

**BASIC ASSESSMENT REPORT AND ENVIRONMENTAL
MANAGEMENT PROGRAMM REPORT FOR THE
APPLICATION OF A MINING PERMIT SITUATED ON A
PORTION OF PORTION 26 OF THE FARM BRYAN 561, IN
THE MAGISTERIAL DISTRICT OF WELKOM**

**FOR
MIME LOGISTICS CC
DMR REF. NO. FS 10355 EM**



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mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

REVISED BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: Mime Logistics CC

REFERENCE NUMBER: FS 30/5/1/3/3/2/1 (10355) EM

PROJECT NAME: Portion 26 of farm Bryan 561

DATE: 01st December 2022

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ABBREVIATIONS USED IN THIS REPORT

DMR	:	Department of Mineral Resources
DRPW	:	Department of Roads and Public Works
DWS	:	Department of Water and Sanitation
ECO	:	Environmental Control Official
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Programme
FS	:	Free State
IAPs	:	Interested and Affected Parties
LOM	:	Life of Mine
MPRDA	:	Minerals and Petroleum Resources Development Act
NEMA	:	National Environmental Management Act
SAHRA	:	South African Heritage Resources Agency
SAPS	:	South African Police Services

1 IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002, as amended), the Minister must grant a prospecting or mining right if among other the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorization can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Program report in term so of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3) (b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17(1) (c) the Competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the Competent Authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorization for listed activities triggered by an application for a right or a permit submitted in the exact format of, and provide all information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorization being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

2 OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a consultative process –

- (a) Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) Identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) Describe the need and desirability of the proposed alternatives;
- (d) Through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within the sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
 - i. The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
 - ii. The degree to which these impacts –
 - a. Can be reversed
 - b. May cause irreplaceable loss of resources; and
 - c. Can be managed, avoided or mitigated;
- (e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to –
 - i. Identify and motivate a preferred site, activity and technology alternative;
 - ii. Identify suitable measures to manage, avoid or mitigate identified impacts; and
 - iii. Identify residual risks that need to be managed and monitored.

PROJECT DETAILS

Name of Project: Portion of 26 of farm Bryan 561
Mining Permit: FS 10203 EM
Name of Applicant: Mime Logistics CC
Responsible person: Ryan Botes
Physical Address: 88 3De Street, Industrial Area, Welkom, 9459
Postal Address: P.O. Box 66450, Riebeeckstad
Telephone: 084 880 9177
E-mail: ryan@josan.co.za

Environmental Consultant (EAP): Mr Tshimangadzo Mulaudzi

Responsible Person: Mr Tshimangadzo Mulaudzi
Physical Address: 15 Barnes Street, Langebaan building, Bloemfontein 9301
Postal Address: P.O. Box 22372, Extonweg, 9313
Telephone: 051 430 1748
Facsimile: 086 551 8225
E-mail: info@engedime.com
Expertise of EAP: Refer to Part A (3) (a) (ii) on the expertise of EAP

PART A

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

3 Contact details of

a) Details of

i. Details of the EAP

Name of the Practitioner: Tshimangadzo Mulaudzi

Tel No.: 051 430 1748

Fax No.:086 556 2568

Email address: info@engedime.com

ii. Expertise of the EAP

1) The qualifications of the EAP

(with evidence)

Tshimangadzo Mulaudzi holds an Honours Degree in Mining and Environmental Geology from the University of Venda. Has since been working as an environmental geologist and environmental practitioner. He has 5 years' experience in Environmental Science, 5 years' experience in Geology, and 5 years' experience in public participation.

2) Summary of the EAP's past experience

(in carrying out the Environmental Impact Assessment Procedure)

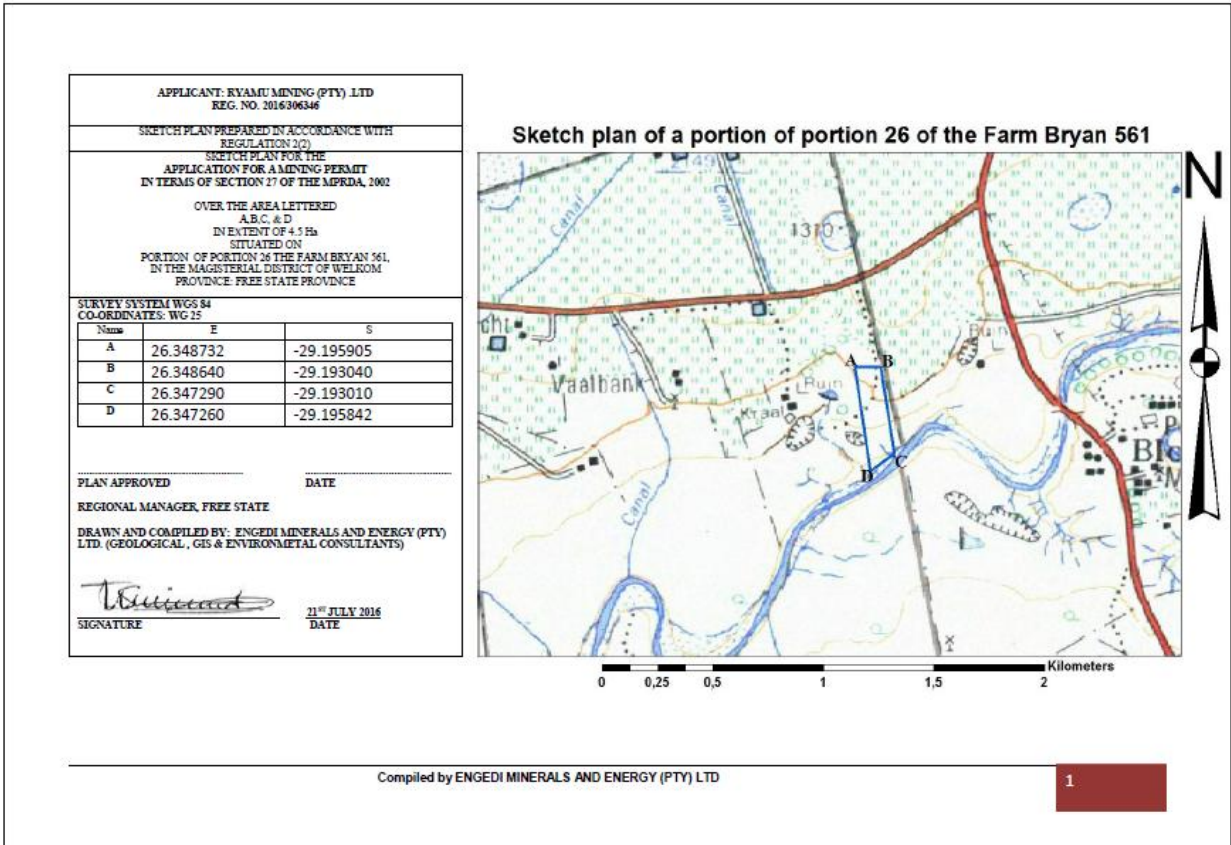
Tshimangadzo Mulaudzi has been carrying out Environmental Impact Assessment Procedure since 2012, in 2012, he joined a large mining consulting company in Kimberly called Breeze Court Investments 47 (Pty) Ltd (Geologist and Mining Consulting firm). This is where Mr Mulaudzi acquired in-depth experience and know how in the mining consulting business by assisting the large to small scale mining companies to obtain prospecting right, mining rights, mining permits, technical co-operate permits, reconnaissance permits, exploration rights, production rights, integrated water use license, and environmental authorisation among other licenses. Mulaudzi has five years working experience in environmental management, geology and public participation process.

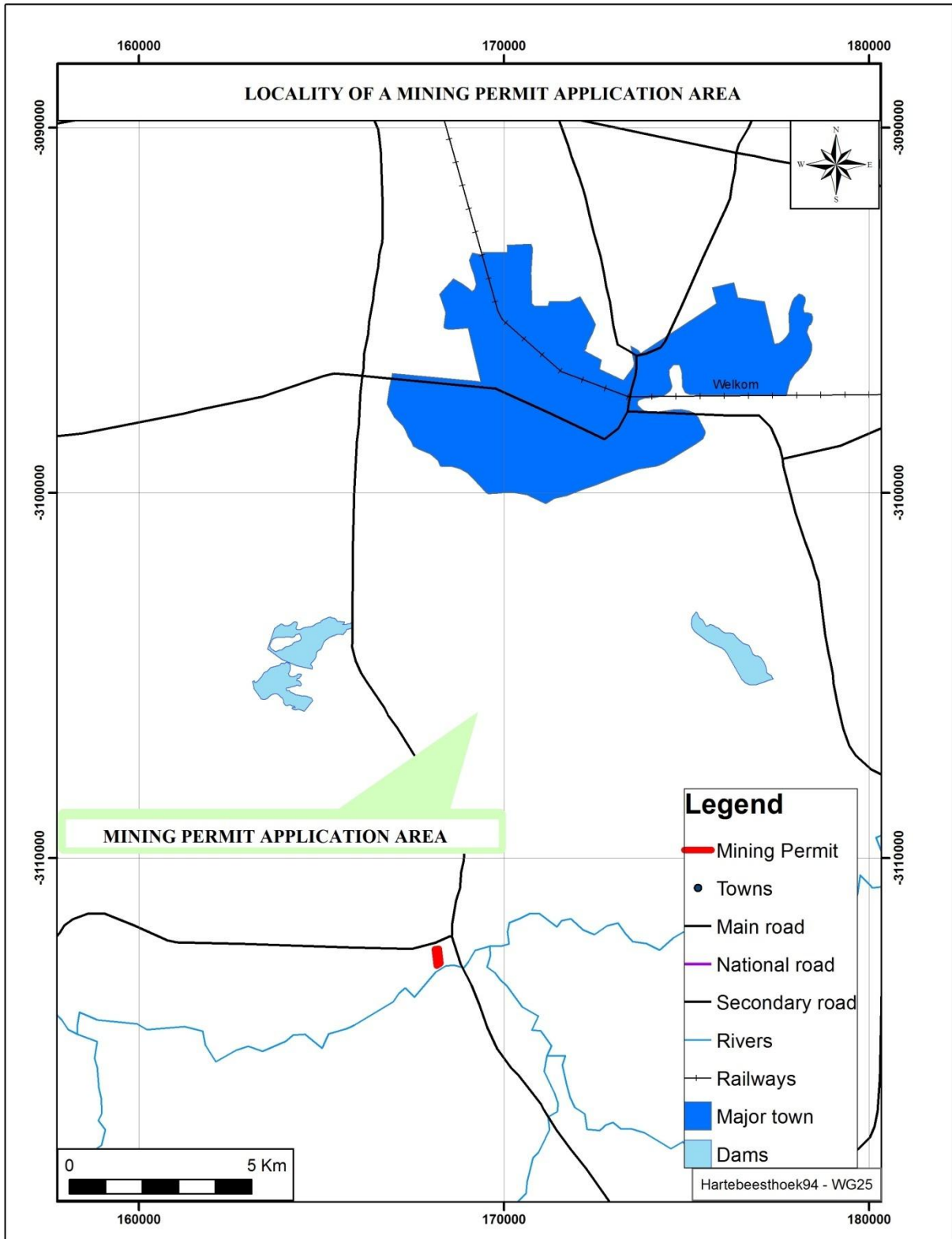
b) Location of the overall Activity

Farm name:	Portion 26 of farm Bryan 561
Application area (Ha):	5 Hectares
Magisterial district:	Welkom
Distance and direction from nearest town:	~ 15 km south west of Welkom of the town
21 digit Surveyor General Code for each farm portion:	F03300000000056100026

c) Locality map

(Show nearest town, scale not smaller than 1:250 000)





d) Description of the scope of the proposed overall activity

(Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site)



i. Listed and specified activities

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m ²	LISTED ACTIVITY (Mark with an X where applicable or affected).	APPLICABLE LISTING NOTICE (<i>GNR 324, GNR 325 or GNR 327</i>) <i>GNR327</i>	WASTE MANAGEMENT AUTHORITY (Indicate whether an authorisation is required in terms of the Waste Management Act).
<p>(E.g. For mining - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc</p> <p>E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors,</p>				<p>(Mark with an X)</p>

etc...etc...etc.)				
<p>Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including —</p> <p>(a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource[,]; or [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)]</p> <p>(b) the primary processing of a mineral resource including winning,</p>	4 Ha	X	Listing Notice 1 Activity No. 21	N/A

<p>extraction,</p> <p>classifying,</p> <p>concentrating,</p> <p>crushing, screening or washing;</p> <p>but excluding the secondary processing of a mineral resource, including the smelting,</p> <p>beneficiation, reduction, refining, calcining or gasification of the mineral resource in</p> <p>which case activity 6 in Listing Notice 2 applies</p>				
Crushing Processing Plant	0.003 Ha	X	Listing Notice 1 Activity No. 21	N/A
Access road	0.4 Ha	X	Listing Notice 1 Activity No. 21	N/A
Stock piles	0.04 Ha	X	Listing Notice 1 Activity No. 21	N/A
Loading, hauling, and transport	0.001 Ha	X	Listing Notice 1 Activity No. 21	N/A

- ii. Description of the activities to be undertaken** (Describe Methodology or technology to be employed, including the type of commodity to be prospected/mined and for a linear activity, a description of the route of the activity)

The activity is for a mining permit application, which will entails the mining of aggregate (dolerite), sand and gravel, which will be crushed and stock pile so that it can be sold to customers. The top soil will be mined out and stored separately in a manner that will prevent erosion because it will be used for rehabilitation concurrently so as the proposed mining activity is proceeding. Machineries like 1 X excavator, 1 X dumping truck, 1 X front end loader will be employed in the process. A small amount of water of about 50 m³ / annum will be used to stabilize rocks and suppress dust during the proposed mining activity.

e) Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT. (E.g. in terms of the National Water Act a Water Use License has/has not been applied for)
National Environmental Management Act (NEMA), No. 107 of 198, as amended	Section 24	In terms of the National Environmental Management Act, an application for an Environmental Authorisation has been applied for.
Regulation 982. National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations, 2014	Regulation 19	In terms of the NEMA EIA Regulations a Basic Assessment Report (BAR) and Environmental Management Programme (EMPr) were prepared to submit to the competent authority.
Regulation 983. National Environmental Management Act (Act No. 107 of 1998): Listing notice 1: List of activities and competent authorities identified in terms of sections 24(2) and 24D	Regulation 20	In terms of NEMA EIA Regulations R.983, Listing notice 1, the activity triggers regulation 21 which refers to a mining permit application and therefore needs an Environmental Authorizations to proceed as well as follow procedures as prescribed in regulation 19 of R.982 (EIA Regulations, 2014).
Mineral and Petroleum	Section 27	In terms of the MPRDA, any

Resources Development Act (Act No. 28 of 2002)		person who wishes to apply for a mining permit must lodge the application in the prescribed manner.
Mineral and Petroleum Resources Development Amendment Act (Act No. 49 of 2008)	Section 23	In terms of the MPRDA, any person who wishes to apply for a mining permit must simultaneously apply for an environmental authorisation and must lodge the application to requirements contemplated by competent authority.

f) Need and desirability of the proposed activities

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location)

The need for the proposed development is of paramount importance in the sense that it is going to assist the local community of Welkom in terms of poverty alleviation through job creation, black economic empowerment in terms of the mining charter which will contribute to the State visions of job creation.

g) Motivation for the overall preferred site, activities and technology alternative

The proposed mining site is preferred because:

1. It contains the right quality of Sand aggregate (dolerite) and gravel bearing material required for the recovering of Sand aggregate (dolerite) and gravel and has a good history of Sand aggregate (dolerite) and gravel quality;
2. The mining site still has good high grade Sand aggregate (dolerite) and gravel bearing material;
3. And the mining site is historic mining area compare to breaking a new virgin ground for mining.

h) Full description of the process followed to reach the proposed preferred alternatives within the site

NB!!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

- i. Details of the development footprint alternatives considered.** With reference to the site plan provided below and the location of the individual activities on site, provide details of the alternatives considered with respect to:
 - a.** The property on which or location where it is proposed to undertake the activity;
 - b.** The type of activity to be undertaken;
 - c.** The design or layout of the activity;
 - d.** The technology to be used in the activity;
 - e.** The operational aspects of the activity; and

f. The option of not implementing the activity

No alternatives are applicable to this project since the Sand aggregate (dolerite) and gravel is contained in the proposed area. Locating the development to another area will result in the Sand aggregate (dolerite) and gravel possibly not being found and the economy and society not benefitting from proposed mining activity.

- ii. Details of the Public Participation Process Followed** (Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attend public meetings. Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land).

Definitions:

‘consultation’ means a two way communication process between the applicant and the community or interested and affected party wherein the former is seeking, listening to, and considering the latter’s response, which allows openness in the decision making process.

‘community’ means a group of historically disadvantaged persons with interest or rights in a particular area of land on which the members have or exercise communal rights in terms of an agreement, custom or law: Provided that, where as a consequence of the provisions of the Act negotiations or consultations with the community are required, the community shall include the members or part of the community, directly affected by prospecting or mining, on land occupied by such members or part of the community.

‘Interested and affected’ parties include, but are not limited to; –

- Host Communities
- Landowners (Traditional and Title Deed owners)
- Traditional Authority
- Land Claimants
- Lawful land occupier
- The Department of Land Affairs,
- Any other person (including on adjacent and non-adjacent properties) whose socio-economic conditions may be directly affected by the proposed prospecting or mining operation
- The Local Municipality,
- The relevant Government Departments, agencies and institutions responsible for the various aspects of the environment and for infrastructure which may be affected by the proposed project.

The following I&APs were contacted:

- Land owner

- Free State Department of Economic Development, Tourism, Environmental Affairs, and Small Business;
- Chief Director: Department of Rural Development and Land Reform (Free State);
- Masilonyana local Municipality– Municipal Office;
- Lejweleputswa District Municipality– Municipal Office;
- Department of Water and Sanitation; and
- Other relevant parties or departments.

The identified I&APs were provided with information regarding the applied proposed mining. The final location of the planned excavations will be decided in consultation with the landowners during mining. All comments from the identified I&APs will be noted and taken into consideration.

After the directly affected land owner has been identified, these parties were consulted telephonically, per email or personally (whichever method is most convenient for the party concerned).

The public participation process mainly comprises engagement with Interested and Affected Parties (I&APs) and is of utmost importance in any environmental assessment process. The public participation process, *inter alia*, involves the following:

- Inform, raise awareness, educate and increase understanding of a broad range of environmental issues that might be arise with the proposed extension in the size of mining operation.
- Establish lines of communication between stakeholders, I&APs and the project team.
- Provide opportunity to all parties for the exchange of information and expression of views and concerns.
- Obtain contributions of stakeholders and I&APs and ensure that all views, issues, concerns and queries raised are fully documented.
- Identify all the significant issues associated with the proposed extension of project

Engedi Minerals and Energy (Pty) Ltd was appointed by **Mime Logistics CC** as the independent consultant to conduct the public participation process as part of the Basic Assessment Report and Environmental Management Programme Report. As stipulated in Section 27 (5) (b) of the MPRDA (Act 28 of 2002) as amended by the MPRDA (Act 49 of 2008) and Regulations, Interested and Affected Parties (I&APs) need to be notified and consulted with, as part of a mining permit application and extension thereof.

The public participation process aims to provide I&APs with objective information in order to assist them to:

- Raise issues of concern and make suggestions for enhanced benefits;
- Contribute local knowledge and experience;
- Verify that their issues have been captured;
- Verify that their issues have been considered; and
- Comment on the findings of the EMP.

An email explaining the project and the background information will be sent to all other I&APs introducing the project. Specifically, the Free State Department of Economic Development, Tourism, and Environmental Affairs giving a background summary about the proposed project

The draft BAR and EMPr was made available for all the registered I&APs. The draft BAR and EMPr was made available to inform the I&APs of the activities, background information of the area, the possible impacts and mitigation measures and other relevant information, and to request input and comment on it.

iii. Summary of issues raised by I&APs (Complete the table summarizing comments and issues raised, and reaction to those responses) -

Interested and Affected Parties		Date Received	Comments	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated
List the names of persons consulted in this column, and						
Mark with an X where those who must be consulted were in fact consulted						
AFFECTED PARTIES						
Landowner/s						
Consulted (Please refer to the Consultation results annexure contained in the report)						

Lawful occupier/s of the land					
Landowners or lawful occupiers on adjacent properties					
Municipal councilor					
District Municipality – Lejweleputswa District Municipality					
Local Municipality – Masilonyana local Municipality					
Organs of state (Responsible for infrastructure that may be affected i.e. Roads Department, Eskom, Telkom, DWA etc.)					
Department of Water Affairs – Free State					
Communities					
Department of Land Affairs					
Department of Rural Development and Land Reform,					

Traditional Leaders					
<i>No traditional leaders are present on site</i>					
Department of Environmental Affairs					
Free State Department of Economic Development, Tourism, Environmental Affairs, and Small Business					
Other Competent Authorities affected					
<i>No other competent authorities will be affected as of yet.</i>					
OTHER AFFECTED PARTIES					
<i>No other affected parties have been identified</i>					

INTERESTED PARTIES				
N/A since it is very far to the nearby cities and community. All I&APs was made aware of the project through public notices and an advert which was placed on the Local newspaper.				

3.1 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE ALTERNATIVES

(The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects).

