabilitation) <ul style="list-style-type: none"> • Stockpile topsoil in areas approved by the ECO, for later reuse in the rehabilitation process. Where possible a top layer of 300 mm in depth must be stripped and stockpiled in an approved manner (normally to the higher side of a disturbed area) and above a 1:20 year flood line, in heaps not higher than 2m. Topsoil shall be defined as the upper soil profile irrespective of the fertility appearance, structure, agriculture potential, fertility and composition of the soil. • Herbaceous vegetation, overlying grass and other fine organic matter shall not be removed from the stripped soil. Stripped topsoil shall not be buried or in any other way be rendered unsuitable for further use by mixing with spoil or subjected to compaction by machinery. • Topsoil shall preferably be stripped when it is in a dry condition in order to prevent compaction. • Topsoil of at least 300 mm in thickness shall be placed over all stripped areas as well as over mined out areas, outside of inundated areas. • Topsoil placement shall be done concurrent with 		Cost implications: R5 600/m.	

<p>mining or as soon as mining in an area has ceased.</p> <ul style="list-style-type: none"> • All areas onto which topsoil is to be spread shall be graded to the approximate original landform with maximum slopes of 1:3 and shall be ripped to 300 mm depth or at least 100 mm into the sub-base soil prior to topsoil placement. • The entire area to be top-soiled shall be ripped parallel to the contours, 300 mm apart and to a minimum depth of 300 mm, where possible. • The top-soiling activity shall be executed prior to the rainy season and or to any expected wet weather conditions. • Stockpiled topsoil shall be placed onto the same zone from where it had been stripped. However, if there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other zones with similar quality, where the topsoil requirement is less, on the approval of the environmental officer. • Where insufficient topsoil that has been stripped by the contractor to provide the minimum specified depth, the contractor shall obtain suitable substitute material from other sources at no cost to the employer. • Any spoil generated in the mining process should only be stockpiled in approved areas, and must be shaped and trimmed. • All waste generated during mining, other than natural materials, e.g. soil and rock, should be disposed of in a proper manner at a registered dumpsite. • All personnel and vehicles used for transportation and/or mining purposes should remain within these demarcated routes and areas, i.e. vehicles should not be allowed to drive randomly across site areas, but should remain within demarcated and approved routes. The purpose of this measure is to: a) limit unnecessary compaction of topsoil; and b) prevent disturbance of vegetation outside of mining areas. • Cut slope gradients should not exceed the natural angle of repose for the particular soil type. If steeper areas are encountered, other measures must be undertaken such as the construction of retaining walls or the implementation of rock protection, all to the prior approval of ECO. • Generally, no slopes are to be steeper than 1:3. • Gradients of road alignments to be minimal, aligning the road obliquely across contours and not perpendicularly. • Storm water controls, during operations have to be maintained in terms of a storm water management 	
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<p>plan submitted to ECO for approval.</p> <ul style="list-style-type: none"> • All exposed surfaces which will not be affected by mining have to be re-vegetated as soon as practically possible. • Monitor vegetation growth. Areas that were compacted need to be ripped to allow for root penetration. • Allow for soil conservation measures such as gabions and packing of rock and branches at any steep slopes, especially at drainage line crossings. • Ensure sloped rehabilitated areas do not erode by using appropriate erosion control such as berms and stakes. • Rehabilitate slope areas to 33° and cover with topsoil, revegetate and water regularly. • Rehabilitate worked-out pit areas by transporting overburden stripped from subsequent mining areas on portion 1 and a portion of portion 6 of Vogelstruisfontein and backfilling into worked-out areas. • Rehabilitation with stockpiled topsoil to occur as soon as possible. 	
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12.1.3 Surface water

The proposed development of the site can be divided into different periods with different impacts especially on flooding and erosion after development.

Currently the movement of water on site is highly impacted. This affects the in situ ability of the wetland to function as normal.

Two areas of wetland was found on site- one being more natural and the other impacted and degraded with only redoximorphic conditions and some hydrophytes indicating wetland conditions. These wetland systems have been impacted on before 1953 through agriculture with cultivation of most of the site. This has reduced the functional wetland areas and limited them to the south of the site. The more recent mining activities (over the past 10 years) have been done in areas where cultivation took place.

Potential impacts include:

- Potential pollution sources (hydrocarbons etc. that end up in the groundwater) moving with the groundwater and into the wetland;
- Stormwater released from hard surfaces into the wetland;
- Alien vegetation (established and future);
- Siltation and or erosion of the wetlands.

Table 11: Surface water impact assessment table and mitigation measures summary

Surface Water			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a low-medium severity	Low Medium (4.5)	Low (4)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the local area.	Local (2)	Local (2)
Probability	The impact will be medium probable during the mining phase.	Medium Probability (3)	Low probable (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a low significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Medium (31)	Low (20)
Mitigation measures: <ul style="list-style-type: none"> • All soil contaminated by oil, fuel, etc. shall be collected immediately and disposed of at an acceptable disposal site to be approved by the ECO. • Water pollution through fuels, oils or other substances must be avoided. • All clean stormwater will be diverted away from mining activities. • Regular maintenance of vehicles will be done according to a preventative maintenance program. • Remove exotic and invasive species during mining and closure periods. The ECO will identify such vegetation and the method of eradication will be specified by him. • The use of topsoil for rehabilitation contaminated with the seed of alien vegetation will not be permitted. Contaminated soils should be sprayed with herbicides to the approval of ECO. • Prevent vehicular and personnel access into undisturbed areas. • Due to the compacting of the soil by vehicles or other means it will be necessary to scarify (rip) such affected areas, including haul and access roads, which will no longer be used as such. This is to allow for the penetration of roots and the re-growth of the natural vegetation. • Seeding or re-vegetation is required. • Draw up a monitoring program and take immediate action should invasives be found. • The disturbed areas must be monitored and maintained to contain and prevent noxious and invasive plants from spreading in the area. • A three monthly inspection by the ECO should be executed in this regard. • Topsoil placement shall be done concurrent with mining or as soon as mining in an area has ceased. • All areas onto which topsoil is to be spread shall be graded to the approximate original landform with maximum slopes of 1:3 and shall be ripped to 300 mm depth or at least 100 mm into the sub-base soil prior to topsoil placement. • The entire area to be top-soiled shall be ripped parallel to the contours, 300 mm apart and to a minimum depth of 300 mm, where possible. 		Cost implications: <p style="text-align: center;">R2 500/m.</p>	

- The top-soiling activity shall be executed prior to the rainy season and or to any expected wet weather conditions.
- Any spoil generated in the mining process should only be stockpiled in approved areas, and must be shaped and trimmed.
- All waste generated during mining, other than natural materials, e.g. soil and rock, should be disposed of in a proper manner at a registered dumpsite.
- All personnel and vehicles used for transportation and/or mining purposes should remain within these demarcated routes and areas, i.e. vehicles should not be allowed to drive randomly across site areas, but should remain within demarcated and approved routes. The purpose of this measure is to: a) limit unnecessary compaction of topsoil; and b) prevent disturbance of vegetation outside of mining areas.
- Cut slope gradients should not exceed the natural angle of repose for the particular soil type. If steeper areas are encountered, other measures must be undertaken such as the construction of retaining walls or the implementation of rock protection, all to the prior approval of ECO.
- Generally, no slopes are to be steeper than 1:3.
- Gradients of road alignments to be minimal, aligning the road obliquely across contours and not perpendicularly.
- Stormwater controls, during operations have to be maintained in terms of a storm water management plan submitted to ECO for approval.
- All exposed surfaces which will not be affected by mining have to be re-vegetated as soon as practically possible.
- Monitor vegetation growth. Areas that were compacted need to be ripped to allow for root penetration.
- Allow for soil conservation measures such as gabions and packing of rock and branches at any steep slopes, especially at drainage line crossings.
- Ensure sloped rehabilitated areas do not erode by using appropriate erosion control such as berms and stakes.
- Rehabilitate slope areas to 33° and cover with topsoil, revegetate and water regularly.
- Rehabilitate worked-out pit areas by transporting overburden stripped from subsequent mining areas on the site and backfilling into worked-out areas.

