APPLICATION REFFERENCE NUMBER:

Environmental Planning
and Impact Assessment Specialists

Together, for Better Roads

BASIC ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR

MINING OF A BORROWPIT NO.1

ON THE REMAINING PORTION OF FARM GREATER GIYANI 891 LT:

MATERIAL SOURCING FOR PROJECT NO. RAL/T825/2018- DESIGN AND CONSTRUCT 3KM OF ROAD D3810 FROM THOMO TOWARDS KHAKHALA

MOPANI DISTRICT

In terms of the National Environmental Management Act, 1998 and the Mineral and Petroleum Resources Development Act, 2002, in respect of listed activities that have been triggered in terms of the Environmental Impact Assessment Regulations, 2014, as amended

Applicant

Roads Agency Limpopo SOC Ltd

26 Rabe Street

Private Bag X 9554

POLOKWANE

0700

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mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

MINING OF A BORROWPIT NO.1

ON THE REMAINING PORTION OF FARM GREATER GIYANI 891 LT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT 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:	Roads Agency Limpopo SOC Ltd (RAL)
TEL NO:	015 291 4236
FAX NO:	086 535 6159
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FILE REFERENCE NUMBER SAMRAD:	TBC

mineral resources
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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 others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms 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 authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the 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 Authorisation 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–

1. 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;
2. identify the alternatives considered, including the activity, location, and technology alternatives;
3. describe the need and desirability of the proposed alternatives,

4. 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 sites and the risk of impact of the proposed activity and technology alternatives on the 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—
      (aa) can be reversed;
      (bb) may cause irreplaceable loss of resources; and
      (cc) can be managed, avoided or mitigated;

5. 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.

PART A
SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

3 CONTACT PERSON AND CORRESPONDENCE ADDRESS

A. DETAILS AND EXPERTISE OF THE EAP

I. Details of the EAP

NAME OF THE PRACTITIONER:	Percy Mhinga of P Enviro Holdings cc
TEL NO:	082 574 6815
FAX NO.:	086 535 6159
EMAIL ADDRESS:	mhinga@penviro.co.za
II. Expertise of the EAP **i. THE QUALIFICATIONS OF THE EAP** (with evidence)	BSc. Environmental Management and Botany; BSc. (Hons) Environmental Management and Analysis. Registration Process Pr.Sci.Nat: with the South African Council for Natural Scientific Professions (Registration Number: T16259/XX)
ii. SUMMARY OF THE EAP'S PAST EXPERIENCE	Percy Mhinga completed his BSc (Hons) at the Rhodes University in environmental management and analysis with a specific focus on soil and rehabilitation. His interests lie within waste and water management, mining developments and rehabilitation projects. Since 2006 he has been involved in a variety of projects including the establishment of commercial and industrial projects, infrastructure development with a specific focus on waste water treatment sites and road upgrades, mining developments and renewable energy projects throughout most of South Africa. His experience involves the compilation, revision, coordination and management of Basic Assessment Reports, Scoping Reports, Environmental Impact Assessments, Environmental Management Programmes, Integrated Water Use License Applications, Integrated Water and Waste Management Plans, Maintenance Management Plans and audit reports, inclusive of the public participation process.

B. LOCATION OF THE OVERALL ACTIVITY

BORROW PIT	
FARM NAME:	Remaining Portion of Farm Greater Giyani 891 LT
APPLICATION AREA (HA):	5.0ha
MAGISTERIAL DISTRICT:	Mopani District
DISTANCE AND DIRECTION FROM NEAREST TOWN:	15km north-East of Giyani
21 DIGIT SURVEYOR GENERAL CODE:	T0LT00000000089100000

C. LOCALITY MAP

The locality map for the borrow pit is attached in APPENDIX 1:

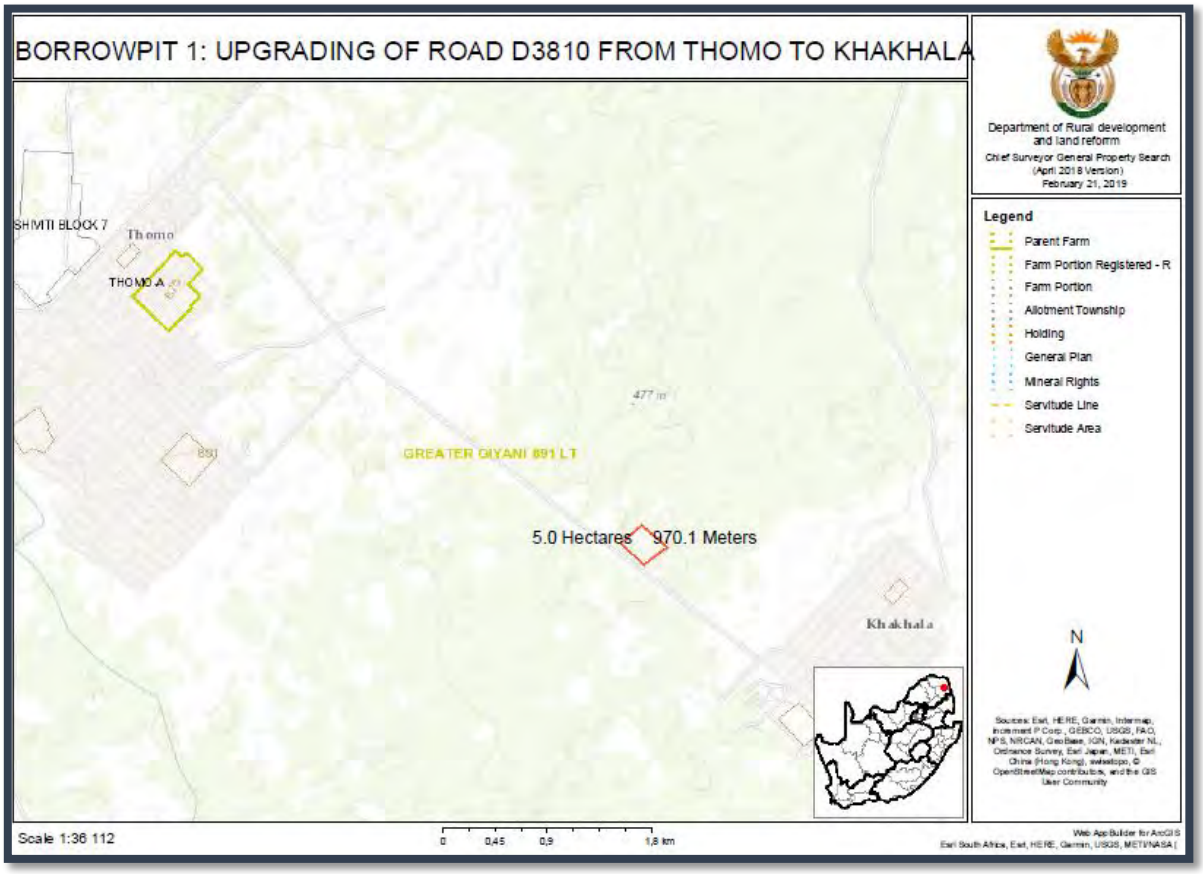

Figure 1: Locality Map of the Proposed Borrowpit Area

D. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

Roads Agency Limpopo has identified material sources for the upgrading of gravel to tar of road D3810 between Thomo Village and Khakhala Village in the Mopane District. As part of this project, borrow pit has been identified along Road D3810 at the **location: 23°15'47.54"S 30°49'53.62"E** (the road Linking Thomo and Khakhala), about 15km north East of Giyani Town (Figure 1 indicates the location of the borrow pit). The borrow pit is proposed to be used as a strategic material source for the Construction 3km of Road D3810 From Thomo Towards Khakhala, Phase A: Improvement Of The Structural Capacity To The Pavement Layers And Phase B: Upgrading Of Gravel To Bituminous Surface, and would be in operation for a period between five (2) and five (5) years. It is likely that the borrow pit would be dormant for extended periods within this timeframe, as the materials would be used in line with the Roads Agency implementation plan for the construction of entire Road Section of Road D3810.