3.1.1 Baseline Environment

a) Type of environment affected by the proposed activity

(its current geographical, physical, biological, socio-economic, and cultural character). The environment on site relative to the environment in the surrounding area

Climate

Welkom normally receives about 401mm to 550mm of rain per year, dependent on wet or dry cycles, with most rainfall occurring mainly during midsummer. It receives the lowest rainfall (0mm) in July and the highest (70mm) in January. The monthly distribution of average daily maximum temperatures ranges from 17 °C in June to 29 °C in January. The region is the coldest during July when the mercury drops to 0 °C on average during the night

Topography and Elevation:

Koppie Alleen is the only hill near Welkom and therefore is aptly named for its oddity. The terrain elevation above sea level is 1435 metres. The largest water catchment is the Sand River to the south-east of Welkom in Virginia's direction. Large saline pans such as Flamingo Pan and Theronia Pan are situated to the south-west of Welkom.

Geology and Soils:

Welkom is located on the south-western corner of the Witwatersrand Basin. This basin situated on the Kaapvaal Craton, is filled by a 6-kilometre thick succession of sedimentary rocks, which extends laterally for hundreds of kilometres.

Basal Reef

The Basal Reef is the most common reef horizon. It varies from a single pebble lag to channels of more than 2m thick. It is commonly overlain by shale, which thickens northwards.

The De Bron Fault

The Free State Goldfields are divided into two sections, cut by the north-south striking De Bron Fault. This major structure has a vertical displacement of about 1500m as well as a lateral shift

of 4 km. A number of other major faults lie parallel to the De Bron Fault. Dips occur mostly towards the east, averaging 30 degrees but this becomes steeper approaching the De Bron Fault. To the east of the fault, a dip occurs towards the west at 20 degrees, although structurally complex dips of up to 40 degrees have also been measured. Between these two blocks, lies the uplifted horst block of the West Rand Group of sediments with no reef preserved.

Biological Environment

Vegetation

Welkom is situated on two vegetation units, the Western Free State Clay Grassland and Vaal-Vet Sandy Grassland; these are differentiated by soil types, rainfall and frost. The dominant grass species are *Hyparrhenia hirta*, *Themodatriandra*, *Sporobolus pyramidalis*, *Eragrostis* sp, *Aristida* sp, and other grasses and herbs.

Trees and shrubs are infrequent due to heavy frost in the winter months. The grasslands surrounding Welkom also include small mammal communities of Yellow Mongoose, Ground Squirrel, Cape Porcupine, African Mole-rat, Pouched Mouse, Large-eared Mouse, Four-stripe Grass Mouse, and Multimammate Mouse.

Birds

There is good number of species, many of which are fairly tame (including Crimson-breasted Shrike, Kalahari Scrub-Robin, Marico Flycatcher, Ground scraper Thrush and Scaly-feathered Finch). Bush thickets close to the dam are good for warblers, when Garden Warbler, Willow Warbler, African Reed-Warbler, Marsh Warbler and Icterine Warbler have been recorded. All three southern African species of mousebird (White-backed Mousebird, Red-faced Mousebird and Speckled Mousebird) may be encountered, with Speckled Mousebird being the least common.

Woodland habitats provide a wealth of birdlife. A family of Magpie Shrike is also present and a few pairs of Southern Yellow-billed Hornbill may also be encountered. Common Scimitarbill is fairly common and Red-crested Korhaan. Pirit Batis and Chestnut-vented Tit-Babbler are common. Acacia Pied Barbet and Crested Barbet, as well as Cape Penduline-Tit, African barred warbler, Yellow-bellied Eremomela and Long-billed Crombec. Waxbills and finches are common in thornveld and also in thicket areas between the gravel road and the edge of Bloemhof Dam. Species such as Blue Waxbill, Black-faced Waxbill and Violet-eared Waxbill, Green-winged Pytilia and Red-billed Firefinch are present, while Jameson's Firefinch is an occasional. Fawn-coloured Lark and Sabota Lark also prefer thornveld habitat. White-backed Vulture nest in this habitat and Verreaux's Eagle-Owl may also be encountered here, particularly at dusk, when its gruff calling may be heard.

Conservation areas

There are no protected areas or ecological corridors within 30km of the site.

Surface water

Catchment

Vaal Dam is supplying the area around in Welkom with water. The largest water catchment is the Sand River to the south-east of Welkom in Virginia's direction, while Flamingo Pan and Theronia Pan are situated to the south-west of Welkom.

Water Management Area

There is only one water management area, namely the Middle Vaal.

Rivers

Five rivers run through the municipality, including the Koolspruit, Sand, Sandspruit and Vet. The Sand River (formerly Zand Rivier) is a river in the Free State, South Africa. It is located close to Welkom and Virginia in the gold mining center of the Free State.

Socio-economic setting

The setting around Welkom is mostly dependant on mining and agriculture for its socio-economic development and employment .The economy of the Matjhabeng Municipality was based on the gold mining industry, and although the gold mining industry has declined since 1991, three of the biggest gold producers in the world are still active in the area and some are even expanding. The mining activities located in and around Allanridge, Odendaalsrus, Welkom and Virginia. Manufacturing aimed at the mining sector exists to a limited extent in the above towns. Other manufacturing activities are limited.

Mining still dominates the local economic scene by contributing 58% of the GDP of the area and 19% of the province. Major strategies are in place to change the economic base away from the mining dependency. The FGF Development Centre, economic development arm of the Matjhabeng Council is devising major strategies to change the economic base away from the mining dependency.

Population

The population of Welkom, South Africa is 64130 (382.76 per km²) according Census 2011

Race

According to Census 2011 both black and white are found in the area but the blacks are pre-dominant.

Population group	People	Percentage
Black African	38953	60.74%
White	17226	26.86%
Coloured	7141	11.14%
Indian or Asian	575	0.90%
Other	234	0.36

Gender composition

The male population were slightly higher than the female population according to (Global Insight 2009).

Gender	People	Percentage
Male	33259	51.86%
Female	30871	48.14%

Age groups

Age Structure	
Population under 15	27.30%
Population 15 to 64	68.10%
Population over 65	4.70%

Education

Education (aged 20 +)	
No schooling	4.60%

Higher education	9.00%
Matric	28.00%

Poverty and inequality

The current employment situation is analysed by considering employment in the various sectors. The GDP report directly point to the sectors which employ the greatest numbers of people. These sectors are agriculture and hunting, food and beverages, transport, finance and insurance education and health and social services of which people that are illiterate and have no skills mostly found within the agriculture sector.

Labour Market	
Unemployment rate (official)	37.00%
Youth unemployment rate (official) 15-34	49.70%

Employment

EMPLOYMENT

	2014/15	2013/14	2012/13	2011/12
Employment				
Employment Costs (R'000)	550 429	482 974	435 167	462 381
Remuneration of councillors (R'000)	25 449	24 682	22 703	19 999
Total Employee Positions	2 379	3 704	3 653	2 131
Total Vacant Employee Positions	0	1 657	1 604	1
Total Vacancy Percentage	0.00%	44.74%	43.91%	0.05%

66% of Coloured and 27% of African females are unemployed. 46% of coloured men are also unemployed with only 13.7% of African males unemployed. This huge difference is explained by the high number of men who are employed in agriculture, mining, and hunting. The high number of coloureds unemployed is a challenge as this could lead to social problems like crime, drug abuse and further depress the upliftment of the racial group.

Income

Income category of agricultural households	
Annual income category of agricultural household heads	Number
No income	4,982
R1-R4 800	741
R4 801-R38 400	7,526
R38 401-R307 200	2,951
R307 201+	277
Unspecified	334

b) Description of the current land uses

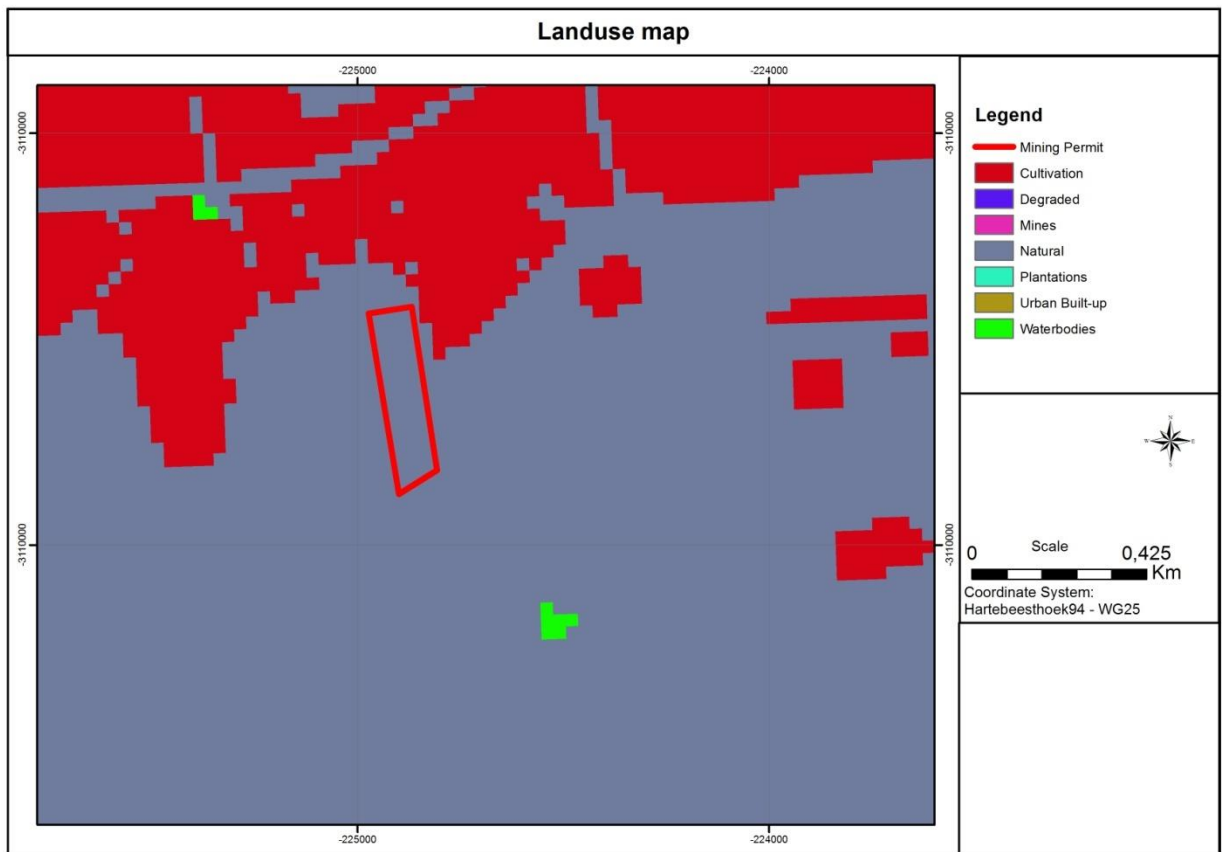
Agricultural (mainly cattle farm and crop farming) and mining (mainly sand and gravel).

c) Description of specific environmental features and infrastructure on the site

Industrial area

d) Environmental and current land use map

(Show all environmental and current land use features) Mining and Agriculture. Vegetation also available for grazing



iv. **Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of impacts, including the degree to which these impacts**

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impact of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of these impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources and can be avoided, managed or mitigated).

Potential impact of each main activity in each phase, and corresponding significance assessment

No	Activity	impact	Duration	intensity	Probability	Significance Rating	
1	Site Preparation	Loss of vegetation	3	5	10	80	High
		Habitat Destruction	3	5	10	80	High
		Visual scarring	3	4	8	56	Medium
		Soil erosion	3	4	6	42	Low
2	Excavations	Dust emissions	2	5	8	56	Medium
		Surface disturbances	4	4	10	80	high
		Drainage interruption	4	4	10	80	high
		Slope instability	4	3	3	42	low
		Noise	2.5	5	10	75	high
		Visual Scarring	3	4	8	56	medium
		Soil erosion	3	4	6	42	low
4	Stockpiles	Dust	2	5	8	56	medium
		Surface disturbances	3	5	10	80	high
		Drainage disruption	2.5	5	10	75	High

5	Loading, Hauling and transportation	Dust	2	5	10	70	medium
		Increased risk of accidents	2	4	4	16	low
		Noise	2.5	5	10	75	high
		Soil contamination from oil/fuel leaks	3	3	6	36	low

- **Potential cumulative impacts**

Since they are other mining company around, the cumulative impact will be noise and dust.

- **Potential impact on heritage resources**

No heritage sites may be present on the site, which may be disturbed and/or damaged during mining.

- **Potential impacts on communities, individuals or competing land uses in close proximity**

(If no such impacts are identified this must be specifically stated together with a clear explanation why this is not the case.)

Expectations could be created that numerous job and business opportunities will become available during mining. All Interested and Affected Parties (I&APs) need to be informed throughout the Mining

- **Confirmation that the list of potential impacts has been compiled with the participation of the landowner and interested and affected parties**

The draft BAR and EMPr was made available to the interested and affected parties for comment and input. The list of potential impacts was included in the draft BAR and EMPr.

- **Confirmation of specialist report appended**

Not yet, but the specialist has been appointed and they busy with the reports, once they are done, they will be sent to your office.

e) Methodology used in determining and ranking nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which they initial site layout needs revision).

Criteria of assigning significance to potential impacts

The significance of the impacts was determined through the consideration of the following criteria:

Probability:	Provides a description of the likelihood/probability of the impact occurring
Extent:	Describes the spatial scale over which the impact will be experienced
Duration:	The period over which the impact will be experienced
Intensity:	The degree/order of magnitude/severity to which the impact affects the health and welfare of humans and the environment
Significance:	Overall significance of the impact on components of the affected environment and whether it is a negative or positive impact

The impacts were individually described and assessed using the criteria drawn from the Environmental Impact Assessment (EIA) Regulations, published by the DEA in terms of the NEMA (Act 107 of 1998).

The significance of each impact is assessed using the following formula (before and after mitigation):

Significance Point (SP) = (Probability + Extent + Duration) x Intensity

The maximum value is 150 SP. The impact significance will then be rated as follows:

SP > 75	Indicates high environmental significance	An impact that could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 – 75	Indicates moderate environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
SP < 30	Indicates low environmental significance	Impacts with little real effect and which should not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences/effects.

Probability (P)		
None (N)	1	The possibility of the impact occurring in none, due either to the circumstances, design or experience (0%).
Possible (P)	2	The possibility of the impact occurring is very low, due either to the circumstances, design or experience (25%).
Likely (L)	3	There is a possibility that the impact will occur to the extent that provisions must therefore be made (50%).
Highly likely (H)	4	It is most likely that the impacts will occur at some stage of the development and plans must be drawn up before carrying out the activity (75%).
Definite (D)	5	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on (100%).
Extent (E)		
Footprint (F)	1	The impact area extends only as far as the activity which occurs within the total site area.
Site (S)	2	The impact could affect the whole site or a significant portion of the site.
Regional (R)	3	The impact could affect the area including the neighboring farms, the transport route and/or the adjoining towns.
National (N)	4	The impact could have an effect that expands throughout the country.
International (I)	5	Where the impact has international ramifications that extend beyond the boundaries of the country.
Duration (D)		
<i>The period over which the impact will be experienced</i>		
Temporary (T)	1	0 – 3 years (or confined to the construction period).
Short term (S)	2	3 – 10 years (or confined to the construction and part of the operational period).
Medium term (M)	3	10 – 15 years (or confined to the construction and whole operational period).
Long term (L)	4	For the whole life of mine (including closure and rehabilitation period).

Permanent (P)	5	Beyond the anticipated lifetime of the project.
Intensity (I)		
Insignificant (I)	2	Will have a no or very little impact on the health and welfare of humans and environment
Low (L)	4	Will have a slight impact on the health and welfare of humans and environment
Moderate (M)	6	Will have a moderate impact on the health and welfare of humans and environment
High (H)	8	Will have a significant impact on the health and welfare of humans and the environment
Very high/ don't know (V)	10	Will have a severe impact on the health and welfare of humans and the environment

v. **Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;**

No alternatives were considered. The summary of identified positive and negative risks is as follows.

Negative Impacts:

- Visual Impacts
- Noise Impacts
- Air Quality Deterioration
- Disruption of surface drainage
- Destruction of flora and loss of habitat
- Loss of soil and agricultural potential
- Water pollution
- Erosion
- Safety and Security Impacts
- Land Degradation

Positive impacts:

- Creation of employment opportunities
- Training and skills development opportunities

vi. **The possible mitigation measures that could be applied and the level of risk**

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

ASPECT	POTENTIAL IMPACT	MITIGATION MEASURES
Soil	Compaction – from movement of heavy machinery	<ul style="list-style-type: none"> • Existing roads and tracks will be used as far as possible. • New access tracks will be kept to a minimum. • Rehabilitation of disturbed areas will take place.
	Loss of topsoil – when the site is cleared of vegetation, topsoil may be lost	<ul style="list-style-type: none"> • Any removed topsoil will be kept to one side and protected from being blown away or being eroded. • Rehabilitation of disturbed areas will take place.
	Erosion – from the clearing of drill sites and movement along access tracks	<ul style="list-style-type: none"> • Sediment and erosion controls will be designed to prevent runoff from the sites into the rivers and any wetland areas. • Appropriate water management, sediment and erosion control measures will be designed for roads and tracks that may be constructed. • Rehabilitation of disturbed areas will take place.
	<ul style="list-style-type: none"> • Contamination – from diesel, oil, grease, etc. used for the machinery and from maintenance of machinery conducted on site • Contamination – from domestic waste, sewerage 	<ul style="list-style-type: none"> • Topsoil must not be contaminated with oil, grease, diesel, etc. which may inhibit the later growth of vegetation. • All chemicals, fuels and oils to be stored on site will be appropriately stored in sealed containers and placed on a lined area. • Inspect equipment daily for leaks. Machinery and equipment will only be maintained over a drip tray, a thin concrete slab or a PVC lining to prevent soil and water contamination. No vehicle will be extensively repaired on site. • All equipment and vehicles must be adequately

		<p>maintained so that during operations it does not spill oil, diesel, fuel, etc.</p> <ul style="list-style-type: none"> • Any contaminated soil will be collected into non-permeable bags and disposed of at an approved landfill site. • A chemical toilet will be used on site and will be used in such a way as to prevent water pollution. Full or leaking toilets must be reported to the supervisor for corrective action or replacement. • Rehabilitation of disturbed areas will take place.
Land use	mining may interfere with any land uses currently taking place on the site	<ul style="list-style-type: none"> • Only one excavation site will be operational at any time. • The area to be disturbed will be kept to a minimum (not exceeding 20mx20m). • No excavations will be established within 50m of any agricultural land unless consent is received from the land owner. • Rehabilitation of disturbed areas will take place.
Biodiversity (fauna and flora)	The fauna and flora could be negatively affected by the establishment of the sites and access tracks	<ul style="list-style-type: none"> • Access tracks will be located in areas that will result in minimal ground disturbance. • A field survey will be undertaken before excavation commences at each excavated site to confirm that no threatened species or ecologically sensitive areas are present in sections to be cleared. • Permission will be obtained from the landowner before trees are felled, should it be necessary. • All trees protected in terms of the National Forests Act, 1998, will be protected – will not be cut, disturbed, damaged, removed, etc.

		<ul style="list-style-type: none"> • Rehabilitation of disturbed areas will take place.
	<p>Alien and invasive species could be introduced through the disturbance</p>	<ul style="list-style-type: none"> • Machinery will be cleared of mud and seeds prior to relocation to the next site to prevent the spread of alien invasive species. • An inspection on whether there is evidence of alien and invasive species as a result of mining activities will be undertaken and removed if required.
<p>Surface- and groundwater</p>	<ul style="list-style-type: none"> • Contamination – from diesel, oil, grease, etc. used for the machinery and from maintenance of machinery conducted on site • Contamination – from domestic waste, sewerage and contaminated soil • Water discharge during excavation 	<ul style="list-style-type: none"> • No excavations will be established within 100m of any watercourse or wetland. • All chemicals, fuels and oils to be stored on site will be appropriately stored in sealed containers and placed on a lined area. • All waste will be collected, separated and stored properly in containers with lids and removed to an approved landfill. • Inspect equipment daily for leaks. Machinery and equipment will only be maintained over a drip tray, a thin concrete slab or a PVC lining to prevent soil and water contamination. No vehicle will be extensively repaired on site. • All equipment and vehicles must be adequately maintained so that during operations it does not spill oil, diesel, fuel, etc. • Any contaminated soil will be collected into non-permeable bags and disposed of at an approved landfill site. • A chemical toilet will be used on site and will be used in such a way as to prevent water pollution. Full or leaking toilets must be reported to the

		<p>supervisor for corrective action or replacement.</p> <ul style="list-style-type: none"> • All excavations will be constructed in such a way as to prevent ingress of water into the hole. • Any completed excavations that are not required for groundwater monitoring will be rehabilitated to prevent groundwater contamination. • Rehabilitation of disturbed areas will take place.
	Drinking water	<ul style="list-style-type: none"> • Drinking water will be supplied in plastic containers to be stored on site.
Heritage sites	Heritage sites may be present on the site, which may be disturbed and/or damaged during mining	<ul style="list-style-type: none"> • Potential heritage sites will be identified during the planning of quarry locations and demarcated. • Access to these sites will then be limited and all workers will be notified to keep at least 100m away from these sites.
Air quality (dust)	The air quality will not be disturbed, however, a minimal dust problem may be experienced, especially in the mining area during excavation	<ul style="list-style-type: none"> • All excavations will be fitted with appropriate dust suppression equipment like water sprays, where possible. • Speed limits on gravel roads will be limited to 40km/hr to minimise dust generation. • Dust will be effectively controlled in all disturbed areas through water spraying. • Excavation, handling and transportation of erodible materials should be avoided during periods of excessive wind. • If necessary, other appropriate dust suppression techniques will be administered. For example chemicals, wind fencing, covering of surfaces and vegetation of open areas.