12.1.4 Groundwater

The impact of the extended mining activities on the currently available water in the area is not expected to be significant.

Other potential impacts include contamination of ground water resources by carbohydrates.

Table 12: Groundwater impact assessment table and mitigation measures summary

Groundwater			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a minor severity.	Minor (2)	Minor (2)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the local area site.	Local (2)	Local (2)
Probability	The impact will be medium probable during the mining phase.	Medium probability (3)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a low significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Low (22)	Low (16)
Mitigation measures: <ul style="list-style-type: none"> • All soil contaminated by oil, fuel, etc. shall be collected immediately and disposed of at an acceptable disposal site to be approved by the ECO. • Water pollution through fuels, oils or other substances must be avoided. • All clean stormwater will be diverted away from mining activities. • Regular maintenance of vehicles will be done according to a preventative maintenance program. • Routine monitoring of water levels, abstraction volumes, rainfall figures and water quality is recommended and should be adhered to. This data will form the basis from which any changes in the groundwater regime are recognised. • Groundwater level monitoring in all boreholes on the farm on a monthly basis is advised for the duration of water abstraction for the development. The information gathered during such a monitoring programme can be used to manage future abstraction figures. • Hydrogeological monitoring data (above described) should be evaluated bi-annually by a qualified hydrogeologist. • The Groundwater Management Plan with relevant Groundwater Monitoring and Reporting protocol, should be established by the client and calibrated annually. This means that the bi-annual report must evaluate the data and that the groundwater regime must be evaluated at least annually. 		Cost implications: R2 500/m.	

12.1.5 Flora

Mining activities would remove the existing vegetation from the site and could impact on the presence of the protected plants, leading to habitat loss and reduction in biodiversity on site and in the region. Clearing of natural vegetation could also lead to invasive alien species increasing on site.

Table 13: Flora impact assessment table and mitigation measures summary

Flora			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a low medium severity	Low Medium (5)	Minor (2)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the local area.	Local (2)	Local (2)
Probability	The impact will be highly probable during the mining and decommissioning phase.	High probability (4)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a medium significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Medium (30)	Low (20)
Mitigation measures: <ul style="list-style-type: none"> • Construct a fence around the mining area of the site with a gate for access control. The fence between the mining area and the natural area to the east with the protected plants is to prevent mining personnel and other people from entering the sensitive area. • Develop a management plan for the sensitive area if any mining or recreation activities will take place near or in the sensitive area. • No firewood or any other resources to be taken from the sensitive area – rather use gas for cooking or heating. • Only natural vegetation directly in the way of the mining area should be removed. • Prevent vehicular and personnel access into undisturbed areas. Due to the compacting of the soil by vehicles or other means it will be necessary to scarify (rip) such affected areas, including haul and access roads, which will no longer be used as such. This is to allow for the penetration of roots and the re-growth of the natural vegetation. • Seeding or re-vegetation is required. The natural vegetation will re-establish from the existing seedbed in the topsoil, but could not be sufficient. • Prevent uncontrolled burning, the burning of trash and dead plant materials. The burning of waste shall not be permitted on site. • The making of open fires shall be restricted to demarcated areas on site. 		Cost implications: R45/m once off R 500/m. Maintenance R3 000/m invasives uithaal	

<ul style="list-style-type: none"> • No vegetative matter shall be removed by contractors for firewood. • Employees must be provided with designated areas for open fire cooking and shall be prevented from creating fires randomly outside these areas. • Remove exotic and invasive species during mining and closure periods. The ECO will identify such vegetation and the method of eradication will be specified by him. • The use of topsoil for rehabilitation contaminated with the seed of alien vegetation will not be permitted. Contaminated soils should be sprayed with herbicides to the approval of ECO. • Prevent vehicular and personnel access into undisturbed areas. • Due to the compacting of the soil by vehicles or other means it will be necessary to scarify (rip) such affected areas, including haul and access roads, which will no longer be used as such. This is to allow for the penetration of roots and the re-growth of the natural vegetation. • Seeding or re-vegetation is required. • Draw up a monitoring program and take immediate action should invasives be found. • The disturbed areas must be monitored and maintained to contain and prevent noxious and invasive plants from spreading in the area. • A three monthly inspection by the ECO should be executed in this regard. 	
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12.1.6 Fauna

Mining activities will cause disturbance and displacement of fauna on site, but those adapted to the rocky ridges will not be directly impacted on. The surrounding area also has enough habitats for the displaced fauna to move into and limited impacts would occur to red data species.

Table 14: Fauna impact assessment table and mitigation measures summary

Fauna			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a low severity	Low (4)	Minor (3)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the mining site.	Site only (1)	Site only (1)
Probability	The impact will be medium probable during the mining phase.	Medium probability (3)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a low significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Low (27)	Low (22)

Mitigation measures:

- Staff should be prohibited to chase, catch or kill any animals found or encountered during mining operation.
- Drivers should be careful not to kill animals on the road.
- Construct a fence around the mining area of the site with a gate for access control. The fence between the mining area and the natural area to the east with the protected trees is to prevent mining personnel and other people from entering the sensitive area.
- Develop a management plan for the sensitive area if any mining or recreation activities will take place near or in the sensitive area.
- No firewood or any other resources to be taken from the sensitive area – rather use gas for cooking or heating.
- Only natural vegetation directly in the way of the mining area should be removed.
- Prevent vehicular and personnel access into undisturbed areas. Due to the compacting of the soil by vehicles or other means it will be necessary to scarify (rip) such affected areas, including haul and access roads, which will no longer be used as such. This is to allow for the penetration of roots and the re-growth of the natural vegetation.
- Prevent uncontrolled burning, the burning of trash and dead plant materials. The burning of waste shall not be permitted on site.
- The making of open fires shall be restricted to demarcated areas on site.
- No vegetative matter shall be removed by contractors for firewood.
- Employees must be provided with designated areas for open fire cooking and shall be prevented from creating fires randomly outside these areas.

Cost implications:

See flora fencing

12.1.7 Socio-economic

There will be a positive impact on the social and cultural structure of the region, as local people will be used on the mine, thus providing jobs and income. As part of the Social and Labour plan for the mine, training is to be done to improve worker skills such as drivers licence training and handling of specialized vehicle training, this will improve the workers marketability if the mine closes down.

Table 15: Socio-economic impact assessment table and mitigation measures summary (positive impacts)

Socio-Economic Aspects			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a moderate severity	Moderate (6)	Low (4)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the local area.	Local (2)	Local (2)
Probability	The impact will have a low probability during the mining phase.	Low probability (2)	Low probability (2)
Significance	If local labourers are used for the new mining activities it will have a medium positive significance of the local area.	Medium (48)	Low (20)
Mitigation measures: <ul style="list-style-type: none"> Local labourers to be used for new mining activities. 		Cost implications: R40 000/m.	

Other potential negative impacts relating to socio-economic factors include: injury to workers or other persons, impacts on local traffic and access roads and damage to neighbouring areas due to fires.