Figure 2 shows the proposed layout of the borrow pit and laydown areas within the fenced site. The borrow pit will be established over the following lease area:

ID,Lat,Long

1. -23.262551°,30.830054°
2. -23.263807°,30.830556°
3. -23.264151°,30.833151°
4. -23.263619°,30.834333°
5. -23.262810°,30.832881°

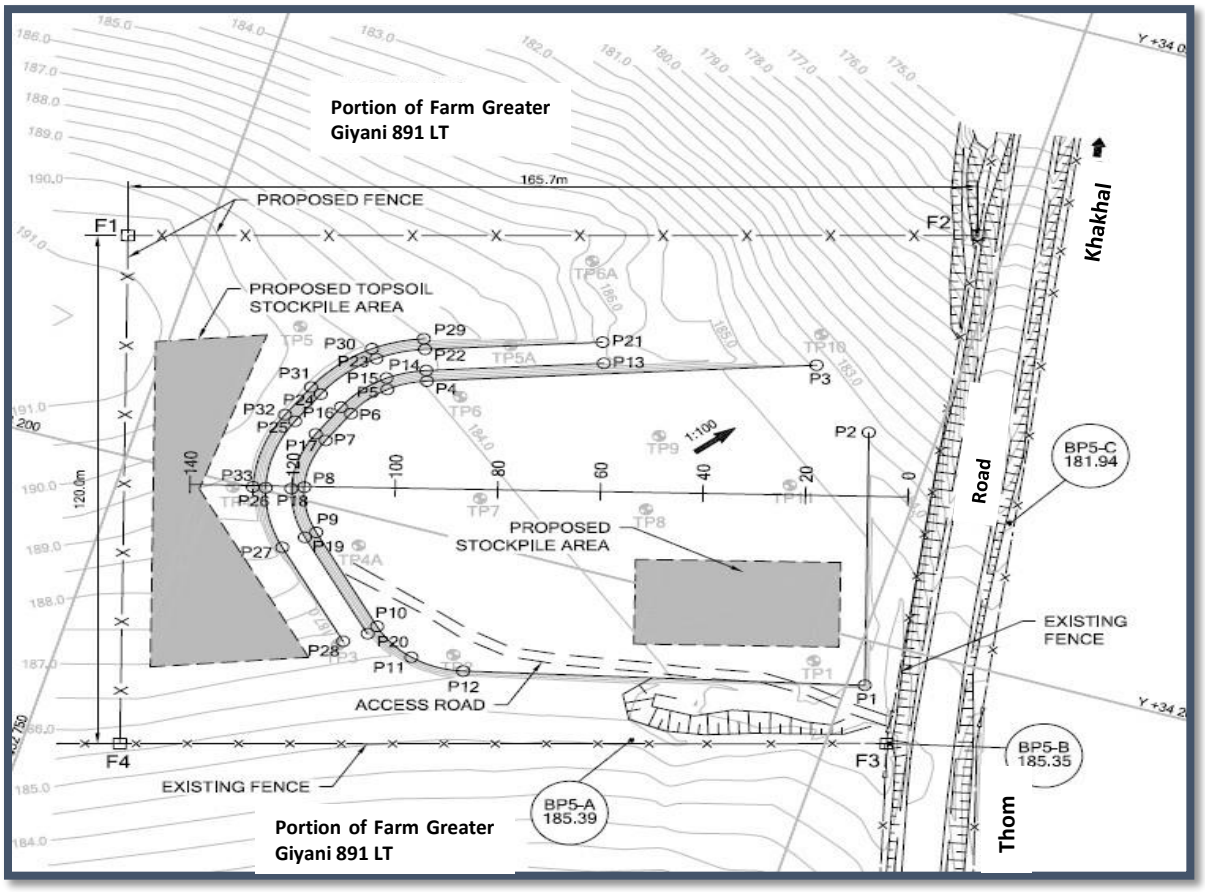

Figure 2: Proposed Layout of Borrowpit and Extract of the mining Plan

The table below shows listed activities that are triggered in terms of NEMA: EIA Regulations 2014, as amended, for the borrow pit.

(i) Listed and specified activities			
NAME OF ACTIVITY **(E.g. For prospecting - drill site, site camp, ablution 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 boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.)**	**AERIAL EXTENT OF THE ACTIVITY HA OR M^2**	**LISTED ACTIVITY Mark with an X where applicable or affected.**	**APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)**

Site camp[1], incl. ablution facilities, waste management facilities, material and equipment storage, etc.	Not defined, will be within the fenced off 5.0ha site	Activity 21	LN 1
Excavations / mining activities	4.8ha	Activity 21	LN 1
Blasting	Up to 0.86ha	Activity 21	LN 1
Crushing	Up to 0.86ha	Activity 21	LN 1
Soil and material stockpiles	0.2ha	Activity 21	LN 1
Stormwater control measures (e.g. berms / cut-off drains)	Minimal new structures	Activity 21	LN 1
Vegetation clearance, including vegetation search and rescue	Up to 5.0ha	Activity 27	LN 1
Decommissioning and rehabilitation	5.0ha	Activity 22	LN 1

(ii) Description of the activities to be undertaken

The mining and related activities would be undertaken by the appointed contractor (implementing agent) while the Engineer and Roads Agency Limpopo would provide oversight and financing (financing agent). It should be noted that although the material from the borrow pit is to be used for road construction, the road related activities are not being applied for and as such are not described in this report.

Site establishment and mining:

The following mining related activities will be undertaken:

- Site preparation would commence with fencing all working areas prior to commencement of mining, and all work shall be confined in the fenced area.
- The site camp would include ablution facilities, waste management facilities, a laydown area for equipment and machinery storage, etc. However, it should be noted that the Contractor may decide to use a central site camp area away from the borrow pit for both the mining activities and road construction activities.

[1] Note that the site camp is only applicable to the borrow pit and not to any activities related to the associate road maintenance, and or upgrade.

- Excavations/mining activities will be undertaken by benching the area to be excavated, starting from the highest level, forming the topmost bench and working progressively down toward the pit floor. Materials are to be mined using a dozer with a ripper (if necessary) and a front-end loader. Grid rolling might be required to break down the material to the required grading.
- Any occurrence of protected plant species within the fenced areas shall be transplanted prior to mining operations commencing. Indigenous vegetation removed during topsoil stripping shall be mulched and stored separately for topsoil stabilisation and rehabilitation purposes.
- Stripped topsoil, after removal of vegetation, shall be stockpiled separately in the designated areas indicated on the mine plan and according to the requirements of the Environmental Management Plan (EMP).
- Access to the borrow pit from Road D3810 shall be confined to the existing entry point.
- Dust control measures shall be implemented to minimise impacts on the surrounding environment.
- Stormwater control measures have been included in the mine plan and rehabilitation plan, for the prevention of ponding during mining and after rehabilitation.

The material to be mined is slightly moist, light red brown laminated cobbles/gravel, underlain by residual shale. It is suitable as gravel wearing course and occurs in layers of approximately 1.30m thick. The underlying residual shale, lying at 1.50m and deeper, can potentially also be used as gravel wearing course.

Mining dimensions and quantities are as follows:

- Total area to be fenced: 5.0ha
- Proposed mining area: 4.8ha
- Proposed stockpile area: 0.2ha
- Depth of topsoil to be removed: approximately 200mm
- Bench slopes to be 1:1 (V:H)

- Borrow pit floor to be sloped at 1:100 (V:H) to allow free drainage
- Total topsoil/overburden to be removed: ±1 720m³
- Total gravel wearing course material to be removed: ±18 360m³

Decommissioning and rehabilitation:

The landowner has indicated that the end land-use would be the same as the current land-use, i.e. communal borrowpit and agriculture (grazing). As such, the decommissioning and rehabilitation of the borrow pit will be undertaken to ensure viability of this land use. The following activities will be undertaken on completion of the mining activities, and in line with the rehabilitation plan attached in APPENDIX 2::

- Rehabilitation would commence only once the mining of each section of the borrow pit has been completed in its entirety.
- Rehabilitated slopes would be battered at 1:3 (V:H), using remaining material and overburden.
- Topsoil shall be uniformly spread across the disturbed area. Where necessary, the topsoil shall be protected using a biodegradable erosion control blanket.
- The disturbed area shall be re-vegetated via hydroseeding.
- The fence around the borrow pit area shall remain in place until vegetation has been successfully reestablished to prevent any disturbances and potential erosion to the rehabilitation process.
- The borrow pit area shall be monitored after completion of rehabilitation (refer to Table 4 in the EMP for monitoring requirements) by a suitably qualified person/specialist to ensure the successful reestablishment of vegetation and identification of any re-established alien vegetation.
- Any alien vegetation that re-establishes after the rehabilitation phase and during the maintenance period shall be removed.