Noise	Noise from the excavation activities could disturb residents within the site	<ul style="list-style-type: none"> • Modern, low noise emission vehicles and equipment will be favoured. • All equipment on site will be maintained in good working order. • Excavations will be restricted to night hours. • Speed limits on gravel roads will be limited to 40km/h to minimise noise generation.
Socio-economic	Expectations could be created that numerous job and business opportunities will become available during mining	<ul style="list-style-type: none"> • Due to the nature of mining, employment opportunities will be minimal. The mining crew is small (4-6 people) with specialised skills. Where possible, local people will however be employed during the project.

f) Motivation where no alternative sites were considered

No location alternatives are applicable to this project since the Sand aggregate (dolerite) and gravel is contained in the proposed mining area. Locating the development to another area will result in the Sand aggregate (dolerite) and gravel not being found and the economy and society not benefitting from future proposed possible mining activities. The proposed site for the proposed mining is located within an area which is already severely disturbed as a result of agricultural activities and previous mining practice compare to the breaking down of a new virgin ground.

g) Statement motivating the alternative development location within the overall site

(Provide a statement motivating the final site layout that is proposed.)

The mining of the site is motivated by the need to improve life of the community of Masilonyana local Municipality, which is currently faced with poverty due to high unemployment rate and through this project poverty will be alleviated. The proposed mining site is preferred as it is situated on the rightful spot for Sand aggregate (dolerite) and gravel mining reflecting to the previous mining which was taking place thereby.

i. Full description of the process undertaken to identify, assess and rank the impacts and risks of the activity will impose on the preferred site (In respect to the final site layout plan) through the life of the activity (Including

- (i) a description of all the environmental issues and risks that were identified during the environmental impact assessment process and
- (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.)

An activity mapping exercise was conducted for the proposed activity, then potential environmental impacts were identified. The DEA impact assessment matrix was used. The impact with medium to high significance requires mitigation/control measures, the following are the possible impacts the project will have on the environment:

- Dust generated during excavation, loading, transportation and offloading of (aggregate and gravel) and dust generated by movement of vehicles from mining site to construction site causing air pollution.
- Noise generated by machinery during Sand aggregate (dolerite) and gravel mining and vehicles while transporting gravel from mining site to construction site.
- Vegetation destruction due to clearing of the site for mining purposes.
- Ecosystem disturbance due to vegetation clearing.
- Erosion causes by removal of vegetation and stripping of top soil to extract the gravel.
- Visual impact due to mining activities, pits will be enlarged and machinery around the site will disturb the natural visual landscape.
- Exposure of animals to excavations filled with water resulting in drowning and death.
- Open excavations are a danger to animals falling in and breaking limbs.
- Improper disposal of waste resulting in land pollution.
- Fuel and oil leakages causing ground and surface water pollution.

h) Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered and affected parties).

NAME OF ACTIVITY (E.g. For prospecting – drill site, site camp, ablation facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. For mining – excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and pitting and trenching, accommodation, offices, ablation, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc)	POTENTIAL IMPACT (Including the potential impacts for cumulative impacts) (E.g. dusts, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc...etc...etc...)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. Construction, commissioning, operational, decommissioning, closure, post-closure)	SIGNIFICANC E If not mitigated	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc...etc...etc)	SIGNIFICANC E If mitigated
Site Establishment activities (fencing, signage, access formation, etc)	Loss of vegetation	Visual character, Land use	Pre-mining	Medium	Remedy through rehabilitation, Limit footprint	Low

	Habitat Destruction	Visual character	Pre-mining	Medium	Remedy through rehabilitation, Limit footprint	Low
	Visual scarring	Visual character	Pre-mining	Medium	Remedy through rehabilitation	Low
	Soil erosion	Visual character, Land use	Pre-mining	Medium	Remedy through rehabilitation, Limit footprint, Control through storm water control	Low
Clearance of area for mining	Visual scarring	Visual Character	Operational Phase	Medium	Remedy through rehabilitation	Low
	Destruction of flora and habitat	Visual Character, Land use	Operational Phase	Medium	Remedy through rehabilitation, Limit footprint and removal of vegetation	Low

	Loss of agricultural potential	Land use management	Operational Phase	Low	Control through soil conservation techniques Limit footprint of the proposed mining as far possible to limit loss of agricultural land	Low
	Soil erosion	Land use	Operational Phase	Medium	Control through soil conservation techniques, Stop through appropriate storage of topsoil	Low
Excavation	Dust emissions	Air quality	Operational Phase	Medium	Control through dust control measures	Low
	Drainage disruption	Drainage	Operational Phase	Medium	Control through storm water controls	Low
	Slope instability	Topography	Operational Phase	Low	Control through slope management controls Low	Low

	Noise	Noise	Operational Phase	Low	Control through noise control measures	Low
	Visual Scarring	Visual Character	Operational Phase	Medium	Remedy through rehabilitation of already worked areas	Low
	Soil erosion	Land use	Operational Phase	Low	Remedy through the rehabilitation of already worked areas, Control through slope control, Stop through appropriate storage of topsoil	Low
	Destruction of heritage resource	Heritage issues	Operational Phase	Low	Avoidance	Low
Waste Disposal and Material storage	Soil contamination	Land degradation	Operational Phase	Low	Avoidance	Low
	Water pollution	Water	Operational Phase	Low	Avoidance	Low
	Increased risk of fire	Safety	Operational Phase	Low	Avoidance	Low

Material handling, hauling and transportation	Dust	Air quality	Operational Phase	Low	Control through dust control measures	Low
	Increased risk of accidents	Safety	Operational Phase	Low	Stop through site management protocols	Low
	Noise	Noise	Operational Phase	Low	Control through noise control measures	Low
	Soil contamination from oil/fuel leaks	Land degradation	Operational Phase	Low	Stop through operational control measures e.g. drip trays and use of well serviced machinery	Low
Removal of infrastructure & equipment and re-shaping of proposed mining	Noise	Noise	Decommissioning and closure	Low	Control through noise control measures	Low
	Dust	Air quality	Decommissioning and closure	Low	Control through dust Control measures	Low
	Soil contamination from oil/fuel	Land degradation	Decommissioning and closure	Low	Stop through operational Control measures, e.g. drip trays and use of well serviced machinery	Low

	Disruption of surface drainage	Water movement	Decommissioning and closure	Low	Control through storm water controls, remedy through rehabilitation	Low
Community and labour relations management	Community conflicts and tensions	Community relations	Operational	Low	Control through Site Management protocols	Low
	Increase risk of fire	Fire risk	Operational	Low	Control through Site Management protocols	Low
	Reduced security on area	Safety Issues	Operational	Low	Control through Site Management protocols	
	Improved employment Improved skills	Community relations Community relations	Operational	Low	Control through Site Management protocols	Low

i) Summary of specialist reports

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form)

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Specialist personnel have been appointed and reports has been attached as Annexures			

Attach copies of Specialist Reports as appendices

j) Environmental impact statement

i. Summary of the key findings of the environmental impact assessment;

In general, it is recognized that the proposed mining activities has the potential to pose various risks to the environment as well as to the residents or businesses in the surrounding area. Therefore, it is important that these possible risks and key issues are identified during the draft phase of the BAR compilation. These impacts, issues and risks will be addressed in consultation with the I&APs, through an internal process based on similar developments.

- ii. **Final Site Map** (Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers) **Attach as Appendix C**



iii. Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

No alternatives were considered. The summary of identified positive and negative risks is as follows.

Negative Impacts:

- Visual Impacts
- Noise Impacts
- Air Quality Deterioration
- Disruption of surface drainage
- Destruction of flora and loss of habitat
- Loss of soil and agricultural potential
- Water pollution
- Erosion
- Safety and Security Impacts
- Land Degradation

Positive impacts:

- Creation of employment opportunities
- Training and skills development opportunities

k) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr;

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation

The objectives of impact management are to avoid and/or minimize negative impacts of a proposed development to ensure minimal impact on the environment.

The mitigation measures are detailed in the EMPr which must be provided to the contractor at tendering stage, implemented and monitored.

It is therefore recommended that an Environmental Control Officer be appointed to monitor and audit the project during mining activities to ensure adherence to the recommendations of the EMPr.

l) Aspects for inclusion as conditions of Authorization

Any aspects which must be made conditions of the Environmental Authorization

EMPr must be on site

- The contractor and key personnel must get an understanding of the EMPr
- An Environmental Control Officer must be appointed to ensure that environmental controls are being implemented, and quarterly reports must be forwarded to the Competent Authority (DMR among others).

- The proponent and contractor must be made aware that they are responsible for rehabilitating the environment they damage to the pre-state of which they found it to be.
- Upon getting done with the prospecting activity, closure report must be submitted to the competent authority ensuring that all the disturbed environmental features are rehabilitated to the pre mining state.

m) Description of any assumptions, uncertainties and gaps in knowledge

(Which relate to the assessment and mitigation measures proposed)

No specialist were engaged hence some impacts could have been missed.

n) Reasoned opinion as to whether the proposed activity should or should not be authorized

i. Reasons why the activity should be authorized or not.

The project will have an advance community development and to fulfill the Integrated Development Plan and mandate of the Masilonyana local Municipality to provide services to the community in terms of job creation.

ii. Conditions that must be included in the authorization

EMPr must be on site;

- The contractor and key personnel must get an understanding of the EMPr
- An Environmental Control Officer must be appointed to ensure that environmental controls are being implemented, and quarterly reports must be forwarded to the Competent Authority.
- The proponent and contractor must be made aware that they are responsible for rehabilitating the environment they damage to the pre-state of which they found it to be.
- Upon getting done with the mining activity, closure report must be submitted to the competent authority.

o) Period for which the Environmental Authorisation is required

The Environmental Authorisation is required for the duration for which a mining permit is being applied for, a period of 2 years upon issuing of the Mining permit.

p) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme report.

Herewith I, the person whose name and identity number is stated below, confirm that I am the person authorised to act as representative of the applicant in terms of the resolution submitted with the application, and confirm that the above report comprises BAR and EMPr compiled in accordance with the guideline on the Departments official website and the directive in terms of sections 29 and 39 (5) in that regard, and the applicant undertakes to execute the Basic Assessment Report and Environmental Management Programme as proposed.	
Full Names and Surname	TSHIMANGADZO MULAUDZI
Identity Number	8803265731082

FINANCIAL PROVISION

(State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation)

The amount will be R 72 401.24

q) Explain how the aforesaid amount was derived.

The financial provisions were derived in order to ensure that the amount of money required for rehabilitation and remediation of environmental impacts and associated damage as well as close-out is provided for and adequately calculated. The money would cover decommissioning and final closure of the operation; and post closure management of residual and latent environmental impacts. The amount was based on an assessment of the expected operational activities that will take place, the level of disturbance damage expected, the sensitivity of the area and the amount of work that is required to bring the site back to a self-sustaining ecosystem again. Consideration on how much it will cost to get labour, material and equipment used for the rehabilitation were also considered.

Calculation of the quantum of the financial provision required to manage and rehabilitate the environment has been worked out. The financial provision was calculated in line with the Financial Provisioning Regulation, 2015.

Applicant:
Evaluator(s)

Mime Logistics CC - FS 10355 MP
Engedi Minerals and Energy (Pty) Ltd

Location:
Date:

Welkom
Dec-22

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	19	1	1	0
2 (A)	Demolition of steel buildings and structures	m2	0	271	1	1	0
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	400	1	1	0
3	Rehabilitation of access roads	m2	5,00	49	1	1	245
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	471	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	3	257	1	1	771
5	Demolition of housing and/or administration facilities	m2	0	542	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	0,1	284292	1	1	28429,2
7	Sealing of shafts adits and inclines	m3	0	146	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0,1	189528	1	1	18952,8
8 (B)	Rehabilitation of processing waste deposits and evaporative ponds (non-polluting potential)	ha	0	236054	1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporative ponds (polluting potential)	ha	0	685612	1	1	0
9	Rehabilitation of subsided areas	ha	0,01	158701	1	1	1587,01
10	General surface rehabilitation	ha	0,01	150138	1	1	1501,38
11	River diversions	ha	0	150138	1	1	0
12	Fencing	m	0	171	1	1	0
13	Water management	ha	0,01	57087	1	1	570,87
14	2 to 3 years of maintenance and aftercare	ha	0	19380	1	1	0
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum				1	0
Sub Total 1							52057,26
1	Preliminary and General		6246,8712		weighting factor 2 1		6246,8712
2	Contingencies			5205,726			5205,726
Subtotal 2							63509,86
VAT (15%)							8891,38
Grand Total							R 72 401,24

r) Confirm that this amount can be provided for from operating expenditure.

(Confirm that the amount is anticipated to be an operating cost and is provided for as such in the Financial and Technical Competence Report (Ftat) or mining Work Programme as the case may be).

Financial provision has been made available through the company's cash reserves. The reserves provide for sufficient funds for premature and planned closure of the prospecting operation. The quantum for financial provision for rehabilitation will be re-assessed on an annual basis and arrangement to fund shortfalls will be made.

s) Specific information required by the Competent Authority

Compliance with the provisions of sections 24(4)(a) and (b) read with section 24(3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998). The EIA report must include the:

- iii. **Impact on the socio-economic conditions of any directly affected person.** (Provide results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond Mining on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an **Appendix** .

Safety of people, even animals if the open excavations are not fenced off and guarded. If water accumulates after rain, there is a risk of drowning and death. The open pits are also a risk to animals falling in and breaking limbs. The high vehicle movement to and from the excavation to the stock piling site is a risk to accidents. Socio-economic impact will be due the job creation and revenue generation for the Masilonyana local Municipality Economic Development.

- iv. **Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.** (Provide the results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as **Appendix 2.19.2** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 herein).

No historical or cultural sites where identified by the previous miners. In case any human remains are excavated during operation, work should be stopped and a report made to the police and SAHRA for removal of the human remains.

t) Other matters required in terms of sections 24(4) (a) and (b) of the Act

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as **Appendix B**).

PART B ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

4 Draft environmental management programme

a) Details of the EAP

(Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

Mulaudzi has been carrying out Environmental Impact Assessment Procedure since 2012, in 2012, he joined a large mining consulting company in Kimberly called Breeze Court Investments 47 (Pty) Ltd (Geologist and Mining Consulting firm). This is where Mr Mulaudzi acquired in-depth experience and know how in the mining consulting business by assisting the large to small scale mining companies to obtain prospecting right, mining rights, mining permits, technical co-operate permits, reconnaissance permits, exploration rights, production rights, integrated water use license, and environmental authorisation among other licenses.

Mulaudzi has five years working experience in environmental management, geology and public participation process.

b) Description of the Aspects of the Activity

(Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

I, Tshimangadzo Mulaudzi, hereby confirm that the requirements to describe the aspects of the activity that are covered by the draft environmental management programme are already included in PART A, section 1(h) herein.

c) Composite Map

(Provide a map (**Attached as an Appendix**) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers)



d) Description of Impact management objectives including management statements

- i. **Determination of closure objectives.** (ensure that the closure objectives are informed by the type of environment described)

The following closure objectives will be applicable for rehabilitation:

- Return the disturbed area to an acceptable post mining state
- Ensure that all areas are stable, and there is no risk of erosion
- Prevent alien plant invasion on the site until the site is in a stable state
- Ensure that all areas are free draining and non-polluting

If the commitments in this EMPr are adhered to and rehabilitation is undertaken as described above, it is not anticipated that there will be any long-term management or maintenance required for areas disturbed during mining.

- ii. **Volumes and rate of water use required for the application.**

About 20 m³ of water per annum will be used for domestic use.

- iii. **Has a water use license been applied for?**

N/A

iv. Impacts to be mitigated in their respective phases

Measures to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
<p>(E.g. For prospecting – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc</p> <p>E.g. For mining – excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and pitting and trenching, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc)</p>	<p>(Of operation in which activity will take place.</p> <p>State; Planning and design, Pre-Construction, Construction, Operational, Rehabilitation, Closure, Post closure)</p>	<p>(volumes, tonnages and hectares or m²)</p>	<p>(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)</p>	<p>(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regard Rehabilitation, therefore state either –</p> <ul style="list-style-type: none"> • Upon cessation of the individual activity <p>Or</p> <ul style="list-style-type: none"> • Upon cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
<p>Site Establishment activities (fencing, signage, access formation, etc.)</p>	<p>Start-up</p>	<p>± 0.1ha</p>	<p>Remedy through rehabilitation</p> <p>Limit footprint,</p> <p>Control through</p>	<p>Issues of compliance with standards will be incorporated into the day to day business activities at the proposed mining. The work methods used the monitoring and</p>	<p>During start up, operational phase</p>

			<p>storm water control</p>	<p>measures done and the review processes will be aimed at ensuring that legal thresholds as set out in the environmental standards are complied with.</p> <p>This will include compliance with standards as per COLTO 1998, the standards as per Mining and Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations, National Water Act regulations.</p> <p>COLTO 1998 Refers to - Standard Specification for Road and Bridge Works for State Road Authorities by the South African Committee of Land Transport Officials.</p>	
Clearance of area for mining	Start up & Operational Phase	0.4 ha	<p>Remedy through rehabilitation</p> <p>Limit footprint and removal of vegetation</p>	<p>The work methods used, the monitoring and measurements done and the review processes will be aimed at ensuring that legal thresholds as set out in the environmental standards are complied with. This will include compliance with standards as per COLTO 1998, the standards as per Mining and Petroleum Resources Development Act regulations,</p>	<p>During start up, operational phase as necessary</p>

				Mine Health and Safety Act regulations, and Conservation of Agricultural Resources Act	
Excavation of material	Operational	0.4 ha	Control with dust control measures Control with Storm water controls Control with slope management controls Control with Noise control measures	Management of legal compliance will be incorporated into normal business activities. This means that particular responsibilities need to be clearly defined for the identification of relevant issues and delivery of compliance. This will help to ensure that adequate resources are available to support these activities. Environmental standards as set out in COLTO 1998, Mining and Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations and Water Act regulations.	Operational Phase
Waste Disposal and Material storage	Operational	Undetermined	Control with dust control measures Control with blast control measures Avoidance, Operational control measures	The waste management hierarchy and the proximity principle will be used in ensuring that the environmental standards as set out in COLTO 1998 and the National Environmental Management Waste Act regulation and National Water Act regulation, are complied with.	Operational Phase

Material handling, hauling and transportation	Operational	Undetermined	Avoidance, Operational control measures	Issues of compliance with standards will be incorporated into the day to day business activities at the proposed mining to ensure that legal thresholds as set out in the environmental standards are complied with. This will include compliance with standards as per COLTO 1998, the standards as per Mining and Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations, National Water Act regulations, Mine Health and Safety Act regulations.	Operational phase
Removal of infrastructure & equipment	Decommissioning and closure	Affected areas	Site management protocols Control with noise control measures	The recommendations will incorporate factors that include the elimination or the minimization of negative impacts in the work methodologies used during decommissioning so as to comply with the standards as per COLTO 1998, Mining and	At decommissioning

			Control with operational control measures	Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations and the National Environmental Management Act.	
Re-shaping of proposed mining	Decommissioning and closure	0.4 ha	Site management protocols Control with noise control measures Control with operational control measures	Considerations with the elimination or at least the minimization of any future impacts from the proposed mining and the long term stability of the facility and any concerns in relation to the long term liability for the proposed prospecting and its aesthetics will be incorporated in order to ensure compliance with standards as set out in COLTO 1998, Mine Health and Safety Act regulations, National Environmental Management Act and National Water Act regulations.	Closure period
Community and labour relations management	Operational	N/A	Control using site management protocols Control with operational control measures	Will comply with standards as per COLTO 1998, Basic Conditions of Employment Act regulations, Employment equity Act, Labour Relations Act and Skills Development Act	During Operational Phase

Revegetation of disturbed areas	Closure	3 ha	Remedy through rehabilitation	The future impacts from the proposed mining and the long term stability of the area, any concerns in relation to the long term liability for the facility and its aesthetics will be taken into account to ensure compliance with the environmental standards as set out in COLTO 1998, the National Environmental Management Act, Conservation of Agricultural resources Act, National Environmental Management Biodiversity Act regulations.	During Operational Phase in sections where mining has been completed and during closure
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e) Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph

ACTIVITY (whether listed or not listed) (E.g. Excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and pitting and trenching, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc)	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc...etc...etc...)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. Construction, commissioning, operational, decommissioning, closure, post-closure)	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc...etc...etc...)	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives etc...etc...etc...)
Site Establishment activities (fencing, signage, access formation, etc.)	Loss of vegetation	Visual character, land use	Start-up	Remedy through rehabilitation Limit footprint	Impact managed effectively, Rehabilitate to a self-sustaining environment
	Habitat Destruction	Visual character, land use	Start up	Remedy through rehabilitation Limit footprint	Impact reduced

	Visual scarring	Visual character	Start up and operational	Remedy through rehabilitation	Impact managed effectively
	Soil erosion	Visual character, land use	Start up and operational	Remedy through rehabilitation, Storm water control. Limit footprint, Control through storm water control	Impact avoided
Clearance of area for mining	Visual scarring	Visual Character	Operational Phase	Remedy through rehabilitation Limit footprint and removal of vegetation.	Impact managed to acceptable levels, residual impact reduced
	Destruction of flora and habitat	Visual Character, land use	Operational Phase	Remedy through rehabilitation	Impact reduced to a satisfactory level, Rehabilitate to an end land use similar to that prior to the activity (depending on the end land use objectives)
	Loss of agricultural potential	Land use management	Operational Phase	Use soil conservation techniques Limit Foot print	Impact managed to ensure suitable soil fertility levels, Rehabilitate to an end land use similar to that prior to the activity.
	Soil erosion	Visual character, land use	Start up and operational	Remedy through rehabilitation, Storm water control	Impact avoided
Excavation	Dust emissions	Air quality	Operational Phase	Control with dust control measures	Particulates reduced to acceptable levels

	Drainage disruption	Drainage	Operational Phase	Control with Storm water controls	Good surface water run-off established
	Slope instability	Topography	Operational Phase	Control with slope management controls	Stable surfaces established
	Noise	Noise	Operational Phase	Control with Noise control measures	Noise reduced to acceptable levels
	Visual Scarring	Visual Character	Operational Phase	Rehabilitation	Impact managed effectively, residual impact reduced
	Soil erosion Land	Land use	Operational Phase	Rehabilitation, use slope management control	Impact levels avoided
	Destruction of heritage	Heritage issues	Operational Phase	Avoidance	Impact Avoided
Waste Disposal and Material storage	Soil contamination	Land degradation	Operational Phase	Avoidance, Operational control measures	Impact Avoided
	Water pollution	Water	Operational Phase	Avoidance, Operational control measures	Impact Avoided
	Increased risk of fire	Safety	Operational Phase	Avoidance, Operational control measures	Impact avoided or managed to low levels
	Dust	Air quality	Operational Phase	Dust Control measures	Particulates reduced to acceptable levels
	Increased risk of accidents	Safety	Operational Phase	Site management protocols	Accidents avoided or reduced to low levels

	Noise	Noise	Operational Phase	Noise control measures	Noise reduced to acceptable levels
	Soil contamination from oil/fuel leaks	Land degradation	Operational Phase	Operational control measures	Impact managed to suitable soil fertility levels
Removal of infrastructure & equipment and re-shaping of proposed mining	Noise	Noise	Decommissioning and closure	Control with noise control measures	Noise levels reduced to acceptable levels
	Dust	Air quality	Decommissioning and closure	Control with dust control measures	Particulates reduced to acceptable levels
	Soil contamination from oil/fuel	Land degradation, water pollution	Decommissioning and closure	Control with operational control measures	Impact managed to suitable soil fertility levels, pollution of water avoided
	Disruption of surface drainage	Water movement	Decommissioning and closure	Control with storm water controls	Free drainage achieved
	Community conflicts and tensions	Community relations	Operational	Control using site management protocols	Reduction in complaints and incidences of conflict
	Increased risk of fire	Fire risk	Operational	Control using site management protocols	Fires avoided and risk reduced
	Reduced security on area	Safety Issues	Operational	Control using site management protocols	Improvement in security and elimination of theft incidences

	Improved employment	Community relations	Operational	Control using site management protocols	Increase in number of people employed
	Improved skills	Community relations	Operational	Control using site management protocols	Improvement in skills level

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved).