Table 16: Socio-economic impact assessment table and mitigation measures summary (negative impacts)

Socio-Economic Aspects			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a minor severity	Minor (2)	Minor (2)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the mining site.	Site only (1)	Local (2)
Probability	The impact will have a low probability during the mining phase.	Low probability (2)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a low significance. It is imperative that the mitigation and recommendation as stipulated in	Low (16)	Low (20)

the EMP, be implemented.	
<p>Mitigation measures:</p> <ul style="list-style-type: none"> • Local labourers to be used for new mining activities. • Structures to be set in place to improve security in the area. • Occupational health remains an area of importance and focus, during all activities. • Ensure that a medical kit is available on site at all times and that emergency contact numbers are available to staff. • Ensure that all operations take place under proper supervision. • Ensure that the emergency spillage procedures are kept on site where relevant. • Smoking should be prohibited in the vicinity of flammable substances. • The proponent should ensure that fire-fighting equipment is available on site. • All regulations contained in the Occupational Health & Safety Act apply. • The developer shall take adequate precautions to prevent and control veld fires to the satisfaction of ECO. The developer shall take all steps to ensure that the fire hazard on and near the site is reduced to a minimum. The developer shall be held responsible for any damage to property adjoining the site as a result of any fire caused by one of his employees. • The developer shall take immediate steps to extinguish any fire, which may break out on the site and shall comply with all statutory provisions, which may be in force from time to time in relation to fire danger or to restrictions on the lighting of fires in the open. The developer shall have a supply of beaters to use in the event of extinguishing veld fires. • No vegetative materials shall be randomly burnt on site. • Firebreaks shall be established and maintained around the sites if and when ordered by the ECO. • Accidental fires should be prevented at all costs. • Open fires for heating and cooking shall only be permitted in protected areas. • Emergency procedures will be clearly displayed for employees to see and water for firefighting will be available on site. • Access to the property should be restricted to employees and contractors during all phases. • The contractors should ensure that labourers remain within the demarcated site. • The contractors should ensure proper supervision of employees at all times. • All staff should be educated as to the need to refrain from destruction of animals and plants, as well as from indiscriminate defecation and urination, waste disposal and/or pollution of soil and water resources. • Staff should be informed that access to adjacent/private properties is strictly off-limits, and that it will be deemed a serious offence if any person is found trespassing. • It is imperative that disturbance to animals and plants be minimised and that labourers do not trap or kill any animals. 	<p>Cost implications:</p> <p>R5 000/m.</p>

<ul style="list-style-type: none"> • Contractors must maintain demarcated areas. • Properly managed and maintained chemical toilet or other approved facilities for contracting staff should service the site. • Chemical toilet facilities should be managed and serviced by a qualified commercial company. • One toilet should be provided per 10-15 staff members on site. • No disposal or leakage of sewage should occur on or near the site. 	
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12.1.8 Land Use

At present the proposed mining area is being utilised for livestock (cattle) farming and crop production. Mining activities will utilise the site, but after rehabilitation it can again be used for grazing.

Table 17: Land use impact assessment table and mitigation measures summary

Land Use			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a minor severity	Minor (2)	Minor (2)
Duration	The impact will be of a long duration (20 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the mining site.	Site only (2)	Local (2)
Probability	The impact will be highly probable during the mining phase.	High probability (3)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a low significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Low (28)	Low (16)
Mitigation measures: <ul style="list-style-type: none"> • This land will be lost for agricultural and other uses. However it will be rehabilitated after mining to be used for grazing again. 		Cost implications:	

12.1.9 Air Quality

Mining activities would cause a degradation of the air quality, in terms of vehicular emissions and dust generated from quarrying, raw material handling and haulage activities.

Table 18: Land use impact assessment table and mitigation measures summary

Dust			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a moderate severity	Moderate (6)	Minor (2)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the mining site.	Local (2)	Local (2)
Probability	The impact will be probable during the mining and decommissioning phases.	Medium probability (3)	Low probability (2)
Significance	The impact if not mitigated during all phases will have a medium significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Medium (48)	Low (16)
Mitigation measures: <ul style="list-style-type: none"> • Dust generation should be kept to a minimum. • Special care should be taken in areas where the road or mining activities is close to other buildings or dwellings. • Water used for dust suppression shall be used in quantities small enough not to generate run-off and resulting soil erosion or mud puddles. • Wet all mining and hauling areas with water from a water truck three times a day during the dry periods of the year. • Wet the access road to the site with water from a water truck regularly. • Monitor dust emissions during mining operations (on a 5 yearly increment) and ensure that the best possible method is used to reduce dust. Mining to occur over 30 years and new methods may be developed. • Do not remove the natural vegetation on site, unless it is in the way of the mining activities and plant more indigenous vegetation on the berms and boundary to reduce dust spreading into the surrounding areas. • All equipment must be SABS approved. 		Cost implications: R3 000/m.	

12.1.10 Noise

There would be an increase in noise on site as a result of quarrying and haulage activities.

Table 19: Noise impact assessment table and mitigation measures summary

Noise			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a minor severity	Minor (2)	Minor (2)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the local area.	Local (1)	Local (2)
Probability	The impact will be probable during the mining phase.	Medium probability (3)	Low probability (2)
Significance	The impact if not mitigated during all phases will have a medium significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Low (21)	Low (16)
Mitigation measures: <ul style="list-style-type: none"> • Mining / hauling operations only on weekdays or if needed on weekends after negotiations with neighbours. • Mining and other noise generating activities should be restricted to between 06h00 and 18h00 Monday to Friday and Saturdays 06h00 to 13h00, unless otherwise approved by the appropriate competent person in consultation with adjacent landowners / affected persons. • Vehicles to have noise mufflers installed to reduce noise. • All equipment must be SABS approved. • People operating equipment like jackhammers, or people working within excessively noisy areas, must be issued with and make use of earplugs. • Noise impacts should be minimised by restricting the hours during which the offending activities are carried out and where possible, by insulating machinery and/or enclosing areas of activity. • Careful placement of berms of approximately 2m high near roads and around the pits will reduce the noise in surrounding areas. • Do not remove the natural vegetation from areas if not needed for mining activities. 		Cost implications: R 500/m.	

12.1.11 Visual Aspects

The location of the topsoil heaps and pits could have an impact on the visual environment, especially if mining continues over a long period of time and is not rehabilitated concurrently.

Table 20: Visual impact assessment table and mitigation measures summary

Visual Aspects			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a moderate severity	Moderate (6)	Low (4)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the local area.	Local (2)	Local (2)
Probability	The impact will be highly probable during the mining and decommissioning phases.	High probability (4)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a medium significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Medium (48)	Low (20)
Mitigation measures: <ul style="list-style-type: none"> • Reduce soil erosion potential of the mining area by rehabilitating concurrently. • Slope the rehabilitated area to look natural. • Place a berm near the road with planting on it to reduce visibility from outside the site of the mining activities. • Careful placement of berms of approximately 2m high near roads and around the pits will reduce the noise in surrounding areas. • Do not remove the natural vegetation from areas if not needed for mining activities. 		Cost implications: Tabel 9	

12.1.12 Cultural historical heritage

Since no sites of heritage importance could be identified on site, no further recommendations are necessary. There is a possibility of unmarked graves being uncovered during mining and the relevant steps for the mitigation of such a situation will be investigated in the Cultural Historical specialist study.