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 COMPLIY 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, 1998 (Act No. 107 of 1998), as amended (NEMA), and Environmental Impact Assessment (EIA) Regulations, 2014, as amended	Listed Activities in terms of the EIA Regulations of 2014, as amended, are triggered by the proposed mining activities	Application is being made for Environmental Authorisation to enable mining of the borrow pit. This report contains the information required for the Competent Authority to make an informed decision
NEMA: Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, 2015, as amended	See Section 2.2. of the Environmental Management Programme (EMP)	Financial provision for the borrow pit has been determined in line with the requirements of the regulations
Mineral and Petroleum Resources Development Act, (Act No. 28 of 2002), as amended (MPRDA), and Mineral and Petroleum Resource Development Regulations, 2004, as amended thereunder (MPRDR)	Material sourcing for the upgrading of gravel roads	The MPRDA describes the requirements for the undertaking of mining and related activities. The applicant is exempt from having to apply for a mining permit

Government Notice (GN) R762 of 2004	Exemption of organs of state is applicable to the mining permit and mining right application processes for organs of state	The applicant is not applying for a mining permit or mining right as they are an exempted organ of state
Mine Health and Safety Act, 1996 (Act No. 29 of 1996), as amended	Generally applicable to all mining operations for the safe conduct during mining and related activities	The project will have a Health and Safety Officer monitoring relevant health and safety considerations at the borrow pit
National Heritage Resources Act (Act No. 25 of 1999)	A Notification of Intent to Develop (NID) was submitted to heritage Resources Agency (SAHRA) – see Section 1.3	The NID for the borrow pit was submitted to SAHRA
Integrated Environmental Management (IEM) Guideline Series	IEM was applied throughout the process	The relevant guidelines have been consulted to inform the application process, consultation, and document compilation
Provincial Spatial Development Framework (PSDF), 2014	The PSDF provides guidance on the required compliance with policies regarding land use change, infrastructure development and environmental resource protection	The PSDF was consulted to identify spatial development requirements for the borrow pit area

Municipality Integrated Development Plan (IDP)	The IDP is the municipality's principal strategic plan that deals with the most critical development needs of the municipal area	The IDP was consulted to identify development priorities. Measures for addressing these priorities have been included in this report as far as possible
Municipality Spatial Development Framework (SDF)	The municipal SDF provides guidance in terms of compliance with policies with a focus on the specific affected area	The SDF was consulted to identify spatial development requirements for the borrow pit area
Spatial Planning and Land Use Management Act (Act No. 16 of 2013), and Greater Giyani Land Use Planning Act (Act No. 3 of 2014), and Municipal bylaws on land use planning	Changes in land use from natural areas to mining	Application will be made to the local authority for a temporary change in land use for the duration of the borrow pit life

F. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

The proposed borrow pit would supply material needed for the construction and/or maintenance of the road at Thomo, specifically between Thomo and Khakhala. A large number of the gravel roads in this area have not undergone maintenance or construction in the past 10 to 20 years, and as such are in need of improvement to ensure that adequate road infrastructure is provided. The Roads Agency has identified the particular Road section as part of the presidential project after much desired request by the local community. As such the road section was identified the most urgent road to be constructed/ maintained, for which the borrow pit being applied for would provide the necessary road building material.

G.	MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES AND TECHNOLOGY ALTERNATIVE

- The borrow pit site has been selected out of a large survey of similar sites in the region, which were unsuitable for various reasons.
- Mining of material source is the only activity considered as material is required for the road construction.
- Technology alternatives for the borrow pit refers to different mining methods. The methods to be used have been determined in the design phase and have taken potential environmental impacts into consideration when identifying the preferred methods.

H.	FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVES WITHIN THE SITE

Consultation with the affected landowner determined the location of the borrow pit on the relevant property, as well as the layout of the excavation, infrastructure and activities. Engineering designs for the mine plan and rehabilitation plan were discussed with the EAP, specialists and the landowners, to ensure optimal placement of the mining and related infrastructure. Alterations were made to the original design, where necessary.

i. Details of the development footprint alternatives considered

(a) The property on which or location where it is proposed to undertake the activity

Alternative borrow pits and/or locations within close proximity to the proposed borrow pit were identified during the borrow pit determination process (see Figure 3). The following alternatives were considered with relevant reasons provided for why they were not preferred.

- **BP 1** is directly opposite the road and is the proposed borrow pit and would have a similar environmental impact. The material has sufficient strength and has been largely mined out. The proposed borrow will extend northerly to excavate better and greater quantity of required material.
- **BP 2** is a previously mined excavation, located within agricultural fields and adjacent to a watercourse. This alternative was discarded after the environmental screening phase due to the negative impacts that would arise on the biophysical environment. Re-using a rehabilitated borrow pit would result in additional environmental impacts. The borrow pit is also located immediately adjacent to the village of Gaula, which could result in negative social impacts.

It is preferable to use the proposed borrow pit as the material to be extracted from it is suitable as gravel wearing course for construction to the road. Not all areas investigated as part of the project had material of the same quality or suitability for the proposed road. As such, only one site is being further assessed as part of this process.