ACTIVITY (whether listed or not listed)	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
<p>(E.g. Excavations, blasting, stockpiles, discard dumps or dams, loading, hauling and transport, water supply dams and pitting and trenching, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc)</p>	<p>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc...etc...etc...)</p>	<p>(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc...etc...etc...)</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regard Rehabilitation, therefore state either –</p> <ul style="list-style-type: none"> • Upon cessation of the individual activity <p>Or</p> <p>Upon cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>	<p>(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities).</p>

<p>Site Establishment activities (fencing, signage, access formation, etc.)</p>	<p>Loss of vegetation</p>	<p>Remedy through rehabilitation</p>	<p>Start-up</p>	<p>Issues of compliance with standards will be incorporated into the day to day business activities at the proposed mining. The work methods used the monitoring and measures done and the review processes will be aimed at ensuring that legal thresholds as set out in the environmental standards are complied with. This will include compliance with standards as per COLTO 1998, the standards as per Mining and Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations, National Water Act</p> <p>Habitat Limit Start up Destruction footprint Visual Remedy Start up scarring through and rehabilitation operational Soil Limit Start up erosion footprint and operational regulations</p>
	<p>Habitat Destruction</p>	<p>Limit footprint</p>	<p>Start-up</p>	
	<p>Visual scarring</p>	<p>Remedy through rehabilitation</p>	<p>Start up and operational</p>	
	<p>Soil erosion</p>	<p>Limit footprint</p>	<p>Start up and operational</p>	

Clearance of area for mining Excavation	Visual scarring	Remedy through rehabilitation	Operational Phase	The work methods used, the monitoring and measurements done and the review processes will be aimed at ensuring that legal thresholds as set out in the environmental standards are complied with. This will include compliance with standards as per COLTO 1998, the standards as per Mining and Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations, and Conservation of Agricultural Resources Act.
	Destruction of flora and habitat	Remedy through rehabilitation	Operational Phase	
	Loss of agricultural potential	Soil conservation techniques, Limit footprint of the proposed prospecting	Operational Phase	
	Soil erosion	Remedy through rehabilitation, Storm water control	Operational Phase	
	Dust emissions	Control with dust control measures	Operational Phase	
Waste Disposal and Material storage	Dust	Control with dust control measures Control with blast control measures	Operational Phase	This will be achieved by clearly outlining the environmental standards to be achieved and the thresholds which are not to be exceeded in the management system used at the site. This will include compliance with standards as per COLTO 1998, Explosive Act regulations, Mine Health and Safety Act Regulations and the Hazardous Substances Act
	Fly rock	Control with blast control measures	Operational Phase	
	Soil contamination	Avoidance, Operational control measures	Operational Phase	
Material handling, hauling and transportation	Water pollution	Avoidance, Operational control measures	Operational Phase	The waste management hierarchy and the proximity principle will be used in ensuring that the environmental standards as set out in COLTO 1998 and the National
	Increased risk of fire	Avoidance,	Operational Phase	

		Operational control measures		Environmental Management Waste Act regulation and National Water Act regulation, are complied with.
	Dust	Control with dust Control measures	Operational Phase	
Removal of infrastructure & equipment and re-shaping of proposed mining	Increased risk of accidents	Site management protocols	Operational Phase	Issues of compliance with standards will be incorporated into the day to day business activities at the proposed mining to ensure that legal thresholds as set out in the environmental standards are complied with. This will include compliance with standards as per COLTO 1998, the standards as per Mining and Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations, National Water Act regulations, Mine Health and Safety Act regulations
	Noise	Control with noise control measures	Operational Phase	
	Soil contamination from oil/fuel leaks	Control with operational control measures	Operational Phase	
	Noise	Control with noise control measures	Decommissioning and closure	
Community and labour relations management	Dust	Control with dust control measures	Decommissioning and closure	The recommendations will incorporate factors that include the elimination or the minimization of negative impacts in the work methodologies used during decommissioning so as to comply with the standards as per COLTO 1998, Mining and Petroleum Resources Development Act regulations, Mine Health and Safety Act regulations and the National Environmental Management Act.
	Soil contamination from oil/fuel	Control with operational control measures	Decommissioning and closure	
	Disruption of surface drainage	Control with storm water controls	Decommissioning and closure	
	Community conflicts and tensions	Control using site management protocols	Operational	

Site Establishment activities (fencing, signage, access formation, etc.)	Increased risk of fire	Control using site management protocols	Operational	The future impacts from the proposed mining and the long term stability of the area, any concerns in relation to the long term liability for the facility and its aesthetics will be taken into account to ensure compliance with the environmental standards as set out in COLTO 1998, the National Environmental Management Act, Conservation of Agricultural resources Act and National Environmental Management Biodiversity Act regulations
	Reduced security on area	Control site management protocols	Operational	
	Improved employment	Control site management protocols	Operational	
	Improved skills	Controls site management protocols	Operational	
	Loss of vegetation	Remedy through rehabilitation	Start-up	

g) Financial Provision

Determination of the amount of Financial Provision

v. Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation

The DPR acknowledges that a proposed mining is a temporary land use which results in areas of land being temporarily disturbed. Whilst steps are taken throughout the project life cycle to reduce negative environmental impacts as they occur, the specific closure objectives are as follows:

- To create a post mining environment that eliminates unacceptable health hazards and ensures public safety.
- To leave the site in a stable, non-polluting and tidy condition with no remaining plant or infrastructure that is not required for post mining operational use.
- To minimise or eliminate the downstream environmental impacts on the ecosystem due to interruption of drainage once the proposed mining operations cease.
- To establish a stable post-mining land surface which has been rehabilitated that also supports vegetation growth, is erosion resistant and has long term sustainability.

To reduce the need for long-term monitoring and maintenance by establishing

vi. Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

Yes it is confirmed.

vii. Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.

Rehabilitation plan

The exact location and extent of the mining activities, including the need for construction of new access tracks, will be determined once all available information has been evaluated. It is therefore not possible to include a rehabilitation plan showing the areas and aerial extent of the main mining activities, including the anticipated mining area at the time of closure. The extent of the proposed mining area is however shown in.

The following environmental controls will be implemented during mining to aid or reduce rehabilitation:

- The environment will be returned to its original state, as far as possible. No physical infrastructure will be left on the site.
- Vegetation cleared from each excavations development will be stored within / adjacent to the excavations site for final rehabilitation.

- Topsoil will be stripped within the excavations site, to a depth of 300mm, and placed separately within the excavations site. All topsoil removed will be appropriately protected from erosion for use during rehabilitation.
- Where vegetation has been removed, they shall be re-established systematically where they used to be.
- The area will be level and even, and in a natural state containing no foreign debris or other materials and to ensure ecological, hydrological and topographical integrity.
- All excavations created will be capped and sealed. Where necessary, excavations will be labelled for future use and for reference purposes.
- Mining activities will be restricted to the designated mining sites and agreed upon access tracks. No further disturbances will be permitted.
- Following rehabilitation the site will blend suitably with the surrounding environment.

Rehabilitation of excavations

- Progressive rehabilitation will be undertaken during mining (Concurrent rehabilitation). Each excavations and associated disturbed areas will be rehabilitated when excavations is completed at each excavations site.
- Once the excavations has been refilled with rocks and coarse natural materials and profiled with acceptable contours and erosion control measures, the topsoil will be replaced across the disturbed area and shaped to allow a free draining surface. No ponding on the disturbed area will be allowed.
- Cleared vegetation will be used as brush-cut packing on the disturbed areas after rehabilitation to prevent erosion while natural vegetation re-establishes. NO alien plant material will be used for this purpose.
- In cases where native vegetation has been removed or damaged and where re-vegetation is required, species endemic to the area will be re-established.
- An inspection will be held after rehabilitation to determine alien and invasive species growth and the necessary corrective action will be implemented.

Closure objectives and their extent of alignment to the pre-mining environment

The following closure objectives will be applicable for rehabilitation:

- Disturbed land will be rehabilitated to a stable and permanent form suitable for subsequent land use.
- There will be no adverse environmental effect outside the disturbed area and the affected area will be shaped to ensure effective drainage and prevent ponding on site.
- The disturbed area will not require any more maintenance than that in or on surrounding land after mining is completed.

If the commitments in this BAR are adhered to and rehabilitation is undertaken as described above, it is not anticipated that there will be any long-term management or maintenance required for areas disturbed during mining

viii. Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The following closure objectives will be applicable for rehabilitation:

- Return the disturbed area to an acceptable post mining state.
- Ensure that all areas are stable and there is no risk of erosion,
- Prevent alien plant invasion on the site until the site is in a stable state, and
- Ensure that all areas are free draining and non-polluting.

The mining operations area is within the agricultural grazing land. The continuous rehabilitation program will attempt to restore the area to an acceptable standard as close to the baseline environmental state as possible to ensure safe use of the area for grazing purpose.

If the commitments in this EMPr are adhered to and rehabilitation is undertaken as described above, it is not anticipated that there will be any long-term management or maintenance required for areas disturbed during mining. Thus the rehabilitation plan is compatible with the closure objectives.

ix. Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with applicable guideline.

The financial provision required to manage and rehabilitate the environment will be **R 72 401.24** (the calculated quantum is attached)

x. Confirm that the financial provision will be provided as determined.

Yes it is confirmed.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- h) Monitoring of Impact Management Actions.**
- i) Monitoring and reporting frequency.**
- j) Responsible persons.**
- k) Time period for implementing impact management actions.**
- l) Mechanism for monitoring compliance**

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Site Establishment activities (fencing, signage, access formation, etc.)	Loss of vegetation, Habitat destruction, Visual scarring, Soil erosion	Visual checks, monitoring incidences of non-compliance, recording of key parameters	Appointed Contractor	At start and as and when required. Record incidences of non-compliance monthly.
Clearance of area for mining	Visual scarring, Destruction of flora and habitat, Loss of agricultural potential, soil erosion	Visual checks, monitoring incidences of non-compliance, recording of key parameters	Appointed Contractor	At start and as and when required. Record incidences of non-compliance monthly.
Excavation	Dust emissions, Drainage disruption, Slope instability, Visual Scarring, Soil erosion, Destruction of heritage resource	Visual checks, monitoring incidences of non-compliance, recording of key parameters	Appointed Contractor	At start and as and when required. Record incidences of non-compliance monthly.
Waste Disposal and Material storage	Soil contamination, Water pollution, Increased risk of fire	Visual checks, monitoring incidences of non-compliance, recording of key	Appointed Contractor	At start and as and when required. Record incidences of non-compliance monthly.

		parameters		
Material handling, hauling and transportation	Dust, Increased risk of accidents, Noise, Soil contamination	Visual checks, monitoring incidences of non-compliance, recording of key parameters	Appointed Contractor	At start and as and when required. Record incidences of non-compliance monthly.
Removal of infrastructure & equipment and re-shaping of proposed mining	Noise, Dust, Soil contamination, Disruption of surface drainage	Visual checks, monitoring incidences of non-compliance, recording of key parameters	Appointed Contractor	At start and as and when required. Record incidences of non-compliance monthly.
Community and labour relations management	Community conflicts and tensions, Increase risk of fire, Reduced security on area, Improved employment rates, Improved skills	Visual checks, monitoring incidences of non-compliance, recording of key parameters	Appointed Contractor	At start and as and when required. Record incidences of non-compliance monthly.

m) Indicate the frequency of the submission of the performance assessment/environmental audit report

The BAR and EMPr will be audited by an independent party on an annual basis to determine the level of compliance. The results of this audit will be used to improve environmental management procedures, where required. The audit report will also be submitted to the Department of Mineral Resources (DMR) upon completion.

n) Environmental Awareness Plan

1. Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

Induction (including environmental awareness) training will be conducted on all people involved in the mining programme, including truck drivers, mine managers crew and relevant technical services, prior to the commencement of any work; according to the relevant legislation, **Engedi Minerals and Energy (Pty) Ltd** Standard Operational Procedures (SOPs) and this EMP. **Engedi Minerals and Energy (Pty) Ltd** will do in-house training, should it be necessary to its personnel on site. The mining contractor will be responsible for training its mining crew and supervisor.

2. Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

1.1 Description of solutions to risks

(Describe the manner in which the risk must be dealt with in order to avoid pollution or degradation of the environment)

It is essential that people involved in the mining programme know how to respond in the event of an environmental emergency situation in order to avoid significant environmental degradation or injury to human health. Ideally such incidents should not occur. If people involved in the mining programme implement all management measures outlined in this EMPr, the likelihood of such incidents occurring is greatly reduced. However, despite the best intentions and the best environmental management practices, it is impossible to ensure that no incidents will ever occur during mining activities. Therefore, it is vital to ensure that all personnel are aware of the management measures to be undertaken in the event of an accident.

Two emergency incidents have been identified:

- Hydrocarbon spills.
- The outbreak of fire.

Emergency incident procedures are outlined below. An Environmental Officer will be appointed to the project to manage all environmental related aspects of the mining programme.

Emergency planning

- The site and all people involved in the mining programme are to be managed in strict accordance with the Occupational Health and Safety Act (Act No. 85 of 1993).
- Potentially hazardous areas are to be cordoned off and clearly marked at all times.
- No unauthorized firearms are permitted on site.
- Adequate emergency facilities (e.g. first aid kit) must be provided for the treatment of an emergency on site.
- Emergency contact numbers are to be displayed conspicuously.
- Necessary Personal Protective Equipment (PPE) and safety gear appropriate to the task being undertaken is to be provided to all personnel working on site (e.g. hard hats, safety boots, ear plugs, masks, etc.).
- All vehicles and equipment used on site must be operated by appropriately trained and/or licensed individuals in compliance with all safety measures.

Management of fire risks

- Each mining site will be cleared of vegetation.
- “No Smoking” signs must be prominently displayed.
- Fires will only be allowed within a facility especially constructed for the purpose of keeping warm and for cooking.
- No burning of refuse or vegetation is permitted.
- Fire equipment must be easily accessible.
- Fire equipment must be serviced, full and in good working order.

Management of spills

- Ensure that a proper spill-kit is available on site. The kit must include absorptive material that can handle all forms of hydrocarbon.
- Ensure that any hydrocarbon spills are cleaned up as soon as possible.
- At least one person on site must receive formal training in the use of the spill control kit.
- Equipment is to be required immediately upon developing leaks.
- A drip tray, a thin concrete slab or a PVC lining shall be used to prevent soil and water contamination.
- All spills on site must be reported to the Control Environmental Officer (CEO).
- Spread absorbent sand Sand aggregate (dolerite) and gravel on areas where oil spills have occurred. Oil-contaminated soils are to be removed to a contained storage area and disposed of appropriately.
- Non-degradable waste must be collected and disposed of at a registered waste site.

Incident reporting

- The supervisor on site must take corrective action to mitigate an incident appropriate to the nature and scale of the incident, immediately after the occurrence of the incident.
- Residual environmental damage that remains after having taken corrective action must be rehabilitated.
- Change operating procedures where necessary to prevent recurrence of similar incident.

- All incidents must be recorded in an Environmental Incident Report, within 24 hours of the incident occurring. Additional documents, including photos must be appended to the incident report to provide a comprehensive record of the incident and the corrective and preventative action taken.
- All incidents will be investigated in collaboration with the Environmental Officer. The focus of these investigations shall not be to apportion blame to specific employees, but to ascertain the root cause of the incident and to prevent a recurrence of similar incidents.

2.1 Environmental awareness training

(Describe the general environmental awareness training and training on dealing with emergency situations and remediation measures for such emergencies).

A number of key elements must be addressed during an environmental awareness training session, since it is recognised that the majority of employees are generally not informed about the environment. The following key elements must be addressed:

- An explanation of the basic key concepts;
- The importance of the environment, including the management thereof;
- Examples of environmental degradation;
- The role that the employees have in protecting the environment;
- Examples of pollution;
- Simple, easy-to-follow rules to protect the environment; and
- South African laws which protect the environment.

All people involved in the mining programme must receive environmental awareness training, to ensure that they are aware of their responsibilities and are competent to carry out their work in an environmentally acceptable manner. The training must also contain all relevant sections of the EMPr and must be presented in a clear, understandable manner. Relevant sections of the EMPr include:

- Access, including use of roads, tracks, gates, etc.;
- Control measures required to manage excluded and exempted areas;
- The handling, storage and disposal of waste;
- Emergency response procedures;
- Control of alien and invasive plant species;
- Fire prevention;
- Sediment and erosion control;
- Control measures to be implemented with regards to the management of water, noise and dust; and
- Rehabilitation of excavations sites and access tracks.

This training may take the form of a PowerPoint presentation, information posters or pamphlets, and other easily accessible methods of information communication.

o) Specific information required by the Competent Authority (Among others, confirm that the financial provision will be reviewed annually)

The BAR and EMPr will be audited by an independent party on an annual basis to determine the level of compliance. The results of this audit will be used to improve environmental management procedures, where required. The audit report will also be submitted to the Department of Mineral Resources (DMR) upon completion.

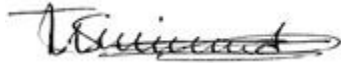
MIME LOGISTICSPTY (LTD) will undertake rehabilitation to minimise negative impacts on the environment.

UNDERTAKING

The EAP herewith confirms

- a) The correctness of the information provided in the reports
- b) The inclusion of comments and inputs from stakeholders and I&APs;
- c) The inclusion of inputs and recommendations from specialist reports where relevant ; and
- d) That the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

X
X
X



Signature of the environmental assessment practitioner:

Engedi Minerals and Energy

Name of company:

01 December 2022

Date:

-END-

SPECIALIST REPORTS

Ecological survey of a portion of portion 26 of the farm Bryan 561, Welkom District, Free State Province

Prepared by

P.J du Preez (Ph.D., Pr.Sci.Nat.)

EnviroNiche Consulting

PostNet Suite 208, Private Bag x16

Hermanus, 7200

for

Engedi Minerals and Energy (Pty) Ltd

May 2017



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ABSTRACT

The requirements of this study were to undertake a specialist study to describe the vegetation and ecology of the borrow pit and sand mine on a portion of portion 26 of the farm Bryan 561, Welkom District.

The site is situated in the Highveld Alluvial vegetation (AZa 5). According to Mucina & Rutherford (2006), this vegetation type has a conservation status of "Least Concerned". However the site is not situated near the Sand River which is a NFEPA-listed aquatic system. The site is not situated in any Critical Biodiversity Area (CBA) but in an ecological support area (ECA 1 & 2)

The site is in a degraded state due to impacts by previous mining activities to mine gravel at a borrow pit and sand which has been deposited by the nearby Sand River. Some of the rubble dumps still exist in the area. An access road, to reach the site already exists. A small man-made dam is present near the site and the Sand River forms the southern boundary of the property. A Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) for the site were calculated. The dam, the Sand River and its tributaries can be regarded as sensitive ecosystems although they have been largely impacted by previous mining activities. A large loss of natural habitat, biota and basic ecosystem functions has occurred – PES category is a D and the EIS scored 0,7.

Species richness of the vegetation of the study area is low with a total of 23 species near the borrow pit site and 12 along the riparian zone. No Red or Orange List species were found to occur on the site.

From an ecological perspective the project site is suitable for a development of this nature. The stated conditions and recommendations must also be adhered to.