Table 21: Cultural historical heritage impact assessment table and mitigation measures summary

Cultural/Historical Aspects			
Impact Evaluation	Description	Summary	Cumulative
Magnitude	The impact will have a low severity	Minor (2)	Minor (2)
Duration	The impact will be of a long duration (30 years), until such time that the site is rehabilitated.	Long term (4)	Long term (4)
Spatial extent	The impact will be restricted to the mining site.	Site only (1)	Site only (1)
Probability	The impact will have a low probability during the mining phase.	Low probability (2)	Low probability (2)
Significance	The impact if not mitigated during the rehabilitation phase will have a Low significance. It is imperative that the mitigation and recommendation as stipulated in the EMP, be implemented.	Low (14)	Low (14)
Mitigation measures: <ul style="list-style-type: none"> If unmarked graves or any artefacts are uncovered during mining, all activities in this vicinity need to be stopped and a specialist need to be called in to assess the situation. 		Cost implications:	

13. A comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural impacts (NEMA Reg 31 (2) (i) and (MPRDA 50 (1) d)

Alternative 1: No-go alternative and consequences of not proceeding with the proposed operation	Alternative 2: Alternative Development	Alternative 3: Alternative Quarrying Operation	Alternative 4: Preferred alternative – proposed quarrying operation
<p>The <i>status quo</i> on site is upheld and the environmental degradation caused by grazing and previous mining activities continues. In addition, the cost of sand resources in the area will stay high due to it being brought in from other areas, local availability could decrease the price. No new jobs will be created at the Vogelstruisfontein mine. If the mine do not expand the current operations might not be economical and this could put the jobs of current labour at risk.</p>	<p>An alternative development has not been considered due to the fact that this will be an expansion of an existing mine on the neighbouring portion.</p>	<p>Alternative quarrying operations are limited. The most economical way of mining sand is by excavator and haul trucks.</p>	<p>The proposed method of quarrying by means of excavator and trucks, load and haul operations is the most suitable and economical for selective quarrying of the identified sand materials.</p>

14. Determine the appropriate mitigatory measures for each significant impact of the proposed mining operation (NEMA Reg 31 (2) k and MPRDA 50 (1) e)

See Section 12 above and the EMP in Appendix I as well as the Impact tables in Appendix J.

15. Identify knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information (NEMA Reg 31 (2) m and MPRDA Reg 50 (1) g)

At the time of writing the EIA report it is believed that the information available and included in this report is correct.

Due to seasonal changes information with regard to veld condition and species occurring on site can change, the specialist and EAP cannot be held responsible for any such discrepancies, although it is attempted to provide as accurate information as possible. Any discrepancies discovered during the course of the project will be investigated.

16. A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation (NEMA Reg 31 (2) (n))

Due to the current disturbed and degraded nature of the site, the proposed development will not have a significant negative impact on the environment and with proper environmental management and implementation of the suggested mitigation measures the site can be rehabilitated after completion of the mining to restore the land to grazing potential. The project should thus be authorised on condition that the suggested mitigation measures as stated in the EMP is adhered to.

17. An environmental impact statement which contains — a summary of the key findings of the environmental impact assessment (NEMA Reg 31 (2) o)

Based on the already disturbed nature of the site as well as the finding of the environmental impact assessment that all the potential impacts listed below can be mitigated to a level of low significance.

- The mining activities will not impact on the class 1 and 2 ridges or the red listed plants on the study site and will occur on the plains.
- There will be a disturbance of soil properties with a loss of soil to wind (dust) and water erosion. This will be caused by the removal of vegetation as well as mining activities and vehicles moving on the site.
- At present the proposed mining area is being utilised for livestock (cattle) farming and crop production. Mining activities will utilise the site, but after rehabilitation it can again be used for grazing.
- Mining activities would remove the existing vegetation from the site.
- Mining activities will cause disturbance and displacement of fauna on site, but those adapted to the rocky ridges will not be directly impacted on. The surrounding area also has enough habitats for the displaced fauna to move into and limited impacts would occur to red data species.
- The proposed mining activities of the site can be divided into different periods with different impacts especially on flooding and erosion after mining.
- Currently the movement of water on site is highly impacted. This affects the in situ ability of the wetland to function as normal. A wetland rehabilitation plan will be compiled to rehabilitate the wetlands and to restore the functionality of the impacted wetlands.
- These wetland systems have been impacted on before 1953 through agriculture with cultivation of most of the site. This has reduced the functional wetland areas and limited them to the south of the site. The more recent mining activities (over the past 10 years) have been done in areas where cultivation took place.
- The impact of the extended mining activities on the currently available water in the area will not be significant.
- Mining activities will cause a degradation of the air quality, in terms of vehicular emissions and dust generated from quarrying, raw material handling and haulage activities.

- There will be an increase in noise on site as a result of quarrying and haulage activities.
- The location of the topsoil heaps and pits could have an impact on the visual environment, especially if mining continues over a long period of time and is not rehabilitated concurrently.
- There will be a positive and/or negative impact on the social and cultural structure of the region, as local people will be used on the mine, thus providing jobs and income. As part of the Social and Labour plan for the mine, training is to be done to improve workers skill such as drivers licence training and handling of specialized vehicle training, this will improve the workers marketability if the mine closes down.

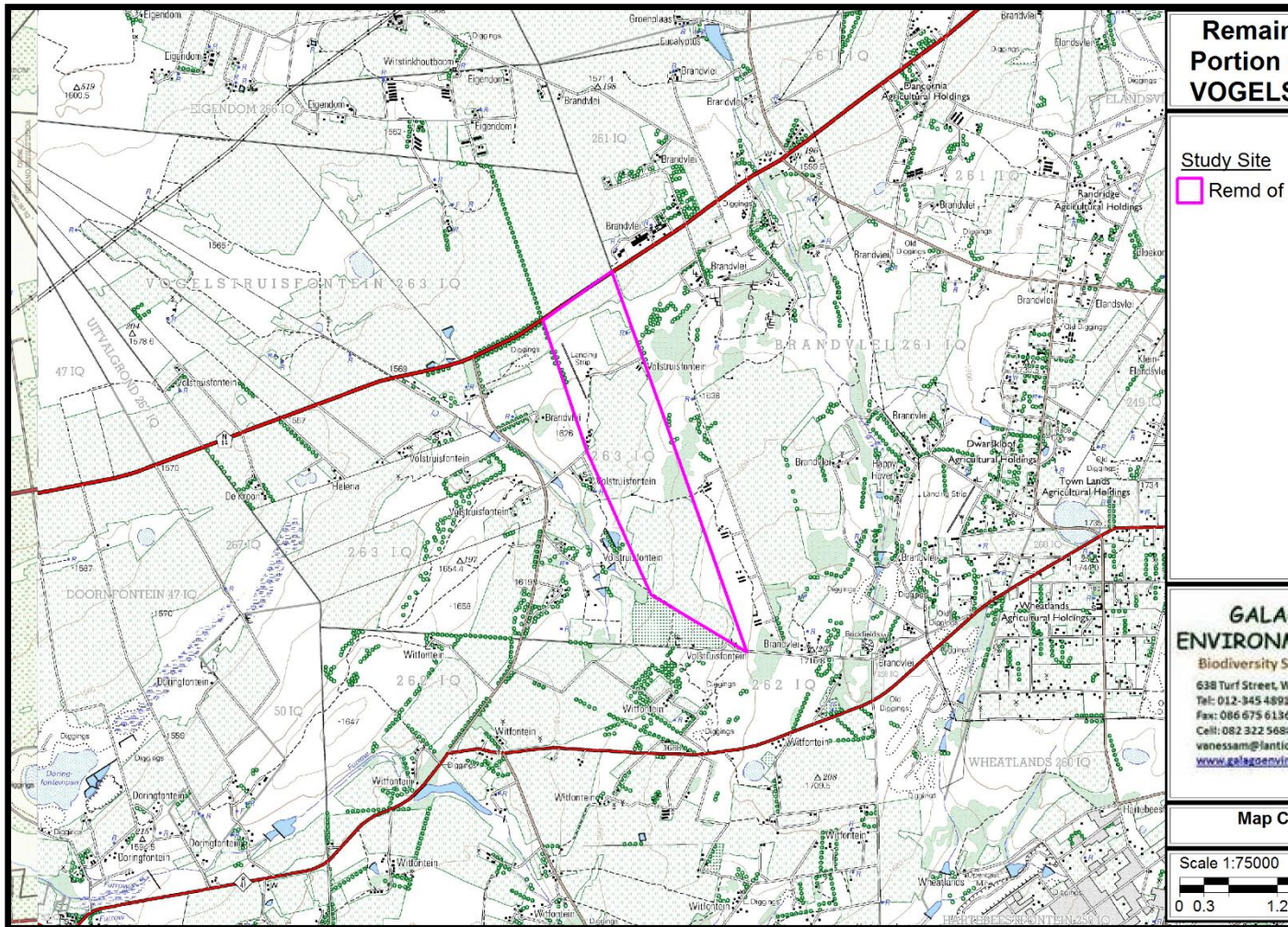
It is therefore stated that if the mitigation measures as stated in the EMP are implemented the site will be rehabilitated to a level where it will be available for use for grazing again. It is thus recommended that the proposed project be approved.