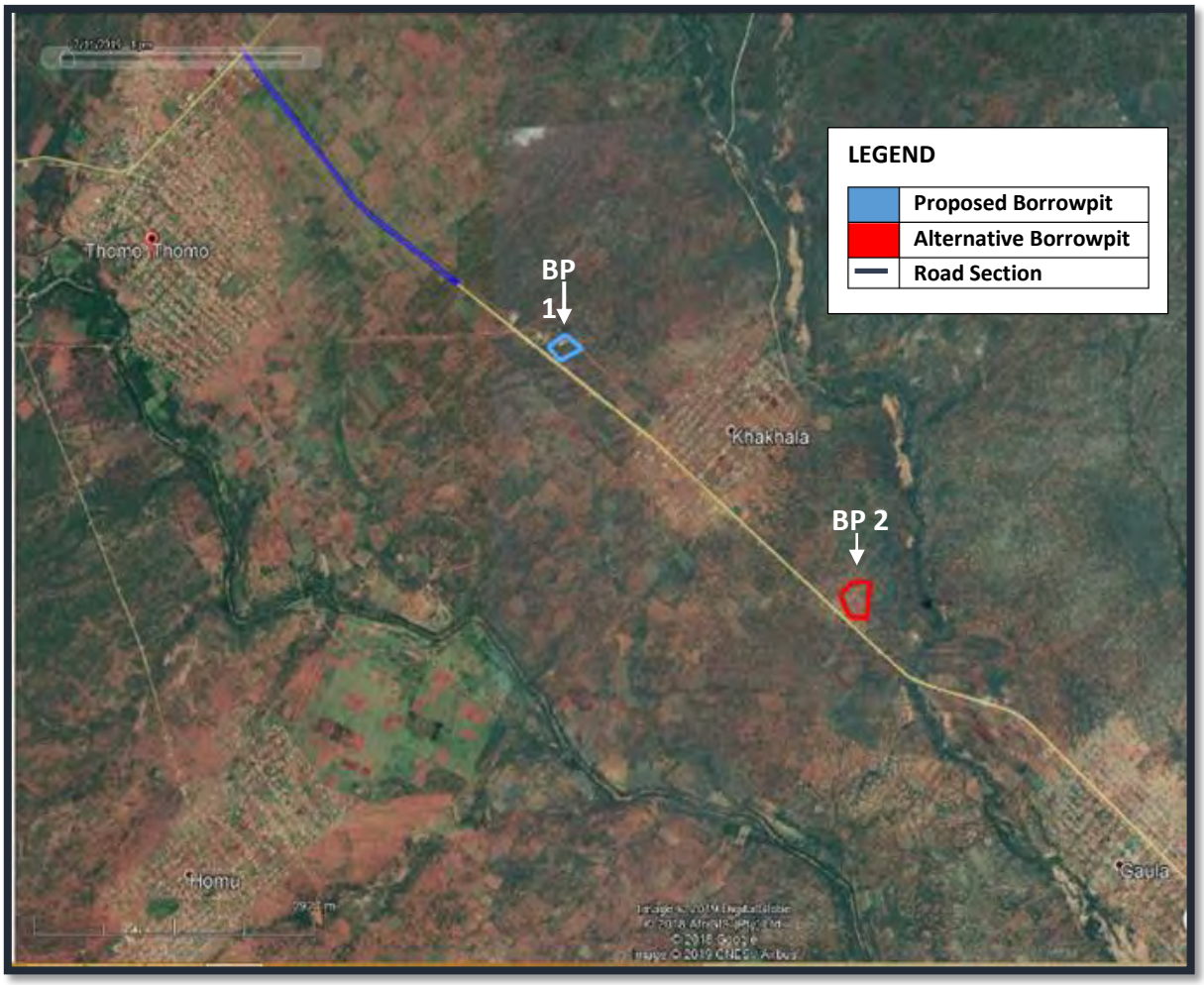

Figure 3: Alternative borrow pit locations (Google Earth, 2019)

(b) The type of activity to be undertaken
The need for material sources defines the type of activity to be undertaken, i.e. mining. As such, no activity alternatives were identified.
(c) The design or layout of the activity
An initial design was undertaken by the project engineer based on the availability of suitable material. Test pits were excavated to test the viability and type of material at the borrow pit. The EAP, specialists and the landowner had an opportunity to review and comment on the proposed layout, and to request changes based on environmental or landowner requirements. No requirements have been identified that necessitated an alternative layout to be developed.

(d) The technology to be used in the activity

Technology for the mining and related activities is linked to methodology, and is described under the operational aspects.

(e) The operational aspects of the activity

No viable alternatives for operational aspects of mining were identified. However, the following operational aspects will be undertaken:

- All work will be limited to the fenced-off mining area indicated on the mine plan. Fencing will remain in place until the monitoring period has been completed.
- Operations will be undertaken in a manner that results in a single occurrence of disturbance over the entire area, allowing for more efficient extraction of resources.
- Topsoil stockpiles would be allowed to revegetate and reseed throughout the mining period, allowing the seedbank to replenish before further disturbance.
- Dust generation, noise impacts, stormwater and erosion would be managed through implementation of the EMP.
- It is proposed to use a dozer with a ripper (if necessary) and a front-end loader, allowing controlled disturbance of smaller areas at a time.

(f) The option of not implementing the activity

The alternative of not using the borrow pit is not preferable, due to the existing poor conditions of gravel roads in the surrounding areas. Should the borrow pit not be approved, the condition of the gravel roads in the area would continue to deteriorate. The roads provide much needed access for local landowners, and for the community who demanded the service delivery request. As such, poor roads have a knock-on effect on the economy. Furthermore, should material source not be approved, the contractor would need to obtain material from commercial sources, at a great expense, and long-haul distances would result in a large carbon footprint and further deterioration to roads. This would ultimately make the construction projects very expensive and potentially unfeasible.

ii. Details of the Public Participation Process Followed

1. OVERVIEW OF THE PPP UNDERTAKEN

A. Identification of I&APs and compilation of the I&AP database

An I&AP database has been opened and will remain open for the duration of the project. The database will be continually updated as new I&APs register. The I&AP database was compiled through consultation with the directly affected landowner and the local municipality, and consists of (where known) individuals who have expressed interest in the project, local interest groups, landowners and occupiers adjacent to the site, Municipal Ward Councillors, and other State Departments and Organs of State.

B. Written Notifications

i. Media advertisements

In accordance with the EIA Regulations 2014, as amended, an advertisement was placed in one local newspaper Mopane Herald running from Friday 08 March to 08 April 2019.

Site notices

A site notice was placed in plain view of the general public at the borrow pit. The site notice was placed on 14 Feb 2019

ii. Notification of I&APs

All registered I&APs, inclusive of relevant Organs of State, were notified via a notification letter. The letter outlined details of the activity, legal requirements and invited them to comment on the BAR and EMP.

iii. Public Participation Meeting

A public meeting Held on 27 Feb 2019 with the local community and Khakhala Royal Council where a unanimous support of the mining of the borrowpit was received without any objections or other comments as the mining of the borrowpit is required for the success of the construction of the Road D3810 which was demanded by the by the community

2. AVAILABILITY OF THE BAR AND EMP FOR COMMENT

The BAR will be made available for a 30-day public review and comment period from 01 March to 03 April 2019.

The BAR and EMP was simultaneously distributed to State Departments and Organs of State (see APPENDIX 6:) who would be affected by the activity.

For information on the public participation process, refer to Appendix 5. Table 1 lists the identified I&APs and contact persons. Since no comments were received from the pre-application public participation, no comments from I&APs are available for inclusion in the BAR. After the 30-day comment period, a Comments and Reponses Report (CRR) will be compiled, and submitted along with the BAR and EMP to DMR for decision making. Should input from I&APs necessitate an amendment of the BAR, the report will be revised and released for a further 30-day commenting period before being submitted to DMR for review and decision-making.

III. Summary of issues raised by I&Aps

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	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.
AFFECTED PARTIES					
Landowner/s	X				
Lawful occupier/s of the land					
Landowners or lawful occupiers on adjacent properties	X				
Municipal councillor	X				
Municipality	X				
Organs of state (Responsible for					

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	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.
infrastructure that may be affected Roads Department, Eskom, Telkom, DWA e					
Communities					
Dept. Land Affairs					
Traditional Leaders					
Dept. Environmental Affairs					

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	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.
Other Competent Authorities affected					
OTHER AFFECTED PARTIES					
INTERESTED PARTIES					

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	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.

IV. The Environmental attributes associated with the alternatives

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

1. Baseline Environment

(a) Type of environment affected by the proposed activity

General description of the affected environment (information extracted from specialist reports attached in APPENDIX 5:,

Geography, geology and soils:

The site falls within the Giyani Group, previously known as the Sutherland greenstone belt. It crops out within the Goudplaats Gneiss from Shangoni eastwards. The soils typically have a marked clay accumulation and are strongly structured. The underlying rock includes ultramafic schists, and amphibolite with interbedded banded ironstone. Weathers surfaces are brown to blackish. The rock consists of alternating quartz – and iron-rich bands, and the individual bands.

Climate:

The climate of the area includes summer rainfall with very dry winters. The Mean Annual Rainfall is about 400 – 600 mm with infrequent frost in winter. The chart below shows the average rainfall values for Giyani per month. It receives the lowest rainfall (0mm) in June and the highest (95mm) in January. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Giyani range from 16.9°C in June to 26°C in January. The region is the coldest during June when the mercury drops to 9.3°C on average during the night. Consult the chart below for an indication of the monthly variation of average minimum daily temperatures.