RECOMMENDATIONS

The following is recommended:

- Care must be taken not to negatively affect the wetland ecosystems further;
- The water quality of the wetland is poor and care must be taken not to drink untreated water from this source;
- Measures to control erosion must always be applied;
- No dumping of construction waste from the development should not take place on areas other than a licenced landfill site;

- Weed control measures must always be applied to eradicate the noxious weeds (Category 1a & 1b species) on disturbed areas at and around the mine site;
- An Environmental Control Officer (ECO) must be appointed to oversee that the aspects stipulated in the Environmental Permit be carried out properly.

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APPOINTMENT OF SPECIALIST

EnviroNiche Consulting was appointed by **Engedi Minerals and Energy (Pty) Ltd** to conduct an ecological, wetland and aquatic survey of the study site as part of the process in support of a mining application for the crusher site.

Details of specialist

Johann du Preez

EnviroNiche Consulting Biodiversity and Environmental Consultants

PostNet Suite 208, Private Bag x16

Hermanus, 7200

Fax: 086 645 2222

Email: greenrsa@gmail.com

Summary of expertise

- Registered professional member of The South African Council for Natural Scientific Professions (Ecological Science), registration number: 400271/07.
- Ecological consultant since 2000.
- Conducted, or co-conducted, over 1 500 specialist ecological surveys as an ecological consultant.
- Co-author of a book on ecology
- Published over 30 refereed scientific reports,
- Presented 25 scientific conference presentations,

DECLARATION OF INDEPENDENCE

I, Pieter Johannes du Preez, ID 6008215016087, declare that I:

- am the owner of EnviroNiche Consulting
- act as an independent specialist consultant in the field of botany, ecology and vegetation science;
- am assigned as specialist consultant by **Engedi Minerals and Energy (Pty) Ltd** for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- remuneration for services by the proponent in relation to this proposal is not linked to approval by decision-making authorities responsible for permitting this proposal and
- the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project.
- have no and will not engage in conflicting interests in the undertaking of the activity;
- undertake to disclose to the client and the competent authority any material, information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2006;
- will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.



PJ DU PREEZ PhD PrSciNat

INTRODUCTION

Terms of reference

In December 2016 Enviro-Niche Consulting was appointed by **Engedi Minerals and Energy (Pty) Ltd** to conduct a flora and vegetation survey as well as a wetland assessment for the study site in support of an application to develop the site. A detailed investigation into the status of the vegetation was to be undertaken, including:

- Assessment of the natural vegetation;
- General floristic diversity;
- Habitat suitability for Red Data flora species;
- Potential presence of Red Data flora species;
- Assess the site for any wetland
- Delineate wetlands if present on site
- To do an aquatic study of the stream

The following was to be provided / undertaken:

- A brief discussion on the vegetation type in which the study area is situated, using available literature, in order to place the study in context.
- A broad-scale map of the vegetation and land cover of the site using available aerial photography. A description of the dominant and characteristic species within the broad-scale plant communities comprising each of these units was to be provided. This was to cover the entire site.
- List of all plant species recorded during the survey.
- A list of Red List plant species previously recorded within the quarter degree grids in which the study area is situated, obtained from the relevant authorities.
- List of naturalized plant species recorded on site, indicating which are declared weeds or alien invasive species, according to the *National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014*.
- Identification of sensitive habitats and plant communities. A map of sensitive areas of the site was to be provided.

Assumptions, uncertainties and gaps in knowledge

1. Assume databases and literature sources are adequate for determining the possible presence of protected and threatened species. These often depend on good geographical coverage of species observations, which is seldom the case.
2. Assume species threatened status has been correctly determined and that no other species should be on the Red Lists.

Limitations

1. This report has been prepared on the strengths of the information available at the time of the assessment. The major reference works consulted is included in the reference list. There is sufficient base line information available in the literature for the area and hence the availability of baseline information was not considered a constraint.
2. There were no financial or confidentiality constraints.
3. Descriptions of vegetation are based primarily on the site assessment in combination with a literature review. Sufficient published information is available for the study area and the surveys provided sufficient site-specific information. There were, therefore, no biophysical constraints.
4. All attempts were made to cover the entire study area at a similar degree of detail. However, due to the fact that the study constituted a single survey in one season it is unlikely that all species that occur on site were located. It was, however, possible to cover it in some detail during the field survey and field data was supplemented with data collected in the area from a previous survey.
5. Due to the brief duration of the survey, the species list provided for the area cannot be regarded as comprehensive, but is nevertheless likely to include the majority of the dominant and common species present.

Exclusions

This study reports on flora and vegetation within habitats on site.

ACTS & LEGISLATION

Acts such as these listed below (Table 1); ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment. It also ensures the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes or products or human activities.

Table 1: List of relevant legislation

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management Act, No. 107 of 1998 (NEMA), as amended & NEMA EIA Regulations, 2014: GN544, published in Government Gazette 33306 in 2014	A full Environmental Impact Assessment Report (EIA) is required for this project	Department of Environmental Affairs (DESTEA)	1998
National Environmental Management: Biodiversity Act (10/2004): Amendments, 2014	Protected species may occur on site	Department of Environment Affairs & Tourism (DEAT)	2014
National Water Act, No. 36 of 1998	The proposed development may trigger a section 21(C and/or i) water use.	Department of Water Affairs (DWA)	1998
National Heritage Resources Act (Act No 25 of 1999)	Resources could be identified during construction phase	South African Heritage Resources Agency	1999
Free State Nature Conservation Ordinance 8 of 1969	Protected species could occur on the proposed site	Department of Economic, Small Business Development, Tourism and Environment Affairs (DESTEA)	1969
National Forests Act (Act 84 of 1998)	Protected trees could occur on the proposed sites	Department of Agriculture, Forestry and Fisheries (DAFF)	1998

DESCRIPTION OF STUDY AREA

Location

The site is on a portion of portion 26 of the farm Bryan 561, Welkom District (Figure 1 - 3).

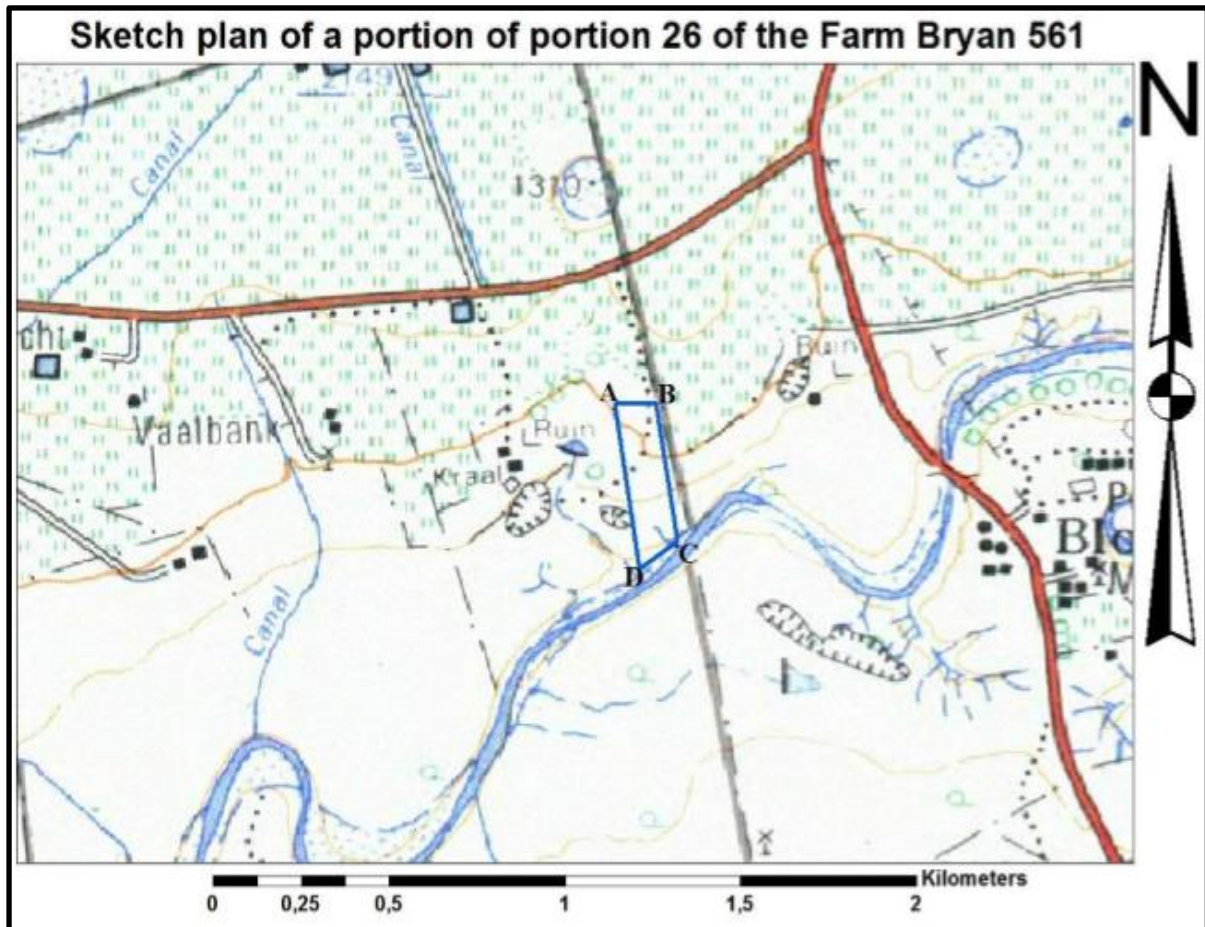


Figure 1: Topographic map of the study area (blue polygon marked A, B, C & D).



Figure 2: A satellite image of the project site (red polygon) (Google Earth).

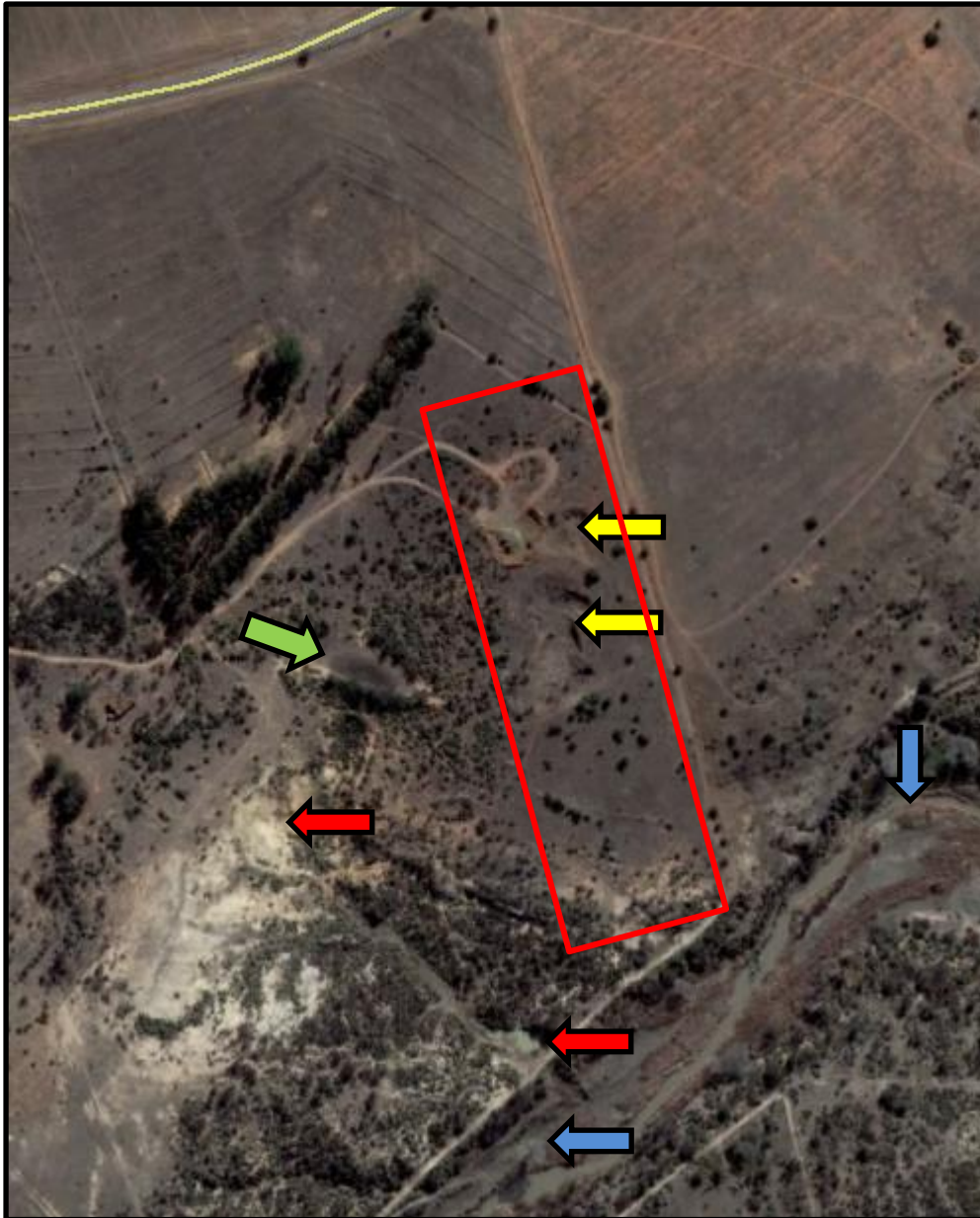


Figure 3: A closer satellite image of the existing borrowpit (red arrows) and sand mine sites (yellow arrows) (Google Earth). Blue arrow indicates the Sand River and the green arrow indicates a man-made dam.

Topography

The study area and access road is situated on undulating plain which gradually slopes towards the Sand River. The site's altitude is 1 300 m.a.s.l. The area to the north is dominated by a plain with deep sand deposits. The Sand River and tributaries drain the landscape.

Geology & soils

The geology consists of mud and sandstones of the Beaufort Group. The soils along the Sand River are deep sedimentary sand deposits transported to the site during previous flash floods. The rest of the area is covered by aeolian sand deposits. On the plains surrounding the site the typical soil forms as Clovelly and Hutton (MacVicar *et al.* 1974).

Climate (Rainfall & temperatures)

The area receives summer rainfall and it is approximately 495 mm per annum. The mean annual temperature is 16,6°C (Mucina & Rutherford, 2006).

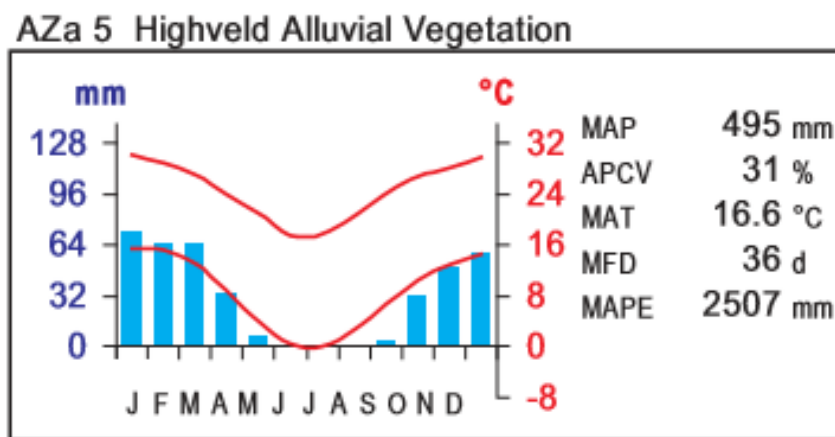


Figure 4: A climate-diagram of the Highveld Alluvial vegetation in which the site is situated (Mucina & Rutherford, 2006).

Landuse & landcover

The borrow pit site, sand mine and access roads is situated in degraded grassland and shrubland. The arable land has been ploughed and used to produce crops. The property towards the Sand River has been transformed due to previous mining activities as well as invasion by Sweet Thorn (*Vachelia karroo*). The invasion of the grassland by Sweet Thorn is a sign of poor management of the vegetation and over grazing.

Vegetation, biogeography and conservation value

The most recent description of the study area's vegetation is the relatively detailed description by Mucina & Rutherford (2006) namely "Vegetation of South Africa, Lesotho and Swaziland" as well as an accompanying map of the country by (Mucina *et al.*, 2005). This memoir contains species information and a comprehensive conservation assessment of all vegetation types.

The vegetation type present on site is classified as the Highveld Alluvial vegetation (AZa 5) (Fig 5) According to Mucina & Rutherford (2006), this vegetation type has a conservation status of “Least Concern” This vegetation type is in the region under pressure mainly due to wood collection. It is shrubland dominated by species such as *Vachelia [Acacia] karroo*, *Ziziphus mucronata*, *Lycium hirsutus*, *Asparagus laricinus*, *Asparagus cooperi* and *Gymnospora buxifolia*. Exotic trees include *Eucalyptus camuldulensis*, and *Salix babylonica*.



Figure 5: A vegetation map of the region and study area (red square) which is dominated by the Highveld Alluvial vegetation (AZa 5). Red polygon indicates location of the project site (Mucina & Rutherford, 2006).

METHODOLOGY

Vegetation survey

Date of fieldwork: 9 January 2017.

Satellite imagery (Google Earth photos), 1:50 000 topographic maps were used to find features on the site.

Quantitative data was collected in each quadrat by undertaking vegetation sampling according to the Braun-Blanquet approach (Mueller-Dombois & Ellenberg 1974; Westhoff & van der Maarel 1978). In each sample site the following data was collected:

Habitat data:

- amount of bare soil
- rock cover,
- slope,
- aspect in degrees,
- latitude and longitude position (from GPS) in decimal degrees,
- presence of biotic disturbances, e.g. grazing, animal burrows, etc.

Vegetation data

- species present,
- cover estimation of each species according to the Braun-Blanquet scale,
- vegetation height,

Data analysis

- The plant communities that were identified were then described using the vegetation sample data.
- Additional checklists of plant species were compiled by traversing the study area on foot and recording species as they were encountered. Plant names follow those of POSA (2015).
- All exotic species categorised as alien invaders or weeds as listed in the *National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014* were also recorded.

Red Data plant species

A list of species collected within the quarter degree square **2826BA** is listed together with the species noted during the site visit (Annexure B & C). For all threatened plants that occur in the general geographical area of the site, a rating of the likelihood of it occurring on site is given as follows:

- **LOW:** no suitable habitats occur on site / habitats on site do not match habitat description for species;
- **MEDIUM:** habitats on site match general habitat description for species (e.g. grassland), but detailed microhabitat requirements (e.g. rocky grassland on shallow soils overlying dolomite) are absent on the site or are unknown from the descriptions given in the literature or from the authorities;
- **HIGH:** habitats found on site match very strongly the general and microhabitat description for the species (e.g. rocky grassland on shallow soils overlying granite);
- **DEFINITE:** species found on site.

WETLAND ASSESSMENT AND DELINEATION METHODOLOGY

Wetland delineation

Introduction

For the purposes of this investigation a wetland was defined according to the definition in the National Water Act (Act 36 of 1998) as: “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

In 2005 DWAF published a wetland delineation procedure in a guideline document named “*A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas*” Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments. These guidelines state that a wetland delineation procedure must identify the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas and is that part of the wetland that remains flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.

The guidelines also state that locating the outer edge of the temporary zone must make use of four specific indicators namely:

- the terrain unit indicator,
- the soil form indicator,
- the soil wetness indicator and
- the vegetative indicator.

In addition the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland; the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive and a 32m buffer delineated around the edge of the wetland in which no development must be allowed to occur.

Desktop delineation

Use was made of 1:50 000 topographic maps, and geo-referenced Goggle Earth images to generate digital base maps of the study area onto which the wetland boundaries were delineated. A desktop delineation of suspected wetland areas was undertaken by identifying rivers and wetness signatures from the digital base maps. All identified areas suspected to be wetland were then further investigated in the field.

Site assessment

The area was traversed by foot and road to determine the presence of any wetland area/s. Notes were made of the broad ecological condition of the study site and any signs indicating the presence of a wetland.

The wetlands were subsequently classified according to their hydro-geomorphic determinants based on modification of the system proposed by Brinson (1993), and modified for use in South Africa by Marneweck and Batchelor (2002) and subsequently revised by Kotze *et al.* (2004). Notes were made on the levels of degradation in the wetlands based on field experience and a general understanding of the types of systems present.

Present Ecological State (PES)

The **Present Ecological State (PES)** refers to the current state or condition of a watercourse in terms of all its characteristics and reflects the change to the watercourse from its reference condition. The results from such an assessment are compared to the standard DWAF A-F ecological categories (Table 2) from where the PES/Habitat integrity of the wetland can be determined. The values give an indication of the alterations that have occurred in the wetland system.

Table 2: Present Ecological Status Categories of Wetlands (adapted from Kleynhans, 1996 & 1999).

ECOLOGICAL CATEGORY	SCORE	DESCRIPTION
A	>90-100%	Unmodified, natural
B	>80-90%	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged
C	>60-80%	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged
D	>40-60%	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred
E	>20-40%	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive
F	0-20%	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

Ecological Importance and Sensitivity (EIS)

The **Ecological Importance and Sensitivity (EIS)** of a watercourse is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales, and both abiotic and biotic components of the system are taken into consideration. Sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The ecological importance and sensitivity categories are indicated in Table 3.