18. REFERENCES

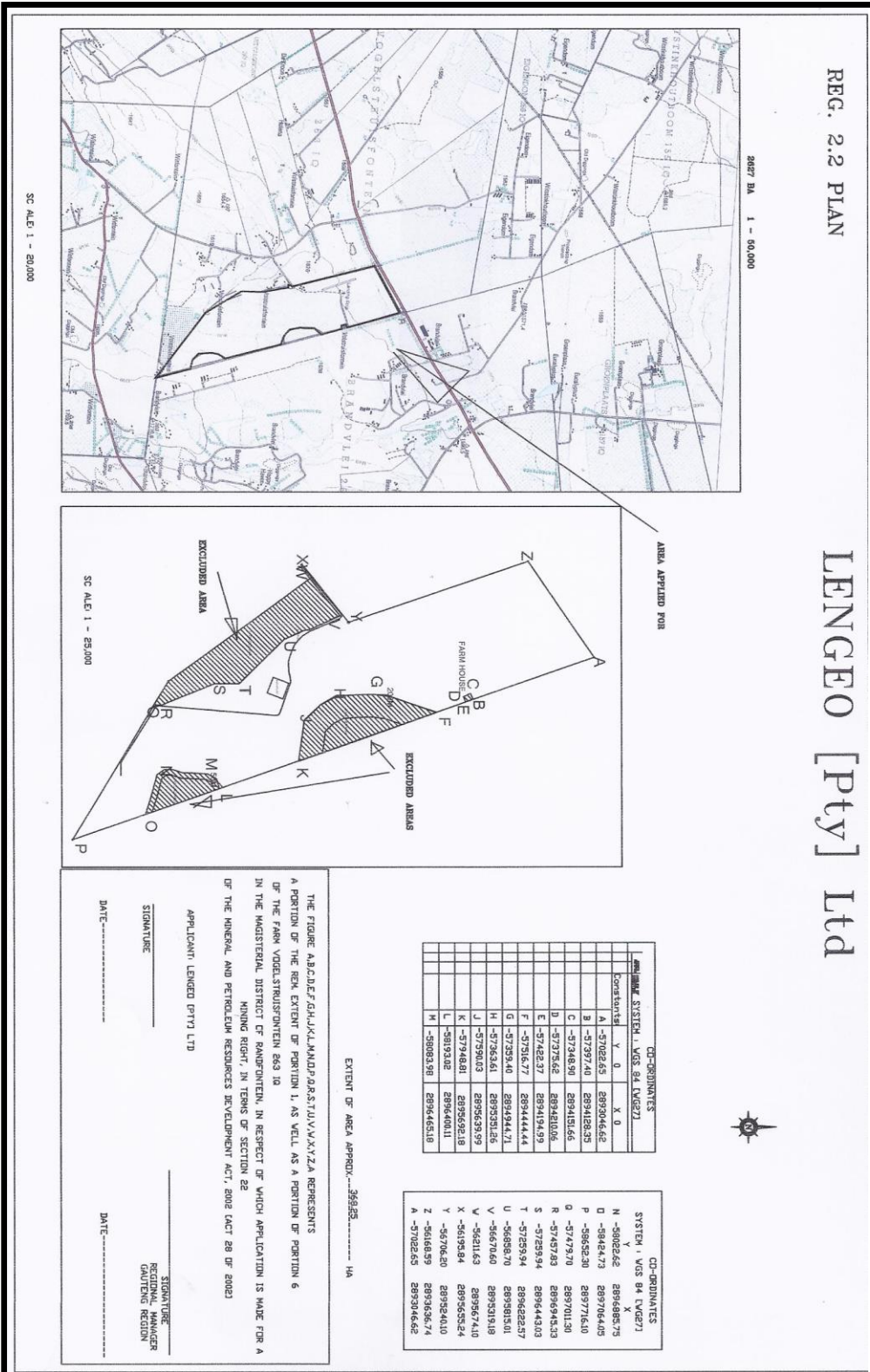
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19. APPENDICES

APPENDIX A: LOCALITY MAP



APPENDIX B: SECTION 2.2 MAP



APPENDIX C: MINE WORKS PROGRAMME

This document has already been submitted.

**APPENDIX D: SPECIALIST REPORTS (NEMA Reg 31 (2) q and
MPRDA Reg 50 (1) i)**

APPENDIX D1: GEOTECHNICAL MINING REPORT

APPENDIX D2: VEGETATION STUDY

APPENDIX D3: MAMMAL STUDY

APPENDIX D4: AVIFAUNA STUDY

APPENDIX D5: HERPETOFAUNA STUDY

APPENDIX D6: WETLAND STUDY

APPENDIX D7: GEOHYDROLOGICAL STUDY

APPENDIX D8: CULTURAL HERITAGE STUDY

APPENDIX E: SOCIAL AND LABOUR PLAN

This document has already been submitted.

APPENDIX F: QUANTUM CALCULATION

LENCEO (PTY) LTD

QUANTUM FOR THE CLOSURE REHABILITATION OF MINING ACTIVITIES ON RE OF POR VOGELSTRUISFONTEIN 263 IQ - DISTRICT RANFONTEIN.

Primary Risk Class: C (Sand & Gravel)

Sensitivity: Low

Background Information

Lengeo (Pty) Ltd will only lease the area that will be mined from the land owner. The land owner indicated during the consultation process that any area should be left intact for the benefit of the land owner.