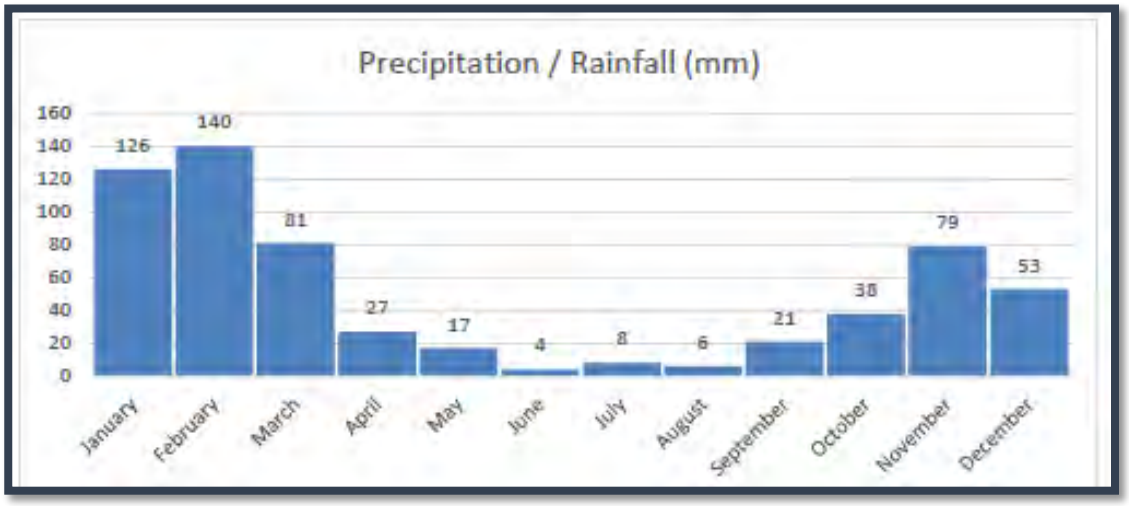

Figure 4: Climate diagram for Giyani

Vegetation:

The site appears to be present within a single vegetation unit, although it is described by Mucina and Rutherford (2006) as Lowveld Rugged Mopaneveld vegetation unit.

The on-site vegetation is relatively completely transformed and is predominantly degraded to no ground cover in some areas, However intact and good ground cover with bush clumps. Where there are still patches of ground cover, this is dominated by tree cover with well-developed canopy and the grass strata is well developed. The site is surrounded settlement and existing road itself. The area is extensively utilised, not only for communal livestock grazing but for intensive long-term transformation for agricultural activities, harvesting of other natural resources such as fuel wood and timber. The vegetation is thus of a degraded nature, with diversity being poor. The presence of some weedy species was noted, and is most likely due to its proximity to settlement areas and other disturbances. None of these were at high densities or especially invasive.

Floral diversity is low, and completely transformed due to extensive utilisation and degradation, with just a grass cover.

Freshwater:

The project occurs on lowlands and at the bottoms of valleys/plateaus of the Letaba catchment and Shingwedzi River and act as areas of natural drainage. The road crosses natural drainage lines (watercourses) at two distinct areas at about 2.5 Km and 3.7Km respectively. An artificial erosion gully has also formed towards the end of the road, as a result of the road interception of natural flow.

Neither the wetlands nor the tributaries would be affected by the proposed borrow pit.

Heritage:

The heritage specialist did not identify any items or structures of heritage value on or in the vicinity of the site.

Socio-economic and cultural aspects:

According to the 2018-2019 Greter Giyani Municipality IDP, Thomo is identified an important development node with routes connecting Giyani Town and the Kruger National Park (Shangoni Gate), however the developments noted are all tart. There is still a need to unlock economic potential activities within the identified nodes. The municipality is to develop a Master plan that will assist in mobilizing funding and attracting investors in the Nodes. The construction of Road D3810 is identified as a priority project in support of the nodal development

(b) Description of the current land uses

The proposed borrow pit site is largely currently used for grazing and excavation/mining by the local community. The area surrounding the proposed borrow pit consists of dryland and irrigation agriculture, as well as small stock grazing. Various services infrastructure identified on item c below transverses the site within 500m of the borrowpit site.

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

The proposed borrow pit site is in a natural but degraded condition. Within 500m buffer of the borrowpit, the Road D3810 transverses the southern boundary of the borrowpit and a dilapidated farm Yard is situated on the northern boundary. On the opposite side of the road runs a bulkwater main pipeline parallel to the Eskom-powerlines trans versing to Khakhala village. The powerlines intersect to connect with a sub-station located 300m from the borrowpit.

Figure 5: Infrastructure located within 500m of the proposed borrowpit

(d) Environmental and current land use map.

Figure 6: Land use map showing historical borrow pits, natural vegetation and cultivated agricultural land (Google Earth, 2019)

V. Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be mitigated

This section identifies the potential impacts. For details on the assessment of these impacts, inclusive of the significance, probability, and duration of the impacts, as well as 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, refer to Table 3

- Impact on indigenous vegetation;
- Erosion and loss of soil;
- Dust and noise nuisances;
- Land-use impacts;
- Impact for landowner, surrounding land-users and road users; and
- Socio-economic impacts.

VI.	*Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks*
Refer to APPENDIX 7: for the detailed breakdown of the impact assessment criteria used in this report.	
VII.	The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected
No alternative site layouts were identified or recommended by the specialist studies. The proposed site and layout would ensure that the maximum amount of available material can be extracted, while minimising the extent of disturbance.	
VIII.	The possible mitigation measures that could be applied and the level of risk
A summary of site-specific mitigation measures in response to identified concerns / potential issues and specialist input for the borrow pit includes the following (refer to APPENDIX 8:): Undertake invasive alien vegetation monitoring and removal as and when needed during the operational and decommissioning phases. Rehabilitate by means of hydroseeding and allowing the site to reach an equilibrium over time. Fence the area so that no livestock can enter the rehabilitated area in the early stage of restoration to prevent erosion.	
IX.	Motivation where no alternative sites were considered
Site alternatives considered are described in section 2.	
X.	Statement motivating the alternative development location within the overall site
The landowner did not have any issues with the location or the proposed layout of the borrow pit. No alternative site layouts were identified or recommended by the specialist studies.	

I.	FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) THROUGH THE LIFE OF THE ACTIVITY
Refer to APPENDIX 7: for a description of the criteria used to assess and identify impact significance. Table 3 provides a description of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	

J. ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

Table 1: Assessment of potential impact significance

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACTS	EXTENT, DURATION, INTENSITY AND PROBABILITY	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE	MITIGATORY POTENTIAL	SIGNIFICANCE IF MITIGATED	DEGREE OF REVERSIBILITY AND IRREPLACEABILITY OF A RESOURCE
CONSTRUCTION AND OPERATIONAL PHASES								
Vegetation clearance	Indigenous vegetation	Loss of Lowveld Rugged Mopaneveld	Extent: Local Duration: Long Intensity: Very low Probability: Definite	**Very Low**	• Removal and disposal of alien vegetation • Stripping, mulching and stockpiling indigenous vegetation • Revegetation during rehabilitation	Very low	**VERY LOW**	Reversibility: Not reversible due to very poor current condition of the veld Irreplaceability: Very low
		Loss of ecological processes	Extent: Local Duration: Long Intensity: Low Probability: Definite	**Low**		Low	**LOW**	Reversibility: Low Irreplaceability: Low
Topsoil stripping	Topsoil	• Loss of topsoil • Soil erosion	Extent: Local Duration: Long Intensity: Medium	**Medium**	• Follow correct topsoil stripping and stockpiling methods • Implement erosion control measures	Medium	**LOW**	Reversibility: Medium Irreplaceability: Low

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACTS	EXTENT, DURATION, INTENSITY AND PROBABILITY	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE	MITIGATORY POTENTIAL	SIGNIFICANCE IF MITIGATED	DEGREE OF REVERSIBILITY AND IRREPLACEABILITY OF A RESOURCE
			Probability: High					
Site camp[2], incl. ablution facilities, waste management facilities, material and equipment storage, etc.	• Vegetation • Soil • Visual	• Soil erosion • Visual impacts for the landowners, surrounding land- and road users	Extent: Local Duration: Medium Intensity: Low Probability: High	**Low**	• Effective solid waste management • Sufficient housekeeping • Appropriate materials management • Locate site camp in disturbed area as far as possible	Low	**VERY LOW**	Reversibility: None Irreplaceability: Medium

[2] Note that the site camp is only applicable to the borrow pit and not to any activities related to the associated road maintenance, construction and/or upgrade.