Table 3: Ecological Importance & Sensitivity Categories of Wetlands

EIS categories	Description
Low/Marginal	Not ecologically important and sensitive at any scale. Biodiversity ubiquitous and not sensitive to flow and habitat modifications. (Wetlands play an insignificant role in moderating water quality and quantity)
Moderate	Ecologically important and sensitive on provincial/local scale. Biodiversity not usually sensitive to flow and habitat modifications (Wetlands play a small role in moderating water quality and quantity)
High	Ecologically important and sensitive. Biodiversity may be sensitive to flow and habitat modifications (Wetlands play a role in moderating water quality and quantity)
Very high	Ecologically important and sensitive. On national even international level. Biodiversity usually very sensitive to flow and habitat modifications (Wetlands play a major role in moderating water quality and quantity)

Sensitivity assessment (Table 4)

The assessment of sensitivity on site follows the guidelines provided by GDACE in the section on Sensitivity Mapping Rules for Biodiversity Assessments in the GDACE document on “Guidelines for Biodiversity Assessments”. As per these guidelines, the sensitive features on site and the mapping rules are given in the table below:

Table 4: The sensitivity mapping rules

Biodiversity element	Sensitivity mapping rule
River/stream	Stream + 100 m buffer zone (outside urban edge) from the edge of the riparian zone as determined according to DWAF guidelines
Wetland	Wetland + 50 m buffer zone extending from edge of wetland temporary zone
Primary vegetation classified as Endangered (SANBI VegMap)	Extent of vegetation type in moderate to good condition
Primary vegetation suitable as habitat for Red or Orange List plant species	Extent of vegetation type in moderate to good condition

Primary vegetation suitable as habitat for Red List bird or animal species	Extent of vegetation type in moderate to good condition
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IMPACT RATING METHODOLOGY

The significance of each identified potential impact was assessed by using the following criteria:

- **Duration** of the impact (time scale);
- **Extent** of the impact (spatial scale);
- Degree to which the impact may cause **irreplaceable loss of resources**;
- Degree to which the impact can be **reversed**;
- **Magnitude (or Nature)** of negative or positive impacts;
- **Probability** of the impact occurring;
- **Cumulative impacts**; and the
- Degree to which the impact can be **mitigated**.

The scales to be used to assess these variables and to define the rating categories are tabulated in the tables below:

TABLE 5: EVALUATION COMPONENTS, RANKING SCALES AND DESCRIPTIONS (CRITERIA).

Evaluation component	Ranking scale and description (criteria)
DURATION	5 – Permanent 4 - Long term: Impact ceases after operational phase/life of the activity (> 20 years). 3 - Medium term: Impact might occur during the operational phase/life of the activity (5 to 20 years). 2 - Short term: Impact might occur during the construction phase (< 5 years). 1 – Immediate
EXTENT (or spatial scale/influence of impact)	5 - International: Beyond National boundaries. 4 - National: Beyond Provincial boundaries and within National boundaries. 3 - Regional: Beyond 5 km of the proposed development and within Provincial boundaries. 2 - Local: Within 5 km of the proposed development. 1 - Site-specific: On site or within 100 m of the site boundary. 0 – None
IRREPLACEABLE loss of resources	5 - Definite loss of irreplaceable resources. 4 - High potential for loss of irreplaceable resources. 3 - Moderate potential for loss of irreplaceable resources. 2 - Low potential for loss of irreplaceable resources. 1 - Very low potential for loss of irreplaceable resources. 0 – None

Evaluation component	Ranking scale and description (criteria)
REVERSIBILITY of impact	<p>5 - Impact cannot be reversed.</p> <p>4 - Low potential that impact might be reversed.</p> <p>3 - Moderate potential that impact might be reversed.</p> <p>2 - High potential that impact might be reversed.</p> <p>1 - Impact will be reversible.</p> <p>0 - No impact.</p>
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	<p>10 - Very high: Bio-physical and/or social functions and/or processes might be <i>severely</i> altered.</p> <p>8 - High: Bio-physical and/or social functions and/or processes might be <i>considerably</i> altered.</p> <p>6 - Medium: Bio-physical and/or social functions and/or processes might be <i>notably</i> altered.</p> <p>4 - Low : Bio-physical and/or social functions and/or processes might be <i>slightly</i> altered.</p> <p>2 - Very Low: Bio-physical and/or social functions and/or processes might be <i>negligibly</i> altered.</p> <p>0 - Zero: Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	<p>10 - Very high (positive): Bio-physical and/or social functions and/or processes might be <i>substantially</i> enhanced.</p> <p>8 - High (positive): Bio-physical and/or social functions and/or processes might be <i>considerably</i> enhanced.</p> <p>6 - Medium (positive): Bio-physical and/or social functions and/or processes might be <i>notably</i> enhanced.</p> <p>4 - Low (positive): Bio-physical and/or social functions and/or processes might be <i>slightly</i> enhanced.</p> <p>2 - Very Low (positive): Bio-physical and/or social functions and/or processes might be <i>negligibly</i> enhanced.</p> <p>0 - Zero (positive): Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>
PROBABILITY (of occurrence)	<p>5 - Definite: >95% chance of the potential impact occurring.</p> <p>4 - High probability: 75% - 95% chance of the potential impact occurring.</p> <p>3 - Medium probability: 25% - 75% chance of the potential impact occurring</p> <p>2 - Low probability: 5% - 25% chance of the potential impact occurring.</p> <p>1 - Improbable: <5% chance of the potential impact occurring.</p>
CUMULATIVE impacts	<p>High: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Medium: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Low: The activity is localised and might have a negligible cumulative impact.</p> <p>None: No cumulative impact on the environment.</p>

Once the evaluation components have been ranked for each potential impact, the significance of each potential impact will be assessed (or calculated) using the following formula:

$$\text{SP (significance points)} = (\text{duration} + \text{extent} + \text{irreplaceable} + \text{reversibility} + \text{magnitude}) \times \text{probability}$$

The maximum value is 150 significance points (SP). The unmitigated and mitigated scenarios for each potential environmental impact should be rated as per the table below (Table 6).

TABLE 6: DEFINITION OF SIGNIFICANCE RATINGS (POSITIVE AND NEGATIVE).

Significance Points	Environmental Significance	Definition
100 – 150	High (H)	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options. Cumulative Impact: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
40 – 99	Moderate (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project. Cumulative Impact: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
<40	Low (L)	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation. Cumulative impact: The activity is localised and might have a negligible cumulative impact.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

RESULTS

The following section provides a description of the floristic and wetland environment that may be affected by the proposed development.

Terrestrial communities

Vegetation and land cover of the study area

The natural vegetation on site has been degraded due to the previous mining activities. The only plants present are pioneer plants such as weeds present on small dumps of spoil material. There are small areas around the borrow pit where natural vegetation still occur. The disturbed vegetation consists mainly of *Vachellia karroo* shrubs, *Asparagus larycinus*, and grasses such

as *Aristida congesta*, *Chloris virgata*, *Hyparrhenia hirta* area. The macrophytes at the nearby dam are *Cyperus longus*, *Cyperus eragrostis*, *Agrostis lachnantha*, *Paspalum dilatatum* and *Persicarya lapathifolium* (Figures 3 and **Annexure A**)

Appendix B lists species found on site and Appendix C lists POSA species collected in the **2826BA** quarter degree square. If present, the protected species on these list are marked with a yellow flag.

Alien trees & weeds

A few weeds were note in disturbed places. Table 7 lists the exotic forbs, shrubs and trees as well as their invasive species category.

Table 7: List of alien species present on site. These alien invaders are classified according to the *National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014*.

No	Plant name	Growth form	Invasive Species Category
1	<i>Bidens bipinnata</i>	Forb	-
2	<i>Conyza bonariensis</i>	Forb	-
3	<i>Datura stramonium</i>	Forb	1b
4	<i>Nicotiana glauca</i>	Shrub	1b
5	<i>Tagetes minuta</i>	Forb	-
6	<i>Tamarix sinensis</i>	Shrub	1b
7	<i>Verbena bonariensis</i>	Forb	1b
8	<i>Xanthium strumarium</i>	Forb	1b

Cultivation

There are signs of previous cultivation north of the project site but not at the project site (Figure 3).

Streams & Wetlands

There are some artificial wetlands near the borrow pit (Fig 3). It is an earth-walled dam. The Sand River forms the southern boundary of the farm and a few drainage lines drain down from the farm into the Sand River.

Protected species

The aim of this section was to list those plant species for which there is conservation concern that may be affected by the proposed infrastructure. This includes threatened, rare, declining and protected plant species.

a) Red List Plant Species

There are three basic rules of conservation that apply to populations of Red List Plant Species. Should any Red List plant species be recorded on site then these guidelines would apply. The guidelines are as follows:

1. All populations of Near Threatened and Threatened plant taxa must be conserved *in situ*.
2. All populations of Near Threatened and Threatened plant taxa must be protected with a buffer zone in accordance with guidelines as set out in the Policy.
3. An Ecological Management Plan must be compiled in respect of all actions that affect populations of Red List Plant Species, and such Ecological Management Plans must conform to the Guidelines.

The site assessment of the site did not reveal any Red Data plant or animal species.

b) Protected species in terms of the National Forests Act (Act 84 of 1998)

No species which are protected terms of the National Forests Act (Act 84 of 1998) occur on site.

c) Free State Nature Conservation Ordinance 8 of 1969

No species listed as protected in terms of the abovementioned legislation were found on the site.

Riparian and Wetland communities

Present ecological status (PES)

A mean Present Ecological Status (PES) value between 0 and 5 is obtained from the PES calculations and a PES class is attributed to the stream based on Table 8 & 9. It should however be noted that if a score of less than 2 is attributed to any impact, the lowest rating is used to attribute PES class and not the mean.

Table 8: Present Ecological Status Categories of Wetlands (adapted from Kleynhans, 1996 & 1999).

ECOLOGICAL CATEGORY	SCORE	DESCRIPTION
A	>90-100%	Unmodified, natural
B	>80-90%	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged
C	>60-80%	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged
D	>40-60%	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred
E	>20-40%	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive
F	0-20%	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the

		basic ecosystem functions have been destroyed and the changes are irreversible.
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Table 9: PES calculation for the study area

Criteria & attributes	Relevance	Score	Confidence
Hydraulic/Geomorphic			
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	3	4
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or changes wetland habitat directly or through changes in inundation patterns.	2	5
Biota			
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	5	5
Indigenous Vegetation Removal	Direct destruction of habitat through any human activities affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	5	5
Alien fauna	Presence of alien fauna affecting faunal community structure.	2	4

Overutilisation of biota	Overgrazing, Over-fishing, etc.	3	4
Mean		3.3	4
Class		D	

Ecological Importance and Sensitivity (EIS)

The EIS and functions were calculated using the new draft DWA guidelines and model, as developed by M. Rountree. Information was used from the SIBIS and VEGMAP products. A mean score between 0 and 4 is obtained, with 0 as the lowest and 4 as the highest score. No classification of the scores is given.

The riparian areas have an Ecological Importance and Sensitivity (EIS) score of 0,7 (Table 10). This is a value between 0 and 4, with 0 being very low and 4 very high. The riparian vegetation therefore has a low EIS score. It is regarded as being not ecologically important or sensitive with a low biodiversity and plays a low role in moderating water quality and quantity.

Table 10: EIS calculation of the wetland areas.

ECOLOGICAL IMPORTANCE AND SENSITIVITY	Score (0- 4)	Confidence (1-5)	Motivation
Biodiversity support	0.00	4.00	
Presence of Red Data species	0.00	4.00	No known red data or protected species observed on site.
Populations of unique species	0.00	4.00	No unique plant or animal populations were observed
Migration / breeding / feeding sites	0.00	4.00	Highly unlikely. No breeding sites were observed with very few bird species seen.
Landscape scale	0.80	5.00	

Protection status of the wetland	1.00	5.00	Wetland does not have a high protection status. The wetland area is being used as a communal grazing area.
Protection status of the vegetation type	0.00	5.00	Vegetation is burnt by local residents on an annual basis. Wetland does not have a high protection status
Regional context of the ecological integrity	1.00	5.00	The wetland is in PES class B. Wetland functions are still in place but does not have an importance in terms of a regional context
Size and rarity of the wetland type/s present	1.00	5.00	The wetland is not particularly large or rare, and has no vulnerable ecosystem present.
Diversity of habitat types	1.00	5.00	The wetland has a low species diversity as well as habitat diversity. The largest component of the natural vegetation has been impacted by grazing and alien invasive species.
Sensitivity of the wetland	1.22	4.00	
Sensitivity to changes in floods	1.50	4.00	No high runoff present in catchment due to the small size of the catchment

Sensitivity to changes in low flows / dry season	1.50	4.00	Minimally impacted by changes in flow. Receives water in rainy season and dry for largest part of the year.
Sensitivity to changes in water quality	0.50	4.00	The wetland receives storm water runoff of various qualities during the rainfall season.
ECOLOGICAL IMPORTANCE & SENSITIVITY	0,7	4	

The PES class and EIS score for the wetland at the site are a **D** and **0,7** respectively indicating that the riparian areas on site are largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred. Impacts are mainly caused by frequent floods, wood collection, overgrazing, erosion, alien plants, and trampling of the vegetation.

Sensitive areas at the project site:

The wetlands in the vicinity of the crusher plant are sensitive, although they are highly modified at present. The Sand River and associated riparian vegetation is also present on site. A 50 buffer zone has been mapped around the drainage lines and dam edge and a 100m buffer was mapped for the Sand River as prescribed by DWS regulations.

SENSITIVITY ASSESSMENT

The sensitivity assessment identifies those parts of the study area that may have high conservation value or that may be sensitive to disturbance. Areas containing untransformed natural vegetation, high diversity or habitat complexity, Red List organisms or systems vital to sustaining ecological functions are considered sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to have low sensitivity. The habitat sensitivity assessment was done according to the rules provided in the “Sensitivity mapping rules for biodiversity assessments”

There are features on site that may be considered to have high conservation value, as follows:

1. Streams (perennial and seasonal)

An earth-walled dam as well as seasonal drainage lines drain into the nearby Sand River

2. Sensitive vegetation:

No officially classified vegetation type occurs on site (Figure 7)

3. Threatened plant species:

There are no protected species near the site.

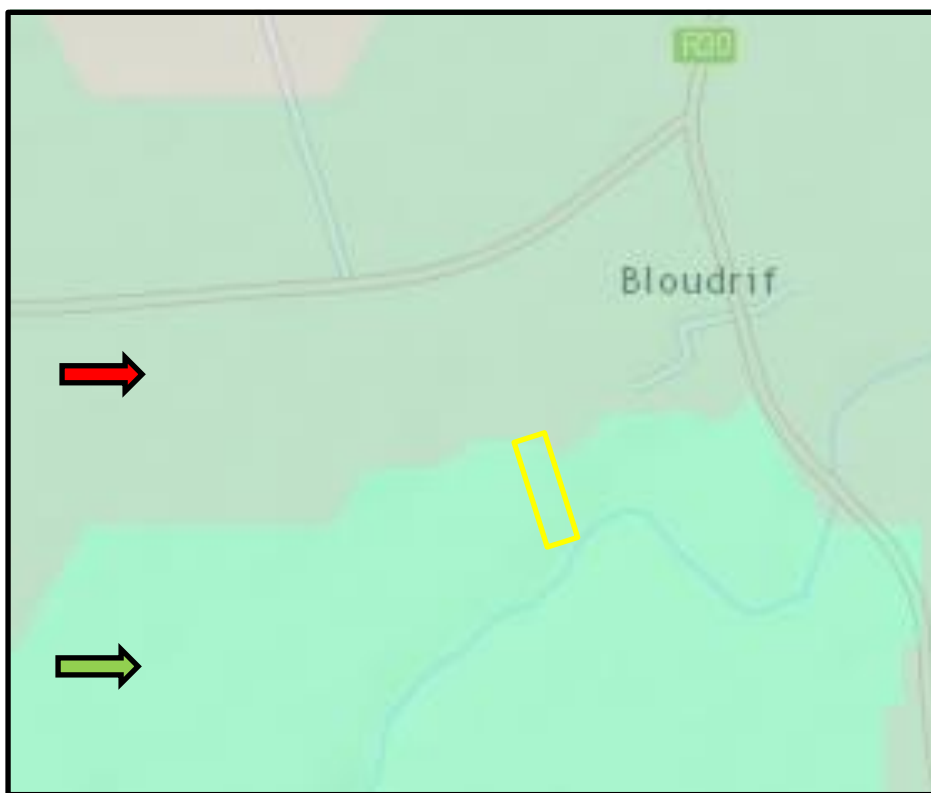


Figure 6: A map of sensitive areas around the project site (yellow polygon)(FS Biodiversity plan 2015). The yellow marked vegetation type is the Vaal-Vet Sandy Grassland (Gh 10)(red arrow)(It is an ecological support area 2). The green arrow indicates an ecological support area 1. The blue line indicate a NFEPA-listed river, and is a sensitive system.

Impact Assessment Summary Tables

The tables below summarise the potential impacts as identified, and provide the significance ratings for these impacts, without and with the implementation of the prescribed mitigation measures.

Table 1: Impact Assessment: Crusher site

PROJECT PHASE	POTENTIAL ENVIRONMENTAL IMPACT	ENVIRONMENTAL SIGNIFICANCE																		MITIGATION SUMMARY		
		BEFORE MITIGATION									AFTER MITIGATION											
		DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE			
Aspect:	Flora																					
Activity	Mine site & access road																					
Planning	Red Data plant species could be damaged or removed.	0	0	0	0	0	0	0	0	L	L	0	0	0	0	0	0	0	0	L	L	Not necessary to appoint specialist to identify Red Data species and recommend appropriate protection action and buffers.
Construction	Red Data plant species could be damaged or removed.	0	0	0	0	0	0	0	0	L	L	0	0	0	0	0	0	0	0	L	L	Demarcation of Red Data Plant and buffer area & No-go area for construction activities not necessary
Operational	Red Data plant species could be damaged or removed.	0	0	0	0	0	0	0	0	L	L	0	0	0	0	0	0	0	0	L	L	The Red Data plant and buffer zone is part of conservation and No-go area.

PROJECT PHASE	POTENTIAL ENVIRONMENTAL IMPACT	ENVIRONMENTAL SIGNIFICANCE																		MITIGATION SUMMARY
		BEFORE MITIGATION									AFTER MITIGATION									
		DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	
Operational	Spread of alien invasive species	5	5	4	3	6	5	115	H	H	4	3	4	4	3	5	90	M	M	Care must be taken to prevent the spread of alien invasive species. Site inspections must be done on an annual basis and eradication must be done
Aspect:	Soil																			
Project Alternative:	Mine site and access road																			
Planning	Erosion of river banks	0	0	0	0	0	0	0	L	L	0	0	0	0	0	0	0	L	L	Environmental specialists to be contracted for the control of soil erosion to avoid environmental degradation.
Construction	Land (commercial land)	5	5	4	3	6	5	115	H	H	4	3	4	4	3	5	90	M	M	Commercial land that is critically impacted by the construction of the site should be closely monitored to avoid soil erosion by officials from the lands department.

PROJECT PHASE	POTENTIAL ENVIRONMENTAL IMPACT	ENVIRONMENTAL SIGNIFICANCE																		MITIGATION SUMMARY
		BEFORE MITIGATION									AFTER MITIGATION									
		DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	
Operational	Commercial land	5	5	4	3	6	5	<u>115</u>	H	H	4	3	4	4	3	5	<u>90</u>	M	M	Care must be taken to prevent erosion. Site inspections must be done on an annual basis

CONCLUSIONS

The requirements of this study were to undertake a specialist study to describe the vegetation and ecology of the borrow pit and sand mine on a portion of portion 26 of the farm Bryan 561, Welkom District.

The site is situated in the Highveld Alluvial vegetation (AZa 5). According to Mucina & Rutherford (2006), this vegetation type has a conservation status of "Least Concerned". However the site is not situated near the Sand River which is a NFEPA-listed aquatic system. The site is not situated in any Critical Biodiversity Area (CBA) but in an ecological support area (ECA 1 & 2)

The site is in a degraded state due to impacts by previous mining activities to mine gravel at a borrow pit and sand which has been deposited by the nearby Sand River. Some of the rubble dumps still exist in the area. An access road, to reach the site already exists. A small man-made dam is present near the site and the Sand River forms the southern boundary of the property. A Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) for the site were calculated. The dam, the Sand River and its tributaries can be regarded as sensitive ecosystems although they have been largely impacted by previous mining activities. A large loss of natural habitat, biota and basic ecosystem functions has occurred – PES category is a D and the EIS scored 0,7.

Species richness of the vegetation of the study area is low with a total of 23 species near the borrow pit site and 12 along the riparian zone. No Red or Orange List species were found to occur on the site.

From an ecological perspective the project site is suitable for a development of this nature. The stated conditions and recommendations must also be adhered to.

RECOMMENDATIONS

The following is recommended:

- Care must be taken not to negatively affect the wetland ecosystems further;
- The water quality of the wetland is poor and care must be taken not to drink untreated water from this source;
- Measures to control erosion must always be applied;
- No dumping of construction waste from the development should not take place on areas other than a licenced landfill site;

- Weed control measures must always be applied to eradicate the noxious weeds (Category 1a & 1b species) on disturbed areas at and around the mine site; An Environmental Control Officer (ECO) must be appointed to oversee that the aspects stipulated in the Environmental Permit be carried out properly

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ANNEXURE A: PHOTOS OF THE SITES



Figure A1: View of some shrubs on a heap of spoil material at the existing borrowpit.



Figure A2: View of the exiting borrow pit site.



Figure A3: View of the sand deposit near the Sand River.