CALCULATION OF THE QUANTUM - Current or Life of Mine

Applicant:
Reference
No

Location:

Date:

No.	Description	Unit	A	B	C	D
			Quantity	Master Rate	Multiplication factor	Weight factor
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	m3	0	11.58	1	1
2 (A)	Demolition of steel buildings and structures	m2	0	161.24	1	1
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	237.62	1	1
3	Rehabilitation of access roads	m2	1500	28.85	1	1
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	280.05	1	1
4 (B)	Demolition and rehabilitation of non-electrified railway lines	m	0	152.75	1	1
5	Demolition of housing and/or administration facilities	m2	0	322.48	1	1
6	Opencast rehabilitation including final voids and ramps	ha	0	169 047.76	0.04	1
7	Sealing of shafts adits and inclines	m3	0	86.56	1	1
8 (A)	Rehabilitation of overburden and spoils	ha	5	112 698.51	1	1
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0.25	140 363.95	1	1
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	407 683.45	0.51	1
9	Rehabilitation of subsided areas	ha	0	94 368.03	1	1
10 (A)	General surface rehabilitation (with undesirable objects)	ha	0	89 276.23	1	1
10 (B)	General surface rehabilitation (no undesirable objects)	ha	5	36 890.00	1	1
11	River diversions	ha	0	89 276.23	1	1
12	Fencing	m	100	101.84	1	1
13	Water management	ha	1	33 945.33	0.17	1
14	2 to 3 years of maintenance and aftercare	ha	15	11 880.87	1	1
15 (A)	Specialist study	Sum	0			1
15 (B)	Specialist study	Sum	0			1
						Sub Total 1

1	Preliminary and General	457.74	122	weighting factor 2
				1
2	Contingencies		102048.1144	
				Subtotal 2
				VAT (14%)
				Grand Total

Notes:

- 3 The main access roads will be utilised by the land owner as fire breaks and will not be rehabilitated. The majority of internal access roads will be rehabilitated together with the mining pits and should not be costed as a separate activity. A short section of road has however been costed and included in the quantum namely 500m of road X 5m wide=1500m²
- 8(A) The majority of the mining area will be rehabilitated on an ongoing basis and a very small open pit area, equivalent to 1 year's mining (5 hectares) will have to be rehabilitated after the mine is worked out.
- 8(B) Lengeo do not intend to initiate any waste deposit site but has catered for an area of 50m X 50m for any unforeseen waste deposition practises.
- 10(B) Also applicable to the statement in 8(A) above
- 12 Fencing erected for the protection of any sensitive areas will be cattle fencing and will not be reclaimed or rehabilitated. A short distance of 100m fencing for security reasons will however have to be reclaimed and rehabilitated.
- 13 The collection / diversion trench required for the protection of the wetland will have to be rehabilitated. (1 ha)
- 14 The ongoing rehabilitation of the mining area will include maintenance and aftercare during the project life. An area equivalent to 2 to 3 years mining (15 ha) have been included in the quantum to cater for the maintenance and aftercare after the mine is worked out.

APPENDIX G: PHOTO REPORT

APPENDIX H: PUBLIC PARTICIPATION PROCESS

Appendix H1: Stakeholder database

INTERESTED AND AFFECTED PARTIES REGISTER FOR THE PROPOSED SAND MINE ON THE REMAINDER OF PORTION 1 AND A PORTION OF PORTION 6 OF THE FARM VOGELSTRUISFONTEIN

NAME AND ORGANISATION	POSTAL ADDRESS	TEL/FAX/ EMAIL
Corrie Pruis Rapid Trade	26 Randfontein, 1760	083-479 0394 Corrie.pruis1@gmail.com
T Joubert Woekerlust Landgoed	1763 Randgate, 3238	083-393 5229
Petal Aucamp	49 Cheyne Road Aldara Park, 2194	082-937 1133
A J van Wyk	Witfontein 262	082-856 6911
Adriaan Aucamp AMC	49 Cheyne Road Aldara Park, 2194	083-442 0968
M J de Jager	P O Box 6193 Greenhills, 1767	084-666 6043
M Botha	P O Box 531 Randfontein, 1760	084-308 7729
Phillip Mmusi Nulaid	Plot 71 Brandvlei	083-430 1945 Phillip.mmusi@gmail.com
Colin Coriedges Kiriake Simbras	P O Box 1128 Randfontein (Gedeelte 5, Witfontein)	chc@vodamail.co.za
Department Water Affairs Charlotte Tema Environmental Officer	Private Bag X995 Pretoria 0001	Tel: 012-392 1412 Fax: 012-392 1486 Cell: 083-488 1211
SAHRA Regional Director	P O Box 87552 Houghton 2041	
Julene Ferreira Busmark 2000		082-460 2356
M P B Botha	Makarlos Vogelstruisfontein	082-764 8100
Attie van Wyk	Gedeelte 6 Witfontein	072-255 4340 vanwykat@gmail.com

NAME AND ORGANISATION	POSTAL ADDRESS	TEL/FAX/ EMAIL
Stefan Meyer	Gedeeltes 15 en 22 Vogelstruisfontein	083-417 6462 Stefan@busmark.co.za
Johan Nolte	Gedeeltes 2 en 4 Witfontein	082-684 0056 011-416 3310 riete@polka.co.za
Andrew	Gedeelte 14 Vogelstruisfontein	072-348 7360
Moosa Chiboo	Gedeelte 27 Vogelstruisfontein	071-643 8270

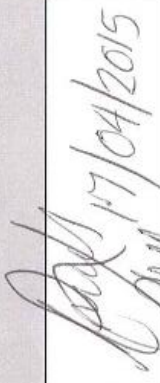
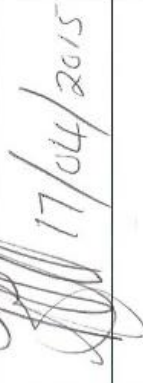



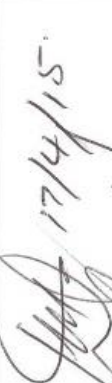

Appendix H2: Issues and response report

Name	Contact details	Date	Comment	Reply
Mr Attie van Wyk	Witfontein 262 082 8566911	17 April 2015, during the public meeting	Is the application for sand or minerals?	Mr de Jager explained that it is only for sand and stone aggregate

Appendix H3: Minutes from I&AP meeting

MINUTES OF THE MEETING HELD ON 17 APRIL 2015 AT 16H00 AT RODORA HALL, DOORNFONTEIN MINING RIGHT PROCESS FOR THE PROPOSED SAND MINE ON VOGELSTRUISFONTEIN	
COMMENT	RESPONSE
Mr Tienie de Jager opened the meeting and welcomed those present. He explained the objective of the meeting.	
Ms Vanessa Marais provided a presentation describing the MRPDA, Scoping/EIA process and the legal implications of the water use for dust suppression.	
Mr Attie van Wyk wanted to know whether the application is for sand or minerals?	Mr de Jager explained that it is only for sand and stone aggregate
Mr Attie van Wyk explained that 3 months ago Mr Phosa notified farmers of Randfontein of an impact study for mineral mining (and not all the I & APs were notified) . He wanted to know if Mr Phosa can just mine for minerals on any farm without due process.	Mr De Jager said that a reconnaissance process must be followed and from 2002 it will be more difficult to continue with mining without permits, as all processes have to be followed.
Mr De Jager stated that the impact of trucks on the roads will be minimal, since mining is already taking place on a small scale. The extended mining area will increase slowly and only if needed over a long time. Traffic will not increase immediately. Demand will depend on the markets.	Ms Marais responded that the access road and infrastructure are already in place, so the mining activities will have a minimal impact on neighbours
The meeting was adjourned by Ms Marais at 17:00.	

**ATTENDANCE REGISTER FOR THE PUBLIC MEETING TO BE HELD ON 17 APRIL 2014
AT 16:00, REGARDING THE PROPOSED SAND MINE
ON THE REMAINDER OF PORTION 1 OF THE FARM VOGELSTRUISFONTEIN 263 IQ
VENUE : THE RODORA HALL, DOORNFONTEIN, RANDFONTEIN (ON THE R41 ROAD)**

NAME AND ORGANISATION	POSTAL ADDRESS	TEL/FAX/ EMAIL	SIGNATURE AND DATE
CORRIE PRUIS RAPIDTRADE	26 RANDFONTEIN 1760	0834790394	 17/04/2015
T Joubert Wekerlust Landgoed	1763 Randgate 3238	0833935229	 17/04/2015
Betal Aucamp	49 Uygest Aldera Park, 2194	0829371133	 17/04/2015
-Alfonso Wijnh Grl.	Mitfontein 262.	0828566911	 17/04/2015
Adriana Aucamp AMC	49 Cheyne rd Aldera Park 2194	0834420968	 17/04/2015
M.J. DE JAGER	Box 6193, GREENHILLS 1767	0846666043	 17/04/15.
M. DOTHIA	Box 531 KANSFONTEIN 1720	0843087729	 17/04/15.