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACTS	EXTENT, DURATION, INTENSITY AND PROBABILITY	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE	MITIGATORY POTENTIAL	SIGNIFICANCE IF MITIGATED	DEGREE OF REVERSIBILITY AND IRREPLACEABILITY OF A RESOURCE
Excavations / mining activities, including blasting and/or crushing	• Road users • Vegetation • Visual	• Dust generation, affecting surrounding agricultural areas • Noise nuisance	Extent: Local Duration: Medium Intensity: Very low Probability: High	**Very Low**	• Dust suppression • Regular maintenance of equipment and machinery	Low	**VERY LOW**	Reversibility: High Irreplaceability: Low
		• Reshaping of land – geomorphological and visual impacts	Extent: Local Duration: Permanent Intensity: Low Probability: Definite	**Low**	• Adequate reshaping of the borrow pit during rehabilitation	None	**LOW**	Reversibility: None Irreplaceability: Low
Material stockpiles	• Visual • Topsoil	• Dust generation • Visual impacts on surrounding land- and road users • Erosion • Topsoil sterilisation if topsoil is not stripped from affected area	Extent: Local Duration: Medium Intensity: Low Probability: Medium	**Very low**	• Dust suppression measures • Erosion control measures • Screening of stockpiles behind existing vegetation • Stripping of topsoil before stockpiling materials	Low	**NO IMPACT**	Reversibility: High Irreplaceability: Low

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACTS	EXTENT, DURATION, INTENSITY AND PROBABILITY	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE	MITIGATORY POTENTIAL	SIGNIFICANCE IF MITIGATED	DEGREE OF REVERSIBILITY AND IRREPLACEABILITY OF A RESOURCE
Subsoil and topsoil stockpiles	• Topsoil • Subsoil	• Loss of topsoil and subsoil through inadequate management or erosion • Contamination of topsoil • Alien vegetation proliferation	Extent: Local Duration: Medium Intensity: Medium Probability: High	**Low**	• Implement adequate subsoil and topsoil stockpiling methods and management • Prevent access of contaminants near topsoil stockpiles • Alien vegetation monitoring and management on topsoil stockpiles	Low	**LOW**	Reversibility: Low Irreplaceability: Medium
Job creation	HDI community members	Job creation leading to improved socioeconomic conditions for HDI community members and contractors	Extent: Regional Duration: Medium Intensity: Low Probability: Medium	***Low Positive***	Ensure that local HDI community members and contractors are employed as part of the contract	N/A	***LOW***	N/A

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACTS	EXTENT, DURATION, INTENSITY AND PROBABILITY	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE	MITIGATORY POTENTIAL	SIGNIFICANCE IF MITIGATED	DEGREE OF REVERSIBILITY AND IRREPLACEABILITY OF A RESOURCE
DECOMMISSIONING PHASE								
Decommissioning and rehabilitation	Land use	Reinstatement of land use potential	Extent: Local Duration: Permanent Intensity: Low Probability: High	***Low***	Restoration of the landform and removal of infrastructure to reinstate land use potential	N/A	***LOW POSITIVE***	N/A
	Subsoil and topsoil	• Incorrect replacement of topsoil and subsoil leading to poor reinstatement of the area • Erosion	Extent: Local Duration: Short to medium Intensity: Medium Probability: Medium	**Low**	• Ensure rehabilitation plan is followed • Implement erosion control measures • Monitor for erosion and remediate where necessary	Low	**VERY LOW**	Reversibility: Medium Irreplaceability: Medium
	Vegetation	Re-establishment of natural vegetation in the borrow pit	Extent: Local Duration: Short to medium Intensity: Medium Probability: High	***Low to Very Low Positive***	• Ensure adequate reseeding • Monitor reestablishment for two (2) years and remediate where necessary	N/A	***LOW POSITIVE***	N/A

NAME OF ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACTS	EXTENT, DURATION, INTENSITY AND PROBABILITY	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE	MITIGATORY POTENTIAL	SIGNIFICANCE IF MITIGATED	DEGREE OF REVERSIBILITY AND IRREPLACEABILITY OF A RESOURCE
	Alien Vegetation	Alien vegetation proliferation	Extent: Local Duration: Short Intensity: Medium Probability: Medium to high	**Low**	Monitoring and removal of alien vegetation for at least three (3) years after rehabilitation	Low	**LOW TO VERY LOW**	Reversibility: High Irreplaceability: Low
	Visual	Reinstatement of natural area – removing visual impacts	Extent: Local Duration: Permanent Intensity: Low Probability: High	***Low positive***	None	N/A	***LOW POSITIVE***	N/A

K. SUMMARY OF SPECIALIST REPORTS.

Table 2: Summary of specialist studies undertaken (refer to Appendix 4 for the full specialist reports)

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 THE REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Heritage Notice of Intent to Develop (NID) and Record of Decision (ROD) from Heritage Resources Agency	The NID indicated that the activities would not impact on heritage resources.	No recommendations were included in this report	N/A
Botanical study/Ecological Study	The botanist indicated that after material have been removed from the borrow pit, it should be shaped and the surface covered with a layer of sandy soil of at least 200mm deep. The area should then be hydro-seeded with commercially-available grass to establish a 'cover crop' i.e. vegetation that would prevent wind and water erosion. In the event of hydro-seeding not being possible, hand-sowing of grass seed should be implemented with light raking of the seed into the topsoil. The area should remain fenced during the early stages of rehabilitation to prevent livestock form entering the rehabilitated area and causing or exacerbating erosion. The rehabilitated area should be allowed to reach its own equilibrium over time. However, the site should be monitored to determine the success of revegetation over a 24-month period after excavation and	All recommended mitigation measures have been included in this report	Table 4

	rehabilitation has been completed. Monitoring should be undertaken for invasive alien vegetation for a three-year period after rehabilitation, and such species should be removed.		
Freshwater opinion	The freshwater specialist stated the following: Due to the distance of the proposed borrow pit from the aquatic features, the activities at the site are unlikely to impact on the flow and water quality in the watercourses. As such the proposed borrow pit is not seen as having potential to impede or divert flow in a watercourse, nor will it have the potential to change the bed, banks or characteristics of a watercourse. The impact of the proposed activities on the tributary is thus unlikely provided that the borrow pit is rehabilitated in line with the rehabilitation plan and EMP during the decommission phase of the project. No associated rehabilitation of the watercourse would be expected as part of this project.	No recommendations to include	N/A

L. ENVIRONMENTAL IMPACT STATEMENT

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

Key findings of the impact assessment are summarised below:

Impacts	Signification before mitigation	Significance after mitigation
Construction and operational phases		
Vegetation clearance (loss of Lowveld Rugged Mopaneveld)	**Very Low**	**VERY LOW**
Vegetation clearance (loss of ecological processes)	**Low**	**LOW**
Topsoil stripping (loss of topsoil and erosion)	**Medium**	**LOW**
Site camp (soil erosion)	**Low**	**VERY LOW**
Excavations / mining activities (visual impacts, dust generation and noise nuisance)	**Very Low**	**VERY LOW**
Excavations / mining activities (geomorphological impacts)	**Low**	**LOW**
Material stockpiles (visual impacts)	**Very low**	**NO IMPACT**
Soil stockpiles (Erosion, topsoil sterilisation, loss of soil, soil contamination, alien vegetation proliferation)	**Low**	**LOW**
Job creation (improved socio-economic conditions for HDI community members)	***Low***	***LOW***
Decommissioning Phase		
Land use reinstatement	***Low Positive***	***LOW POSITIVE***
Soil erosion	**Low**	**VERY LOW**
Vegetation (re-establishment of indigenous vegetation)	***Low to Very Low Positive***	***LOW POSITIVE***
Vegetation (alien vegetation proliferation)	**Low**	**LOW TO VERY LOW**
Reduction in visual impacts	***Low positive***	***LOW POSITIVE***

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.
Attached in APPENDIX 2:
iii. Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives
See Section J for a summary of the positive and negative impacts and risks of the proposed project. An assessment was not undertaken for the alternatives as these alternatives were not considered viable for further investigation or implementation.
M. PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR
Impact management objectives include the following: • Reduction or avoidance of detrimental environmental impacts. • Practical and implementable management and rehabilitation measures. • Rehabilitation of the affected areas to the agreed end land use. Refer to section K above for specialist recommendations providing the impact management outcomes which have been incorporated into the EMP.
N. ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION Any aspects which must be made conditions of the Environmental Authorisation
All mitigatory aspects have been included in the EMP. It is not deemed necessary to include any further specific measures in the Environmental Authorisation.

O. DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

Assumptions:

- This report was compiled based on the assumption that the applicant provided all information required to undertake a complete an accurate assessment.
- The assessment is based on the assumption that the applicant will comply with the outcome of the assessment, particularly the mitigation and management measures, to limit the impacts and the need for continual monitoring.
- It is assumed that there will be no significant changes to the proposed project description between the completion of the report and the initiation of the project which could have an effect on the outcome of the assessment.

Uncertainties:

This Basic Assessment Process provides an indication of likely / potential environmental impacts based on subjective criteria, the public consultation process, maps of the site and nature of the receiving environment.
As such the impact assessment process is a predictive tool that cannot provide actual impact measurements. It is therefore important that the applicant ensure continual monitoring to ensure environmental protection. It is also essential that the EMP be updated to reflect actual impacts and the changing institutional and legal environment as appropriate.

Knowledge gaps:

No knowledge gaps were identified for the proposed project.

P. REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

i. Reasons why the activity should be authorized or not

It is the reasoned opinion of the EAP that this activity should be authorised. The following reasons apply:

- The material is required to maintain or regravel roads that are in poor condition, for use by the local communities, commercial farmers and other users of the road.
- Should the borrow pit not be approved, the contractor would need to obtain material from commercial sources, at a great expense, and long-haul distances would result in a large carbon footprint and further deterioration to roads. This would ultimately make the construction projects very expensive and potentially unfeasible.

• All impacts were of acceptable risk levels, with the implementation of mitigation measures.
ii. Conditions that must be included in the authorisation
See Section N
Q. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED
The applicant requests a 5-year commencement validity period from the date of the decision, and a 10-year validity period from the date of commencement to accommodate the long-term nature of the mining activities.

R. 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
It is hereby confirmed that the undertaking is provided at the end of the EMP and is applicable to both the BAR and the EMP.

S. FINANCIAL PROVISION

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.
The borrow pit has a low environmental sensitivity. As such the financial provision was calculated at R10 000.
i. *Explain how the aforesaid amount was derived*
Financial Provision has been calculated in terms of Section 6 of GNR1147 of 2015, as amended. The financial provision has been based on an escalation of the base rates provided in the 2005 financial provision guideline document. Note that the financial provision is only calculated for remediation of latent or residual environmental impacts identified during the monitoring period. Other rehabilitation and remediation aspects, such as annual and final rehabilitation, and a three-year monitoring and maintenance period after completion of rehabilitation would be costed for in the contract budget and is not deemed to form part of Financial Provision.

ii. *Confirm that this amount can be provided for from operating expenditure*
The applicant confirms that the amount for financial provision is available. DMR to stipulate the form of provisioning to be used.

T. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

i. *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:-*
1. Impact on the socio-economic conditions of any directly affected person
The primary landowner[3] was consulted after the identification of the borrow pit locality. Landowner approval was obtained for the placement of the borrow pit, as well as the proposed layout / design of the borrow pit. This ensured that the landowners are not detrimentally impacted by the proposed borrow pit in terms of farming operations. The landowners will be compensated for the use of the property by means of a temporary expropriation grant. Adjacent landowners are not deemed to be directly affected by the proposed borrow pit. The landowners have been included on the I&AP database and have been provided with an opportunity to comment on this report. Any comments received during the public participation comments period will be collated into a CRR which will be submitted to DMR.
2. Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act
No national estate referred to in Section 3(2) of the NHRA will be affected by the proposed project.

U. OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT
Alternatives have been described in Section 2 of this report. As such, a motivation in terms of Section 24(4)(b)(i) of NEMA is not required.

[3] The secondary landowner has an agreement with the primary landowner, and as such the primary landowner made the agreement for use of the land on behalf of both parties.

PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1 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).	**Y** ✓	N
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 Section 1.1.2(ix) herein as required).	**Y** ✓	N
c) *Composite Map* (Provide a map (Attached in APPENDIX 2:) 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)	**Y** ✓	N

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)
In terms of Section 38(1)(d) of the MPRDA, Integrated Environmental Management and Responsibility to Remedy: *"The holder of a … mining permit … must as far as it is reasonably practicable, rehabilitate the environment affected by the … mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development"*. In line with the above, it was agreed with the landowners that the land use would be restored to pre-mining conditions, i.e. natural areas with grazing capacity. The following closure objectives have been set to achieve this:

- Ensure the long-term stability and environmental quality of the site to minimise potential environmental and health risks.
- Ensure that the site is able to sustain an agreed post-mining land use and that sufficient land capability is reached to achieve this.
- The site must be safe for humans, domestic livestock and wildlife.

ii. Volumes and rate of water use required for the operation.

It is not anticipated that water will be required for the construction / operation of the borrow pit.

iii. Has a water use license has been applied for?

The borrow pit does not trigger any water use activities as listed in Section 21 of the National Water Act, No. 36 of 1998.

iv. Impacts to be mitigated in their respective phases

Impact management and mitigation for each of the phases are included in Table 3**.** Note that the tables provided in the EMP template have been combined for ease of reference.

e) *Impact Management Outcomes*

Impact management outcomes identified to achieve the above-mentioned objectives include the following:

- Monthly monitoring of the site by an independent Environmental Control Officer (ECO) must be undertaken for the duration of the mining activities. Furthermore, an Environmental Officer must be appointed for daily monitoring at the site. Refer to APPENDIX 8: for the roles and responsibilities of the ECO and EO.
- Bi-annual performance assessments, in terms of Section 55 of the MPRDR, during the active operations should show compliance with management and mitigation measures. Should the performance assessment show that management and mitigation measures are insufficient, an amendment to the EMP may be required.
- Install sufficient drainage features to prevent ponding and ensure effective drainage from the rehabilitated area.
- Vegetation establishment should be in line with surrounding vegetation. Should vegetation not have sufficiently established within two years after rehabilitation, additional rehabilitation measures would be required.

- Alien vegetation proliferation should be minimal to non-existent. Monitoring will need to be undertaken until natural vegetation has sufficiently established, and further action taken if required.
- Closure to be obtained not less than two years after rehabilitation.

f) *Impact Management Actions*

A description of impact management actions, in line with the impact management objectives and outcomes contemplated in section V and section VII are included in Table 3.

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
SITE-ESTABLISHMENT								
General	All	Up to 5.0ha	• Disturbance of surrounding areas	• Fence the site	• EMP	• Fence the entire borrow pit area indicated on the mine plan prior to undertaking any other activities • Treat all areas outside the fence as no-go areas • Should any heritage features (e.g. artefacts, structures or human remains) be identified on site, all work should cease, and a heritage specialist contacted to investigate the find. The heritage specialist will provide further management	At the start of site establishment	Overall responsibility: RAL Monitoring: Environmental Officer (EO) and Environmental Control Officer (ECO)