Figure A4: One of the tributaries which drain into the Sand River

ANNEXURE B:

Species found during survey

None of these species are protected

No	Plant name	Growth form	Invasive Species Category
Borrow pit site			
1	<i>Bidens bipinnata</i>	Forb	-
2	<i>Conyza bonariensis</i>	Forb	-
3	<i>Cyperus longus</i>	Sedge	Indigenous
4	<i>Datura stramonium</i>	Forb	1b
5	<i>Diospyros austro-africana</i>	Shrub	Indigenous
6	<i>Eragrostis curvula</i>	Grass	Indigenous
7	<i>Eragrostis lehmanniana</i>	Grass	Indigenous
8	<i>Eragrostis obtusa</i>	Grass	Indigenous
9	<i>Eragrostis superba</i>	Grass	Indigenous
10	<i>Eucalyptus camuldulensis</i>	Tree	1b
11	<i>Helichrysum rugulosum</i>	Forb	Indigenous
12	<i>Heteropogon contortus</i>	Grass	Indigenous
13	<i>Hyparrhenia hirta</i>	Grass	Indigenous
14	<i>Nicotiana glauca</i>	Shrub	1b
15	<i>Salsola kali</i>	Weed	1b
16	<i>Sporobolus fimbriatus</i>		Indigenous
17	<i>Tagetes minuta</i>	Forb	-
18	<i>Themeda triandra</i>	Grass	Indigenous
19	<i>Tribulus terrestris</i>	Forb	Indigenous
20	<i>Typha capensis</i>	Sedge	Indigenous
21	<i>Vachelia karroo</i>	Tree	Indigenous
22	<i>Verbena bonariensis</i>	Forb	1b
23	<i>Xanthium strumarium</i>	Forb	1b
Riparian vegetation			
1	<i>Cyperus longus</i>	Sedge	Indigenous
2	<i>Datura stramonium</i>	Weed	1b
3	<i>Diospyros lycioides</i>	Shrub	Indigenous
4	<i>Eragrostis curvula</i>	Grass	Indigenous
5	<i>Eragrostis lehmanniana</i>	Grass	Indigenous
6	<i>Lycium cinerium</i>	Shrub	Indigenous
7	<i>Lycium hisrsutum</i>	Shrub	Indigenous

8	<i>Phragmites australis</i>	Reed	Indigenous
9	<i>Salix babylonica</i>	Tree	1b
10	<i>Searsia pyroides</i>	Shrub	Indigenous
11	<i>Vachelia karroo</i>	Tree	Indigenous
12	<i>Ziziphus mucronata</i>	Tree	Indigenous

ANNEXURE C:

Species on POSA list for the 2826BA quarter degree square

Species marked with an asterisk are naturalized exotics. Species taxonomy is according to Germishuizen and Meyer (2001). Yellow marked species are protected species.

Grid: 2826BA		
Family	Species	Threat status
ASPHODELACEAE	Bulbine abyssinica A.Rich.	LC
BORAGINACEAE	Heliotropium lineare (A.DC.) Gürke	LC
IRIDACEAE	Lapeirousia plicata (Jacq.) Diels subsp. plicata	LC
PAPAVERACEAE	*Papaver aculeatum Thunb.	LC

ANNEXURE D:

EROSION CONTROL MANAGEMENT PLAN

1. Soil

1.1 Soil Stripping

Soil should be stripped in a phased manner in order to retain the vegetation cover for as long as possible i.e. strip the minimum area necessary to enable construction activities to proceed. Once a detailed construction plan has been compiled, the ECO, in consultation with the Contractor, must evaluate the construction site as well as the contractor's camp site in order to minimise the stripping of soil. The stock pile area for the stripped soil must be in area away from the construction activities.

When stripping an area, all available soil must be stripped prior to construction and stockpiled for use in the rehabilitation/landscaping process. Even though the soils will have been modified by years of agricultural activities it can be expected that there will be a richer organic layer near the surface. This topsoil layer (top 30 to 50 cm) must be stripped first and stockpiled separately. Thereafter, the underlying subsoil layers can be stripped and stockpiled.

1.2 Soil Handling

Soil must not be handled when wet, as this will precipitate compaction. This needs to be balanced against the high erosion potential of the soils especially when they are dry.

Repeated handling of soil must be avoided as this result in the loss of soil structure and compaction. Planning the soil stripping and stockpiling process and allocating formal stockpile areas will minimise the chance of repeated handling.

Soil must not be handled during windy conditions to minimise soil loss through wind erosion.

In order to minimise the risk of spillage and loss through wind erosion, haul trucks must not be overloaded when transporting soils to, from and around the site. Soils being transported long distances must be covered with a tarpaulin.

1.3 Soil Stockpiling

Any additional soil material not utilised for during the construction (e.g. the construction of barrier berms, filling, etc. must be stockpiled in the stockpile/storage area.

The exact stockpiling location within the stockpile/storage area will need to be identified by the ECO in consultation with the project manager. Soil stockpiles (including barrier berms) must be:

- placed and maintained in a neat, orderly state;
- must not exceed 2.5 m in height;
- must be convex at the top to promote run-off;
- must be revegetated using the grass seed mix if permanently stockpiled.

2 Erosion Control

2.1 Delay Period

Should the soil remain unvegetated for a long time period, effective dust and erosion control measures will need to be implemented.

Four options can be implemented during the delay period:

- Applying a chemical surface binder. The effectiveness of the binders may be short-lived if trampling or raindrops breaks the surface crust. Continuous re-application may therefore be required.
- Hydroseeding with a grass mix to establish a cover of shallow rooting plants. The grass cover can be ploughed into the surface when construction begins.
- Covering exposed areas with biomatting (woven material made from sisal or jute that is laid over the surface). Large rolls of biomatting are laid onto the surface and the meshwork structure provides protection from direct exposure.
- Capping the site with an erosion resistant layer. Gravel, coarse ash, wood chips or cane trash could be utilised for this purpose.

Prior to site clearing and bulk earthworks, the ECO will discuss the various options with the project manager and contractors to identify the most practical yet effective method. If none of

these alternatives are suitable, the ECO in consultation with the Contractors and project manager are to identify a practical yet effective method.

2.2 River bank and riverbed erosion

Care must be taken to minimise erosion of the river banks and beds. Excavations on the banks must be limited to a minimum. These excavations must be done during the dry winter months while the flow in the river is at its lowest. Rock gabions (wire frames filled with rock fragments) should be used to stabilised areas of the river banks which are prone to erosion.

2.3 On-going Erosion Control

The ECO will monitor for actual or potential erosion sites. These sites are to be repaired immediately using the method prescribed by the ECO. This may involve one or more of the following:

- Re-grassing areas using a suitable grass seed mix;
- Covering areas with biomatting;
- Placement of sack gabions (biodegradable sacks filled with soil, *Cynodon dactylon* seed and fertiliser);
- Placement of rock gabions (wire frames filled with rock fragments).

The ECO will decide where/when erosion control/protection measures are required and will specify the method for use in each situation.

MILLENIUM HERITAGE GROUP (Pty) Ltd

PHASE 1

ARCHAEOLOGICAL IMPACT ASSESSMENT

RELATING TO THE APPLICATION OF A MINING PERMIT ON PORTION OF PORTION

26 OF THE FARM BRYAN 561 WITHIN THE MAGESTRIAL DISTRICT OF WELKOM,

FREE STATE PROVINCE



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EXECUTIVE SUMMARY

The proposed study area is situated approximately 8 kilometers West of Welkom central business district, situated on the portion of portion 26 of the farm Bryan 561. The site borders the Sand River towards the south. The farm is currently used as livestock grazing camps. The proposed study area covered approximately 5 hectares of land located at GPS co-ordinates (GPS S28°.07 ' , 08.02" & E 26°.42'.45 .04"). The proposed area is already a disturbed site characterized by open area where sand extractions has been previously conducted.

A multi-stepped methodology was used to address the terms of reference. To begin with, a robust desktop study was carried out to understand the framework for managing and accessing impact near Heritage Sites. This included consulting the 1972 Convention, the operational guidelines of 2013, the ICOMOS (2011) guidelines on assessing impact on or near Heritage sites. The IUCN guidelines and standards of best practice were also consulted. Subsequently, a review of the archaeology of the area was carried out using contract archaeology reports, research reports and academic publications. Desktop studies were followed by fieldwork carried out by professional archaeologist and heritage manager in conformity with the National Heritage Resources Act, Act 25 of 1999. Based on an interdisciplinary methodology, that combined ICOMOS methodology with several techniques from various disciplines, the impact of the proposed site was considered.

The following conclusions were reached:

The aim of this impact assessment was to document and evaluate sites, objects and structures of cultural significance and to consider alternative plans to mitigate adverse impact on heritage sites. The survey of the sand mining rights revealed no heritage resources sites within the proposed development footprint.

The proposed sand mining rights development is scheduled to take place on disturbed farm land with large sections where sand has been extracted previously.

Based on the current information obtained for the area during the initial site visit no heritage sites were geo-referenced within the study area. No further studies / Mitigations are recommended given the above mentioned fact, since there are no archaeological or place of historical significance that will be impacted by the proposed sand mining activities. However, should any chance archaeological or any other physical cultural resources be discovered subsurface, heritage authorities should be informed. From an archaeological and cultural heritage resources perspective, there are no objections to the proposed sand mining activities and resort and we recommend to the Provincial Heritage Resource Agency or South African Heritage Resource Agency to approve the project as planned.

ACKNOWLEDGEMENTS:

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AIA	Archaeological Impact Assessment
EIA	Environmental Impact Assessment
EIA	Early Iron Age
EMP	Environmental Management Plan
NEC	Naledzi Environmental Consultants
NEMA	National Environmental Management Act, 1998 (Act No.107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No.25 of 1999)
SAHRA	South African Heritage Resources Agency
ESA	Early Stone Age
MSA	Middle Stone Age
LSA	Late Stone Age
IA	Iron Age
LIA	Late Iron Age
UNESCO	United Nations Educational, Scientific and cultural Organization
WHC	World Heritage Conventions of 1972

DEFINITIONS

Archaeological Material remains resulting from human activities, 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.

Chance Finds Archaeological artefacts, features, structures or historical cultural remains such as human burials that are found accidentally in context previously not identified during cultural heritage scoping, screening and assessment studies. Such finds are usually found during earth moving activities such as water pipeline trench excavations.

Cultural Heritage Resources Same as Heritage Resources as defined and used in the South African Heritage Resources Act (Act No. 25 of 1999). Refer to physical cultural properties such as archaeological and paleontological sites; historic and prehistoric places, buildings, structures and material remains; cultural sites such as places of ritual or religious importance and their associated materials; burial sites or *graves* and their associated materials; geological or natural features of cultural importance or scientific significance. Cultural Heritage Resources also include intangible resources such as religion practices, ritual ceremonies, oral histories, memories and indigenous knowledge.

Cultural Significance The complexities of what makes a place, materials or intangible resources of value to society or part of, customarily assessed in terms of aesthetic, historical, scientific/research and social values.

Grave A place of interment (variably referred to as burial), including the contents, headstone or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery.

Historic Material remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

In Situ material *Material culture* and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

Late Iron Age this period is associated with the development of complex societies and state systems in southern Africa.

Material culture Buildings, structure, features, tools and other artefacts that constitute the remains from past societies.

Site A distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

1. INTRODUCTION

Ryamu Mining (PTY) LTD commissioned studies for the proposed application for Sand mining permit on portion 26 of the farm Bryan 561 near Welkom central business district, Free State Province. To ensure that the proposed development meets the environmental requirements in line with the National Environmental Management Act 107 of 1998 as amended in 2010, The National Environmental Management Waste Act 2008 and the Mineral and Petroleum Resources Development Act 2002, they appointed Engedi Minerals Energy (PTY) LTD as an Independent Environmental Assessment Practitioner, who then appointed Millennium Heritage Groups (PTY) LTD to undertake archaeological impact assessment for the proposed project.

The proposed activities is listed Activity No 20 as described in Government gazette Notice 1, GNR (983), promulgated on 4 December 2014 of the Regulation compiled in terms of section 24(5) read with section 44 of the National Environmental Management Act (Act 107 of 1998) that Ryamu Mining (PTY) LTD intend to apply for mining permit on portion 26 of the farm Bryan 561. The proposed activities form part of the development process, where application for Environmental Assessment Authorization must be completed. As part of the Environmental Impact Assessment (EMP) process, an application was lodged with the Department of Mineral Resource, Free State Province. Archaeological Impact Assessment (AIA) report form part of a series of appendices prepared for Environmental Management Plan (EMP) pursued in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the National Heritage Resources Act 25 of 1999.

In order to comply with relevant legislations, the applicant Ryamu Mining (PTY) LTD requires information on the heritage resources that occur within or near the proposed site and their heritage significance. The objective of the study is to document the presence of archaeological and historical sites of significance in order to inform and guide planning on decision making. The study serve as a statutory frame of reference on archaeology and heritage sites that occur within the proposed study area. The document enable the developer to align their functions and responsibilities in order to facilitate forward planning

in minimizing impact on archaeological and heritage sites. Archaeological/ Heritage impact assessment is conducted in line with the National Heritage Resources Act of 1999 (Act No. 25 of 1999). The Act protects heritage resources through formal and general protection. The Act provides that certain developmental activities require consents from relevant heritage resources authorities. The South African Heritage Resources Agency developed minimum standards for impact assessment, In addition to these local standards, the International Council of Monuments and Sites (ICOMOS) published guideline for assessing impacts. The Burra Charter of 1999, require a caution approach to the management of sites, it set out the need to understand the significance of heritage places, and the significance guide decisions.

The proposed study serve as framework tools which ensure that the National Heritage Resources Act (25 of 1999) and the ICOMOS standard principles are applied, in an effective and equitable manner in order to avoid loss and disturbance of heritage sites in the study area. This will enable applicant to take pro-active measures to limit the adverse effects that the development could have on such heritage resources. Information presented in this report form the basis of Archaeological resources assessment of the proposed project as the proposal constitutes an activity, which may potentially have direct or indirect impact to heritage resources that may occur in the proposed study area.

The National Heritage Resources Act (NHRA - Act No. 25 of 1999) protects all structures and features older than 60 years (Section 34), archaeological sites and material (Section 35) and graves and burial sites (Section 36). In order to comply with the legislation, the applicant requires information on the heritage resources, and their significance that occur in the demarcated area. This will enable the Applicant to take pro-active measures to limit the adverse effects that the development could have on such heritage resources.

2. RELEVANT LEGISLATION

Two sets of legislation are relevant for the study with regards to the protection of heritage resources and graves.

2.1. The National Heritage Resource Act (25 of 1999)

This Act established the South African Heritage Resource Agency (SAHRA) as the prime custodians of the heritage resources and makes provision for the undertaking of heritage resources impact assessment for various categories of development as determined by section 38. It also provides for the grading of heritage resources (section 7) and the implementation of a three-tier level of responsibility and functions from heritage resources to be undertaken by the State, Provincial and Local authorities, depending on the grade of heritage resources (section 8)

In terms of the National Heritage Resource Act 25, (1999) the following is of relevance:

Historical remains

Section 34 (1) No person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the relevant Provincial Heritage Resources Authority.

Archaeological remains

Section 35(3) Any person who discover archaeological or Paleontological object or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resource authority or the nearest local authority or museum, which must immediately notify such heritage resources authority.

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

- destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
- destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;

- trade in ,sell for private gain, export or attempt to export from republic any category of archaeological or paleontological material or object or any meteorite; or
- bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment which assist with the detection or recovery of metal or archaeological material or object or such equipment for the recovery of meteorites.

Section 35(5) When the responsible heritage resource authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or paleontological site is underway, and where no application for a permit has been submitted and no heritage resource management procedures in terms of section 38 has been followed, it may

- serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order
- carry out an investigation for the purpose of obtaining information on whether or not an archaeological or paleontological site exists and whether mitigation is necessary;
- if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and
- recover the cost of such investigation from the owner or occupier of the land on which it is believed an archaeological or paleontological site is located or from the person proposing to undertake the development if no application for a permit is received within two week of the order being served.

Subsection 35(6) the responsible heritage resource authority may, after consultation with the owner of the land on which an archaeological or paleontological site or meteorite is situated; serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

Burial grounds and graves

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

- (i) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- (ii) bring onto or use at a burial ground or grave any excavation equipment, or any equipment which assists in detection or recovery of metals.

Subsection 36 (6) Subject to the provision of any person who in the course of development or any other activity discover the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resource authority which must, in co-operation with the South African Police service and in accordance with regulation of the responsible heritage resource authority-

- (l) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this act or is of significance to any community; and
if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangement as it deems fit.

Cultural Resource Management

Section **38(1)** Subject to the provisions of subsection (7), (8) and (9), any person who intends to undertake a development*...

- must at the very earliest stages of initiating such development notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

development means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way

result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including:

- (i) Construction, alteration, demolition, removal or change of use of a place or a structure at a place;
- (ii) Any change to the natural or existing condition or topography of land, and
- (iii) Any removal or destruction of trees, or removal of vegetation or topsoil;

place means a site, area or region, a building or other structure

structure means any building, works, device or other facility made by people and which is fixed to the ground.

2.2. The Human Tissue Act (65 of 1983)

This act protects graves younger than 60 years, these falls under the jurisdiction of the National Department of Health and the Provincial Health Department. Approval for the exhumation and reburial must be obtained from the relevant provincial MEC as well as relevant Local Authorities.

3. TERMS OF REFERENCE

The terms of reference for the study were to undertake an Archaeological Impact Assessment on portion 26 of the farm Bryn 561 near Welkom, Free State Province and submit a specialist report, which addresses the following:

- Executive summary
- Scope of work undertaken
- Methodology used to obtain supporting information
- Overview of relevant legislation
- Results of all investigations
- Interpretation of information
- Assessment of impact

- Recommendation on effective management measures
- References

4. TERMINOLOGY

The Heritage impact Assessment (HIA) referred to in the title of this report includes a survey of heritage resources as outlined in the National Heritage resources Act, 1999 (Act No 25 of 1999). Heritage resources, (Cultural resources) include all human-made phenomena and intangible products that are result of the human mind. Natural, technological or industrial features may also be part of heritage resources, as places that have made an outstanding contribution to the cultures, traditions and lifestyle of the people or groups of people of South Africa.

The term ‘ pre – historical’ refers to the time before any historical documents were written or any written language developed in a particular area or region of the world. The historical period and historical remains refer, for the project area, to the first appearance or use of ‘ modern’ Western writing brought South Africa by the first colonist who settled in the Cape in the early 1652 and brought to the other different part of South Africa in the early 1800.

The term ‘ relatively recent past’ refers to the 20th century. Remains from this period are not necessarily older than sixty years and therefore may not qualify as archaeological or historical remains. Some of these remains, however, may be close to sixty years of age and may in the near future, qualify as heritage resources.

It is not always possible, based on the observation alone, to distinguish clearly between archaeological remains and historical remains or between historical remains and remains from the relatively recent past. Although certain criteria may help to make this distinction possible, these criteria are not always present, or when they are present, they are not always clear enough to interpret with great accuracy. Criteria such as square floors plans

(a historical feature) may serve as a guideline. However circular and square floors may occur together on the same site.

The 'term sensitive remains' is sometimes used to distinguish graves and cemeteries as well as ideologically significant features such as holy mountains, initiation sites or other sacred places. Graves in particular are not necessarily heritage resources if they date from the recent past and do not have head stones that are older than sixty years. The distinction between 'formal' and 'informal' graves in most instances also refers to graveyards that were used by colonists and by indigenous people. This distinction may be important as different cultural groups may uphold different traditions and values with regard to their ancestors. These values have to be recognized and honored whenever graveyards are exhumed and relocated.

The term 'Stone Age' refers to the prehistoric past, although Late Stone Age people lived in South Africa well into the historical period. The Stone Age is divided into an Early Stone Age (3 Million years to 150 000 thousand years ago) the Middle Stone Age (150 000 years ago to 40 years ago) and the Late Stone Age (40 000 years to 200 years ago).

The term 'Early Iron Age' and Late Iron Age respectively refers to the periods between the first and second millenniums AD.

The 'Late Iron Age' refers to the period between the 17th and the 19th centuries and therefore includes the historical period.

Mining heritage sites refers to old, abandoned mining activities, underground or on the surface, which may date from the pre historical, historical or relatively recent past.

The term 'study area' or 'project area' refers to the area where the developers wants to focus its development activities (refer to plan)

Phase I studies refers to survey using various sources of data in order to establish the presence of all possible types of heritage resources in a given area.

Phase II studies includes in-depth cultural heritage studies such as archaeological mapping, excavating and sometimes laboratory work. Phase II work may include

documenting of rock art, engravings or historical sites and dwellings; the sampling of archaeological sites or shipwrecks; extended excavation of archaeological sites; the exhumation of bodies and the relocation of grave yards, etc. Phase II work may require the input of specialist and require the co-operation and the approval of SAHRA.

5. METHODOLOGY

Source of information

Most of the information was obtained through the initial site visit made on the 04 December 2016 by Mr. Mathoho Eric where systematic inspections were covered along linear transects which resulted in the maximum coverage of the entire site. Standard archaeological observation practices were followed; Visual inspection was supplemented by relevant written source, and oral communications with local communities from the surrounding area. In addition, the site was recorded by hand held GPS and plotted on 1:50 000 topographical map. Archaeological/historical material and the general condition of the terrain were photographed with a Canon 1000D Camera.

Assumption and Limitations

It must be pointed out that heritage resources can be found in the unexpected places, it must also be borne in mind that survey may not detect all the heritage resources in a given project area. While some remains may simply be missed during surveys (observation) others may occur below the surface of the earth and may be exposed once development (such as the construction of the proposed facilities) commences.

6. ASSESSMENTS CRITERIA

This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The significance of archaeological and heritage sites were based on the following criteria:

- The unique nature of a site.

- The amount/depth of the archaeological deposit and the range of features (stone walls, activity areas etc).
- The wider historic, archaeological and geographic context of the site.
- The preservation condition and integrity of the site.
- The potential to answer present research questions.

6.1 Site Significance

The site significance classification standards as prescribed in the guideline and endorsed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used as guidelines in determining the site significance for the purpose of this report.

The classification index is represented in the Table below.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction

Generally Protected C (GP.C)	Grade 4C	Low Significance	Destruction
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Grading and rating systems of heritage resources

6.2 Impact Rating

VERY HIGH

These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or cultural) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects.

Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.

Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.

HIGH

These impacts will usually result in long term effects on the social and /or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.

Example: The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.