Presentation
2015/04/22

**APPLICATION FOR A MINING RIGHT ON THE
REMAINDER OF PORTION 1 AS WELL AS A
PORTION OF PORTION 6 OF THE FARM
VOGELSTRUISFONTEIN 263-IQ**

17 April 2015

Applicant:
LENCEO (Pty) Ltd



CONTENTS

- * Introduction
- * Locality
- * MPRDA process to be followed
- * Specialist studies
- * Public Participation Process
- * Issues and Concerns
- * Conclusion & Way forward

INTRODUCTION

Background:

- * LENGEO (Pty) Ltd started mining Sand on the Remainder of Portion 1 and a portion of portion 6 of the farm Vogelstruisfontein 263-IQ with a 5 year mining permit that has been extended twice
- * Mining took place only on a small portion of the farm
- * Other mining activities took place on the farm in the past that was not rehabilitated
- * Now applying for a mining right for larger portion of the farm to make mining more sustainable and to enable the company to implement rehabilitation measures on un-rehabilitated areas on the farm

INTRODUCTION ...

Need and desirability:

- * Farming has become unsustainable - water scarce and electricity very expensive to operate pivot point irrigation constantly in order to make a living from crop farming.
- * The application is for the mining of building and plaster sand.
- * This material is primarily for the domestic market.
- * Demand increased tremendously in recent years

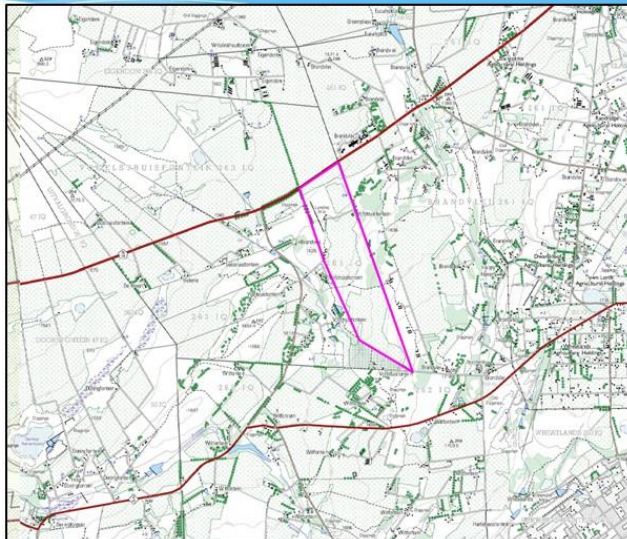
INTRODUCTION ...

Mining Process:

- * The mining process proposed is very simplistic.
- * The first 30cm of topsoil is removed and stockpiled for rehabilitation purposes.
- * Sand is mined through excavation with a back-actor.
- * The average thickness of the deposit is a very conservative 1.53 m.
- * The sand is then loaded on trucks and hauled to markets.

LOCALITY

The study site is approximately 413,9430 ha in extent.



AERIAL MAP



MPRDA PROCESS

- * Galago Environmental was appointed to facilitate the Mining Right process on the Re of Portion 1 and a ptn of ptn 6 of the farm Vogelstruisfontein 263-IQ.
- * Galago are independent environmental consultants.
- * Will follow the process as described in the Mineral and **Petroleum Resources Development Act** (Act 28 of 2002) (as amended) and the **National Environmental Management Act** (NEMA) Act no. 107 of 1998 (as amended)

MPRDA PROCESS

MPRDA Process of DMR:

- * Submit application for Mining Right including Social and Labour plan, mining work programme - done
- * Scoping (30 days):
 - * Determine environmental status quo
 - * Identify potential environmental, social & cultural impacts
 - * Identify development alternatives
 - * Conduct public participation process
 - * Specialist studies identified for EIA

MPRDA PROCESS ...

MPRDA Process of DMR: ...

- * Submit draft Scoping Report for comment to I&APs
- * Submit Scoping Report for approval by DMR
- * Compile Environmental Impact Assessment (EIA) report
- * Compile Environmental Management Plan (EMP)
- * Submit draft EIA and EMP for comment to I&APs
- * Submit EIA and EMP to DMR

SPECIALIST STUDIES

- * Social and Labour plan
- * Mining Work programme – geology and mining techniques
- * Fauna and flora
- * Wetland delineation and rehabilitation
- * Cultural and Historical – graves or old buildings
- * Geohydrological – yield of borehole
- * Water license application

PUBLIC PARTICIPATION

- * Adverts in the Randfontein Herald in English on **7 April 2015**
- * Notices placed at entrance to the farm in English & Afrikaans
- * Distribution of BID document to neighbours by hand and by email
- * Public Meeting **17 April 2015**
- * Forum meetings if needed
- * Meetings with DWS and DMR

PUBLIC PARTICIPATION...

- * Register as I&APs
- * Raise issues and concerns at meeting for minutes and Issues and Concerns Register
- * In writing provide comments, issues or concerns
- * Note issues and concerns and address them either in writing to individual, in the Scoping Report or in the EIA.

ISSUES AND CONCERNS

Issues and Concerns identified:

- * Sensitive fauna and flora
- * Sensitive wetland areas that could be impacted
- * Potential graves or historical buildings on site
- * Water quantity for dust suppression
- * Rehabilitation of previously mined areas

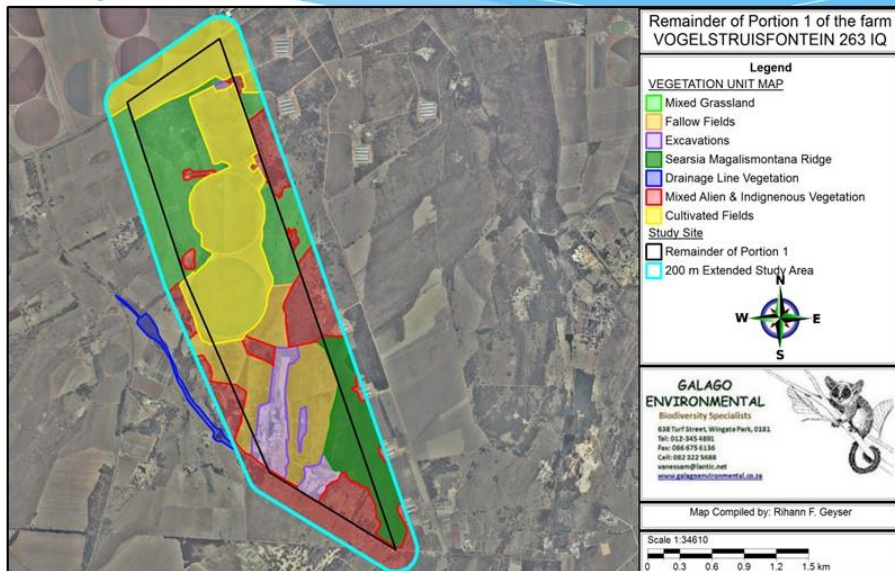
SPECIALIST STUDIES

Flora specialist study:

- * According to Mucina and Rutherford, 2006 the study site is located in two vegetation units
 - * Carltonville Dolomite Grassland
 - * Soweto Highveld Grassland
- * 7 Vegetation units were identified on site
- * *Searsia magalismsontana* ridge vegetation study unit, the Mixed grassland on the ridge east of the two circular fields and the drainage line are considered sensitive.

SPECIALIST STUDIES

Flora specialist study:



SPECIALIST STUDIES

Faunal specialist studies:

- * According to the mammal and avifaunal studies the site is disturbed and has a low sensitivity
- * The herpetological study found that the wetland areas and dams on site is sensitive and should be conserved together with a 50m buffer

Ridges:

- * There is a class 1 and a class 2 ridge on site. It is recommended that the class 1 ridge must be protected by a 200m buffer

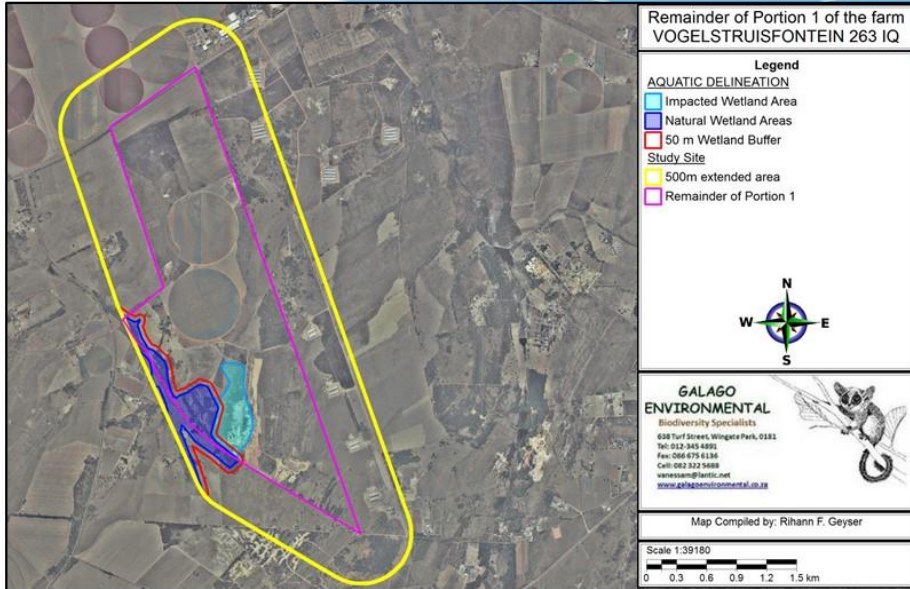
SPECIALIST STUDIES

Wetland delineation specialist study:

- * 2 Wetland areas found on western boundary of site
- * Natural and impacted wetlands
- * A buffer of 50m around wetland areas proposed
- * Impacted wetland to be rehabilitated
- * Wetland areas excluded from mining right

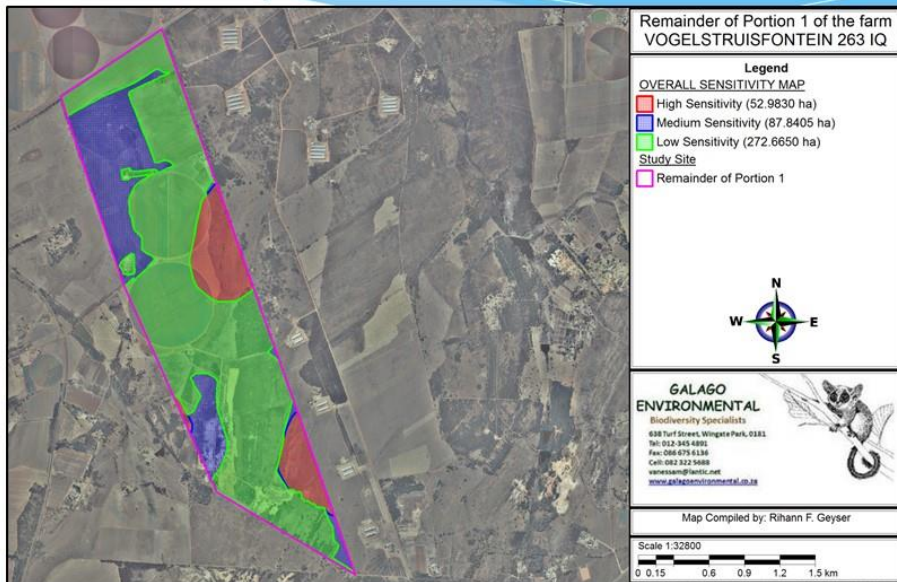
SPECIALIST STUDIES

Wetland delineation study:



SPECIALIST STUDIES

Overall sensitivity of the site:



SPECIALIST STUDIES

Cultural Heritage Impact Assessment:

- * National Heritage Resources Act, 1999 (Act No. 25 of 1998)
- * Permits are administered by the South African Heritage Resources Agency (SAHRA).
- * A paleontological analysis of the area indicated that it lies on non-fossiliferous strata.
- * The mining will not be bedrock intrusive and as such a paleontological deposits will not be affected
- * No sites of heritage importance could be identified on site

SPECIALIST STUDIES

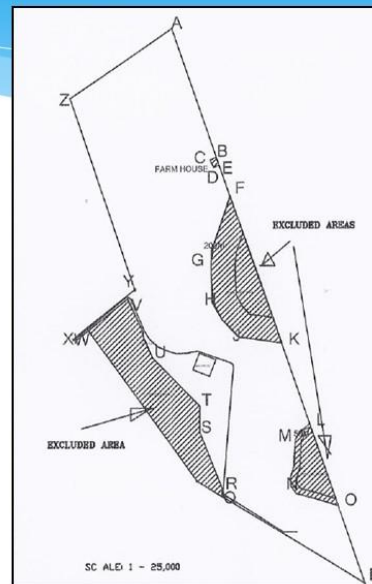
Geo-hydrological specialist study:

- * Yield of the borehole will be tested
- * Water only needed for dust suppression on haul roads
- * No water will be used in mining processes
- * Water Use License Application at DWS for use of water.

ALTERNATIVES IDENTIFIED

Site alternatives:

- * Wetland areas
- * Ridge areas
- * Buffer areas – excluded from proposed mining right



IMPACTS IDENTIFIED

- * Dust
- * Noise
- * Impacts on wetlands
- * Soil properties , topsoil and rehabilitation for grazing
- * Visual impacts
- * Social and Cultural impacts – job creation, income generation and provision of sand to local markets.
- * Cumulative impacts

CONCLUSION & WAY FORWARD

- * Minutes of meeting distributed next week
- * Register as I&APs and extra comments before **7 May 2015** for inclusion in Scoping
- * Distribution of Draft Scoping Report by 27 April 2015
- * Ongoing participation through EIA process
- * Distribution of Draft EIA Report for comments
- * Submission of Final EIA by **15 September 2015**

**THANK YOU FOR YOUR
PARTICIPATION**



Appendix H4: Notices and advertisements

Appendix H5: BID

REGISTRATION FORM FOR I&AP's
Name and Surname:
Postal Address:
Postal Code:
Telephone No:
Fax No:
Cell No:
Email Address:
Who else do you think should be included in the process? (Please include contact details if possible)
Do you require any additional information at this stage? If yes, please specify.
Please write your comments and questions here:
<p>Please return completed forms or email the relevant information to:</p> <p>Vanessa Marais Galago Environmental TEL: 012-345 4891 FAX: 086 675 6136 EMAIL: vanessam@lantic.net Postal Address: 638 Turf Street, Wingate Park, 0181</p>

APPENDIX I: DRAFT EMP

(NEMA Reg 31 (2) p) and a description of the arrangements for monitoring and management of environmental impacts (MPRDA Reg 50 (1) h)

APPENDIX J: IMPACT TABLES