Example: The change to soil conditions will impact the natural system, and the impact on affected parties (e.g. farmers) would be HIGH.

MODERATE

These impacts will usually result in medium- to long-term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by the public or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are real, but not substantial.

Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.

Example: The provision of a clinic in a rural area would result in a benefit of MODERATE significance.

LOW

These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.

Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.

Example: The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people living some distance away.

NO SIGNIFICANCE

There are no primary or secondary effects at all that are important to scientists or the public.

Example: A change to the geology of a certain formation may be regarded as severe from a geological perspective, but is of NO SIGNIFICANCE in the overall context.

6.3 Certainty

DEFINITE: More than 90% sure of a particular fact. Substantial supportive data exist to verify the assessment.

PROBABLE: Over 70% sure of a particular fact, or of the likelihood of an impact occurring.

POSSIBLE: Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.

UNSURE: Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.

6.4 Duration

SHORT TERM : 0 – 5 years

MEDIUM: 6 – 20 years

LONG TERM: more than 20 years

DEMOLISHED: site will be demolished or is already demolished

6.5 Mitigation

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be classified as follows:

- ✓ **A** – No further action necessary
- ✓ **B** – Mapping of the site and controlled sampling required
- ✓ **C** – Preserve site, or extensive data collection and mapping required; and
- ✓ **D** – Preserve site

7. Brief synthesis

Previous studies in the region reflected that the area is of high pre- historic and heritage significance. It is in fact a cultural landscape where heritage understanding is supported by overwhelming recorded evidence represented by the presence of cultural material fingerprints (remains). Generally the archaeology of human occupation within the study area is made out of pre-colonial elements (stone and Iron ages) as well as the colonial components.

7.1. Stone Age (Esa, Msa and Lsa)

Free State Province is marked by outstretch of plains, rocky outcrops, grassland and Thornveld with strong trees growth along major rivers. Most of the Rivers, are surrounded by evidence of Stone Age and Iron Age occupations. Evidence of Stone Age within the

study area dates back to 500 000 years ago, this time period is associated with the earliest Homo predecessors who lived near sources of water. Along the Vaal River caches of stone tools manufactured from dolerites with Sangoan feature has been found.

These tools were simple meant to chop and butcher meat, de- skin animal and probably to smash bones to obtain marrow. The presence of cut marks from animal fossil bones dating to this period has led to the conclusion by researchers that human ancestors were scavengers and not hunters (Esteyhuysen, 2007). They may have preyed on a drowned or crippled animals or shared a kill by another predator, which explains why at some ESA sites occur high bone proportions of large, dangerous game (Wadley, 2007). The industries were later replaced by the Acheulian stone tool Industry which is attested to in diverse environments and over wide geographical areas. The Industry is characterized by large cutting tools mostly dominated by hand axes and cleavers. Bifaces emerged and have been reported from a wide range of areas in South Africa. These stone tools products were astonishingly similar across the geographical and chronological distribution of the Acheulian techno-complex: large flakes that were suitable in size and morphology for the production of hand axes and cleavers perfectly suited to the available raw materials (Sharon, 2009).

Evidence presented from Sterkfontein cave, Khathu Pan reflected that the first tool making hominids belong to either an early species of the Homo or an immediate ancestor which is yet to be discovered here in South Africa (Esteyhuysen, 2007, Walker, Chazan & Morris 2013). Both the Oldwan and Acheulian industries are well represented in the archaeology of Free State and Northern Cape. Some of the well remarkable tools has been found in Gauteng Province in the Cradle of Humankind from sites (Strekfontein and Kromdraai). These discoveries have made considerable contribution to the body of scientific knowledge in the subject of tool manufacturing process in association with human evolutions. The Middle Stone Age dates back to about 250 000 ago ending at around 25 000 years ago. In general Middle Stone Age tools are smaller than those of the Early Stone Age period. They are characterized by smaller hand axes, cleavers, and flake and blade industries. The period is marked by the emergence of modern humans through

the change in technology, behavior, physical appearance, art, and symbolism. Various stone artifact industries occur during this time period, although less is known about the time prior to 120 000 years ago, extensive systemic archaeological research is being conducted on sites across southern Africa dating within the last 120 000 years (Thompson & Marean, 2008). The distribution of Middle stone age sites in the Free State Province are concentrated on the stream banks with rare sites away from the water source but near to the outcrops of lydianite. Possibility to this distributions could be attributed to access to water and raw materials. Several sites subjected to archaeological investigations include, Orangia 1, Elandskloof and the farm Zeekoegat (Sampson 1968). The buried samples were found in primary and secondary sealed contexts. Orangia and Zeekoegat site 27 are one of the goods example of primary context where the artifacts have been uncovered on a single level or floor with little disturbances.

In other areas of the Free States several middle stone aged tools were uncovered scatters in erosion features along the silt stream banks and sometimes on the bare rock benches of the river itself. Many of such occurrences cover a wide area of sheet erosion. In general surface scatters of these flake and blade industries occur widespread across the Province although rarely with any associated botanical and faunal remains. The artifacts were made exclusively of lydianite, a black isotropic rock found in the hot-contacts zone between the dolerites and mudstone of the area. With time this rock develops a grey to brown patina common to all middle Stone Age samples in the area (Sampson 1968).

It is also common for these stone artifacts to be found between the surface and approximately 50-80cm below ground. Fossil bone may be associated with MSA occurrences. These stone artifacts, like the Earlier Stone Age hand axes are usually observed in secondary context with no other associated archaeological material.

An early South African Middle Stone Age stone artifact industry referred to as the Mangosian had a very wide distribution stretching across Limpopo, the eastern Orange Free State, around Cape Point and Natal (Malan 1949). These stone artifacts industry, may have represented the final development that the prepared core technique of the

Middle Stone Age reached prior to its replacement by the micro lithic techniques of the Later Stone Age. Malan (1949) also made mention that there are variations of Middle Stone Age assemblages throughout South Africa (Binnerman *et al*, 2011).

A variety of MSA tools includes blades, flakes, scraper and pointed tools that may have been hafted onto shafts or handles and used as spear heads. Residue analyses on some of the stone tools indicate that these tools were certainly used as spear heads (Widely, 2007). The presence of spear heads on some of the MSA assemblages is an indication that these group of people were hunters who targeted middle sized game such as hartebeest, wildebeest and zebra (Wadley, 2007), some assemblages show the presence of bone tools such as bone points.

The last phase of stone tool industry is associated the late stone age. The Karoo landscape is exceptionally rich in the distribution of this phase and is characterized by wide distribution of engravings. The greatest concentrations of engravings occur on the basement rocks and the intrusive Karoo dolerites, but sites are also found on rock types including dolomite, granite, gneiss, and in a few cases on sandstone (Morris, 1988). Most of these paintings depict a wide variety of the fauna of the Free state and the Northern Cape artistic renderings of animal such as giraffes and other large grazers and mixed feeders such as zebra, wildebeest, hartebeest, eland and buffalo (Parkinton et al. 2008) Late Stone age period is associated with the use of micro- lithic stone tools. Few LSA tools have been found within the study area however the artifacts were out of context due to environmental and human interference. Free State and the Northern Cape are well represented during the mid- Holocene. Several travelers from the 1840s onwards mentioned the carving or drawings of animals and footprints across a wide area of the Karoo (Parkington etal, 2008:31)

7.2. Iron Age Period

Iron Age communities moved into southern Africa by c. AD 200, entering the study area either by moving down into the Northern Cape via Botswana or via coastal plains route. Their movement followed various rivers inland. Being cultivators, they preferred the rich

alluvial soils to settle on. These landscapes, drainage systems and good climatic conditions could have influenced diverse societies including wildlife and farming communities to settle within the region. It is indisputable that the natural environment has played the dominant part; nevertheless it is not deterministic (Katsamudanga, 2007). The introduction of farming communities in southern Africa early in the first millennium AD is characterised by the appearance of distinctive pottery wares (Huffman, 2007), metal working (Friede, 1979), agriculture and sedentism (Maggs, 1980; Phillipson, 2005). Mining and metallurgy were largely limited to the reduction of iron and copper ore for the manufacturing of utilitarian and decorative implements. Iron Age occupation of the region seems to have taken place on a significant scale and at least three different phases of occupation have been identified.

Current research has established that there are more than 200 Iron Age sites identified to date in Free State. These sites were characterized by huts remains associated with different time periods built from different materials. Some of the remains are characterized by stone walled sites with particles containing pieces of daga with reeds and grass impressions. Building in stones had considerable antiquity in the Orange Free State and this contractual design progressed to the relatively recent past time period. These settlements have been recorded throughout Free State Province as well as north east of Kuruman (Maggs 1976).

The attention of archaeologists was first drawn to Iron Age of Free State by van Reith Lowe who reported on the stone hut settlement on Vegkop in 1927. He described the presence of cobbled huts and the plan of a typical settlement unit in the vicinity. Similar settlements were also described by Daubenton (1938) north and south of Steynsrust. Pullen (1942) described the cultural material remains collected from settlements of the same type near Frankfurt. It is now firmly established that much of the stone buildings on the Highveld region was the work of the Ghoja communities. These were the first communities to cross the Vaal River and moved southwards into what is Orange Free State were the Ghoja and the Fokeng. The Ghoja occupied the flat hilltops bordering the Valsch, Rhenoster, Wilge Sand and other tributaries of the Vaal River. While the Fokeng occupied to the east along

the Caledon. The ruins settlements associated with the Ghoya are scattered over a wide area in the Northern Free State particularly good examples being those at the Sand River poort and on Doringberg (which now form part of the Willem Pretorius Game Reserve) at Mooihoek and Driefontein near Senekal at Platkop, Ellerest, Goedhoop near Stynrust (Walton 1965).

The most interesting feature of these settlement are the huts themselves, which are corbelled stone beehive built from boulders of spheroidal dolerite or untrimmed blocks. The settlement covers several acres consisted of a series of home stead loosely linked together. The actual date of the Bantu arrival in the Free State has not yet been definitely determined. The Ghoya ceramic recovered from the midden comprised of globular pots with short vertical necks, neck less bowls' and small cups decorated with triangular areas defined rows and areas of comb impressions (Walton 1965).

At present it is not clear, but, judged on the pottery found; these sites might even date to early historic times. As this was a period of population movement, conflict and change, it in large part set the scene for the current population situation in the country. Considering the time period that they were occupied, they also feature in the early historic period. They build stone huts and kraals which were later occupied by the Tlhaping. The arrival of the latter tribes forced the Ghoya to move eastwards to the Vaal, where they hybridized and finally conquered and completely absorbed by the Taung under chief Moletsane 3. Some of the Ghoya who adopted the tribal name Kubung, continued to live as individual units among the Taung (Walton 1965). Preliminary archaeological investigations by the McGregor Museum revealed that early mining had contrary to the cited historical evidence, Charcoal sample submitted for Radio Carbon dating indicated that mining activities in the excavated portion range from 19th century to AD800 (Ibid 1981).

7.3. HISTORICAL / COLONIAL PERIOD

Historical archaeology could be associated with the unwelcome political authority at the Cape which drive dis affected Dutch farmers in search of greener pastures outside the

British sovereignty (Parkington et al, 2008). This period is associated with the last 500 years when European settlers and colonialism entered into southern Africa. Movement into the interior was closely linked with the change from farming to stock farming. The movement of Dutch into the interior got underway when Wilhelm Adrien van der Stel began to issue free grazing permits in 1703. The exoduses went hand in hand with hunting expeditions into the interior which not only provided the farmers with meat, but also enable them to learn more about the resources of the hinterland. British government made its laws which undermine the freedom of the Boers. The mounting conflict between African and white stock farmers played the dominant part. This led to the general dissatisfaction and a feeling of insecurity among the Afrikaner. The frontier wars of 1834/35 caused the frontier farmers to suffer heavy losses. To aggravate matters, land prices rose sharply during the 1820 and 1830 and drought was a serious problem. These conditions threatened the pastoral lifestyle. There was no land for the younger generations. They opted to migration in search of land and grazing in the interior.

During the great trek into the interior they were already acquainted with conditions of the interior and with the main trek routes. They got available information from travelers, hunters and missionaries and writes such as Lichtenstein and Buchell. The region was infiltrated by Missionaries such as Moffat. Availability of springs and fountains in the vicinity attracted nomadic trek Boers who served as prospectors and miners working on the rich iron ore deposits near Sishen farm. Some of the ancient mines were described and investigated near Postmansburg. This cave site was first described from historical records by P.B Borchers who visited the area in the early 1801. The area was further examined by Dr. Somerville who was an interpreter during the expedition. Historical documents suggest that the site was characterized by a cave with red mixed mica and iron ore, which was mined by Tswana speaking groups from the region. According to Beaumont and Thackeray (1981) the locals besprinkle themselves with this powder after besmearing themselves with grease or fat, which gives their bodies a reddish shining colour (Beaumont and Thackeray, 1981).

The site was further investigated in the early 1805 by H Lichtenstein and later in 1812 by Williem Burchell who maintained that several Tswana people lost their lives after the mine roof collapsed down while they were busy extracting ochre, He further maintained that incidences like this shows that there was no control of the mining activities in the area, entrance into the mine was open to every individual without restrictions. Investigations shows that the floor of the cave was scatted with animal bones, with sections of heath remains, an indication that fire was used possibly as the source of light inside the cave. Records also show that the cave was also used as refuge shelter during the time of war and there is evidence that suggest that san communities as well as wild animals used to stay inside the cave (Ibid 1981).

The area was regarded as the Mecca to the Karroo region some travel from far to obtain fresh supply of the shining powder. By 1840s and 1850s Dutch had reached parts of the study area resulting in the establishment of the ZAR Republic. During that time they came into contact with African tribes for example the Korana pastoralist and the San communities. It is these contacts that brought with it genocidal attacks on the San Communities within the Karoo. The San communities specifically the Xam! Language speaker who inhabited the Karoo region responded to whites' invasion. They armed themselves and resisted against whites inventions. However the San lost their land in this conflict as long as their language they ended up being incorporated into the colonial society. Some of them were employed within the farms working for whites as shepherds, laborers and domestic workers (Parkington etal, 2008). Many of these farms have been in the ownership of Dutch families for generations. As a result, they possess a large corpus of information with regarding to the area and its history. A significant number of battles and skirmishes took place and were famously chronicled in the Anglo Boer war in the region. The remains of blockhouses can be found on many ridges and at river crossings (Van Schalkwyk, 2011).

8. SITE LOCATION AND PROJECT DESCRIPTION

The proposed study area is situated approximately 8 kilometers West of Welkom central business district situated on the portion of portion 26 of the farm Bryan 561. The site

borders the Sand River towards the south. The farm is currently used as livestock grazing camps. The proposed study area covered approximately 5 hectares of land located at GPS co-ordinates (GPS S28° .07 ' , 08.02" & E 26° .42'.45 .04"). The proposed area is already a disturbed site characterized by large open area where sand extraction has been previously conducted.

The dominant geology of the study area varies considerably from deep sand to clayey (but mostly coarse sand) dominated by alluvial sediments characterized by Oakleaf, Dundee and shortland. The dominant vegetation occur alongside the alluvial drainage lines and floodplains and along river embedded within the grassland biome and marginal units of the savanna biome. This type of vegetation has been recorded along the Upper Riet, Harts, upper Modder, upper Caledon, Vet, Sand, Vals Wilge, Mooi, Middle and upper Vaal River and numerous tributaries. This vegetation occurred in flat topography supporting riparian thickets mostly dominated by *Acacia Karroo* accompanied by seasonally flooded grassland and disturbed herb lands often dominated by alien plants (Werger, 1978, Thomas & Shaw 1991, Mucina & Rutherford, 2006). The vast area of study is still covered by natural vegetation characterized by sparse, patchy grass and sedge land. Some of the common dominant grass species include (*Acacia Karroo*, *Salix mucronata*, *Ziziphus mucronata*, *Rhus lancea*, *Gymnosporia buxifolia*, *Rhus pyroides* with *Reeds beds dominated by Phragmites australis* (Mucina & Rutherford, 2006). The proposed development entails:

- ✓ Mining of sand on the property.



Figure 1: View of the study area, not isolated shrubs and bush



Figure 2: Surface sand stockpiled in the property

9. ASSESSMENT OF SITES AND FINDS

This section contains the results of the heritage site/find assessment. The phase 1 heritage scoping assessment program as required in terms of the section 38 of the National Heritage Resource Act (Act 25 of 1999) done for the proposed Sand mining activities on portion 26 of the farm Bryan 561.

There are no primary or secondary effect at all that are important to scientist or the general public that will be impacted by the proposed project activities.

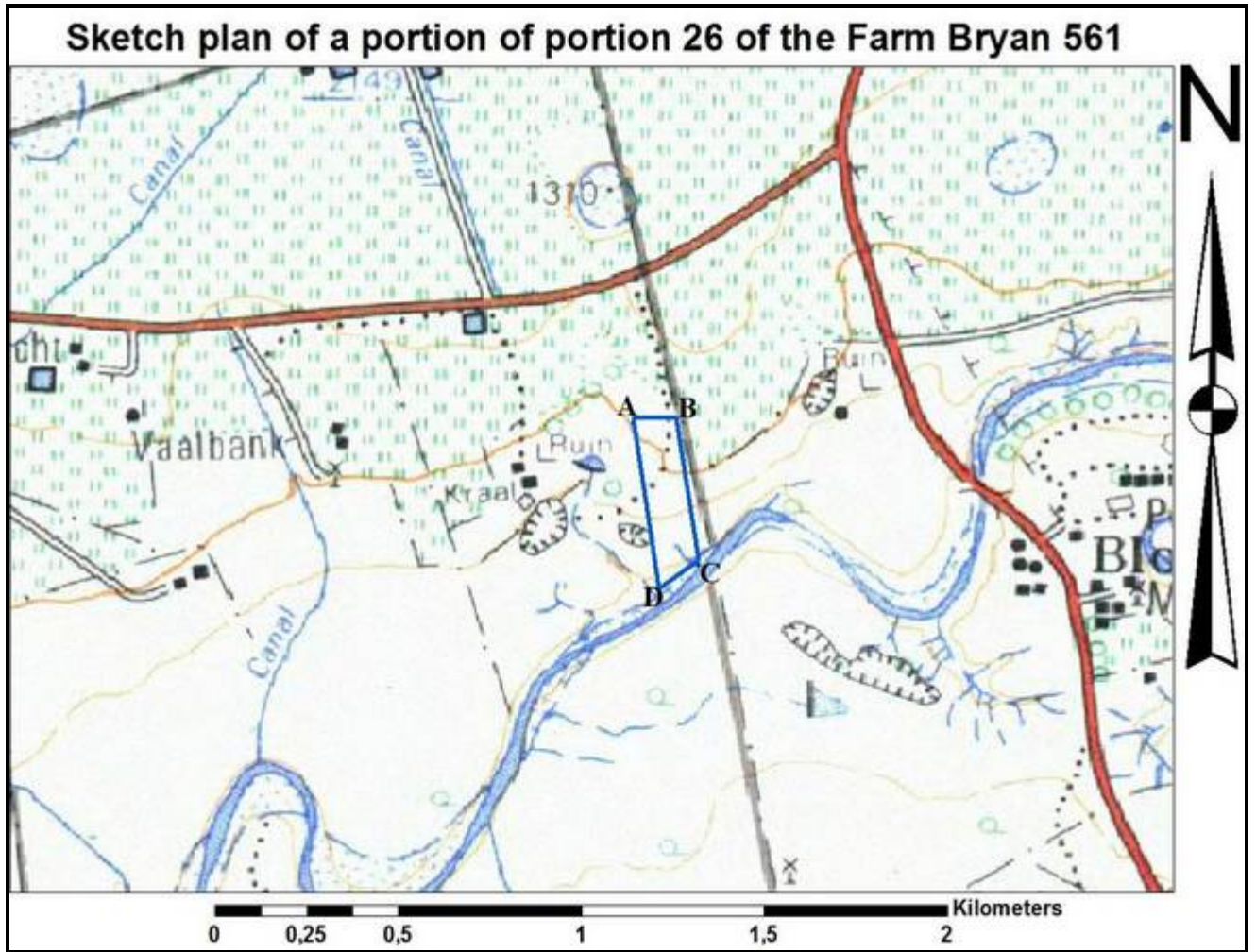
<i>Heritage Significance:</i>	No significance
<i>Impact:</i>	Negative
<i>Impact Significance:</i>	None
<i>Certainty:</i>	Probable
<i>Duration:</i>	Permanent
<i>Mitigation:</i>	A

10. CONCLUSION AND RECOMMENDATIONS

The phase 1 Archaeological Impacts Assessments for the proposed sand mining rights on portion 26 of the farm Bryan 561 revealed no heritage resources within the proposed development foot print.

No further studies / Mitigations are recommended given the fact that within the proposed development footprint and its surrounding there is no archaeological or place of historical significance that will be impacted by the proposed sand mining activities. However, should any chance archaeological or any other physical cultural resources be discovered subsurface, heritage authorities should be informed. From an archaeological and cultural heritage resources perspective, there are no objections to the proposed sand mining activities and we recommend to the Provincial Heritage Resource Agency, South African Heritage Resource Agency to approve the project as planned.

11. TOPOGRAPHICALMAP AND SITE LAYOUT PLAN



PROFESSIONAL DECLARATION

I, the undersigned Mr. Ndivhuho Eric Mathoho hereby declare that I am a Professional archaeologist accredited with the Association for South African Professional Archaeologists (ASAPA) and that Millennium Heritage Group (Pty) Ltd is an independent Consultants with no association or with no any other interest what so ever with any institution, organization, or whatever and that the remuneration earned from consulting work constitute the basis of company livelihood and income.

Mr. Mathoho Ndivhuho Eric



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Archaeologists and Heritage Consultants for Millennium Heritage Group (Pty) Ltd
ASAPA Member

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