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						measures and recommendations in terms of notifying relevant heritage authorities, etc. • Failing implementation of the requirements listed in this table, a fine may be issued at the discretion of the ECO		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
Vegetation clearance	Indigenous vegetation	Up to 5.0ha	• Loss Lowveld Rugged Mopaneveld • Loss of ecological processes	• Removal and disposal of alien vegetation • Stripping, mulching and stockpiling indigenous vegetation • Revegetation during rehabilitation • Preventing erosion	• NEM: Biodiversity Act (No.10 of 2004) • CARA, 1989 and Alien and Invasive Species Regulations, 2014	• Due to the highly destructive nature of a borrow pit, mitigation is largely limited to shaping and hydro-seeding the disturbed area during rehabilitation – for detail in this regard, refer to the rehabilitation mitigation measures described under decommissioning and rehabilitation section of this table. • Remove alien vegetation – a suitably qualified contractor shall be appointed for this activity	At the start of site establishment	Overall responsibility: RAL Monitoring: EO and ECO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						• Indigenous vegetation must be cleared only after removal of any alien vegetation • Indigenous vegetation must be mulched and stockpiled, preferably with the topsoil, to ensure continuity of the seed bank to assist with rehabilitation and revegetation of the area		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
Topsoil stripping	Topsoil	Up to 5.0ha	• Loss of topsoil • Soil erosion	• Follow correct topsoil stripping and stockpiling methods • Implement erosion control measures	• Mine Plan • EMP	• Strip topsoil only after removal of vegetation and only in areas where excavations or stockpiles (i.e. areas of disturbance) have been indicated on the mine plan • Strip topsoil to a depth of 200mm - topsoil is considered to be the natural soil covering, inclusive of organic matter	After removal of vegetation	Overall responsibility: RAL Monitoring: EO and ECO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
Subsoil and topsoil stockpiles	• Topsoil • Subsoil	0.2ha maximum	• Loss of topsoil and subsoil through inadequate management or erosion • Contamination of topsoil • Alien vegetation proliferation	• Implement adequate subsoil and topsoil stockpiling methods and management • Prevent access of contaminants near topsoil stockpiles • Alien vegetation monitoring and management on topsoil stockpiles	• Mine Plan • EMP	• Stockpile topsoil in areas indicated on the mine plan • Shape topsoil stockpiles in a convex form and no more than 2m high • Shape topsoil stockpiles so that no surface water ponding can take place • Do not subject topsoil stockpiles to compaction greater than 1500kg/m^2	Throughout site establishment, after stripping of topsoil	Overall responsibility: RAL Monitoring: EO and ECO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						• Do not push topsoil stockpiles (e.g. with a bulldozer) for more than 50m		
Site camp	• Vegetation • Soil • Visual	Minimal	• Soil erosion • Visual impacts on surrounding land- and road users	• Effective solid waste management • Sufficient housekeeping • Appropriate materials management	• EMP • Byla ws	• Keep site camp area to a minimum • Develop adequate material storage facilities for general and hazardous material	Throughout site establishment, after stripping of topsoil	Overall responsibility: RAL Monitoring: EO and ECO
CONSTRUCTION AND OPERATIONAL PHASE								
Soil stockpiles	See site establishment details					• Protect topsoil stockpiles from erosion by wind and rain by providing	Throughout the operational phase	Overall responsibility: RAL

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						suitable stormwater and cut off drains and/or by establishing suitable temporary vegetation		
						• Do not cover topsoil stockpiles with materials, such as plastic, that may cause it to compost or kill the seed bank • Do not subject topsoil stockpiles to compaction greater than 1500kg/m^2		Monitoring: EO and ECO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						• Do not push topsoil stockpiles (e.g. with a bulldozer) for more than 50m • Monitor topsoil stockpiles throughout the operational phase to identify any alien vegetation • Remove all alien vegetation when it germinates to prevent contamination of the seed bank • Dispose of all contaminated soil (by hazardous substances e.g. hydrocarbons) at a registered landfill site		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						• The Contractor shall be held responsible for the replacement, at his own cost, for any unnecessary loss of topsoil due to his failure to work according to the approved MS and the requirements of this Construction EMP.		
Site camp	See site establishment details					• Provide secure / weatherproof ablution facilities	Throughout the operational phase	Overall responsibility: RAL

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						• Place ablution facilities at least 32m away from any no-go area • Appropriately store and contain all materials. Hazardous materials must be stored in a bund with 110% capacity of the materials stored inside • Provide waste bins with lids (i.e. weather and vermin proof) for management of waste on site • Waste to be picked up from site daily • Use bund for temporary		Monitoring: EO and ECO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						storing of hazardous waste. Dispose of all hazardous waste at a hazardous waste landfill • Undertake disposal of general waste to landfill at least weekly, or more frequently if required • Implement waste hierarchy principles – reduce, re-use, recycle. Recyclable waste must be kept separate from general waste and taken to a		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						waste recovery / recycling facility		
Material stockpiles	• Visual • Topsoil	0.2ha maximum	• Dust generation • Visual impacts on surrounding land- and road users • Erosion • Topsoil sterilisation if topsoil is not stripped from affected area	• Dust suppression measures • Erosion control measures • Stripping of topsoil before stockpiling materials	• Mine Plan • EMP	• Strip topsoil in areas earmarked for material stockpiles • Develop material stockpiles only in areas designated on the mine plan • Where possible, existing vegetation to be left in place between the material stockpiles and borrowpit to act as a visual screen • Implement dust suppression and erosion control	Throughout the operational phase	Overall responsibility: RAL Monitoring: and ECO EO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						on fine material stockpiles		
Excavations / mining activities, including blasting and/or crushing	• Road users • Vegetation	0.86ha	• Dust generation • Noise nuisance	• Dust suppression • Regular maintenance of equipment and machinery	• Mine Health and Safety Act, 1996 • Mine plan • Bylaws	• Undertake dust suppression on exposed / excavated areas – dust suppression should be undertaken with a non-potable water resource as far as possible (e.g. use of treated effluent is acceptable) • Maintain excavation equipment in a good condition to avoid leaks and spills • Avoid undertaking	Throughout the operational phase	Overall responsibility: RAL Monitoring: and ECO EO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						blasting activities on windy days • Undertake excavations, blasting and crushing only after 06:00 in the morning and before 18:00 in the evening		
Job creation	HDI community members and contractors	N/A	Job creation leading to improved socio-economic conditions for HDI community members and contractors	Ensure that local HDI community members and contractors are employed as part of the contract	• Municipal IDP • NDP	• Implement a local procurement contract for employment of local HDI people and contractors in line with the national reform	Throughout the operational phase	Overall responsibility: RAL

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						and employment targets		
DECOMMISSIONING PHASE[4]								
Decommissioning and rehabilitation	Land use	5.0ha	• Reinstatement of land use potential	Restoration of the landform and removal of infrastructure to reinstate land use potential	• Rehabilitation plan • EMP	• Fence to remain in place until rehabilitation and monitoring has been completed • Remove all equipment, remaining stockpiles and other material from the site upon completion of works • Remove and dispose of any contaminated soil prior to undertaking rehabilitation	Upon commencement of decommissioning	Overall responsibility: RAL Monitoring: and ECO EO

[4] The decommissioning phase will commence immediately upon completion of mining activities. It will entail clearing the site of all equipment, machinery and infrastructure such as stockpiles. Rehabilitation of the disturbed areas will subsequently be undertaken. This will be followed by a threeyear monitoring and aftercare period.

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						• The landform to be shaped in line with the rehabilitation plan – overburden, including subsoil, to be used for this purpose • Batter slopes at 1:4 (V:H) – slopes should be in line with the surrounding landforms and not a smooth flat surface. Flowing curves that blend into the surrounding landscape should form in preference to sharp angles • Ensure that the site is free draining and that		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						no ponding can occur • No construction equipment, vehicles or unauthorised personnel shall be allowed onto areas where topsoil has been reinstated • Monitor the access road, reinstated borrow pit and other disturbed areas for erosion for a two (2) year period after completion of rehabilitation. Reinstate eroded areas immediately upon identification thereof		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						• Obtain confirmation of acceptance of rehabilitation from the landowner after rehabilitation – note that the acceptance letter does not remove the obligation to monitor and undertake maintenance during the monitoring period, as described in Table 5		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
	Subsoil and topsoil	5.0ha	• Incorrect replacement of topsoil and subsoil leading to poor reinstatement of the area • Erosion	• Ensure rehabilitation plan is followed • Implement erosion control measures • Monitor for erosion and remediate where necessary	• Rehabilitation plan • EMP	• Spread topsoil at least 150mm deep over all disturbed areas • Protect slopes with a biodegradable erosion control blanket, if required – this will be necessary if rehabilitation takes place outside the growing season (see vegetation)	After shaping and filling, prior to revegetation	Overall responsibility: RAL Monitoring: and ECO EO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
	Vegetation	5.0ha	• Re-establishment of natural vegetation in the borrow pit	• Ensure adequate reseeding • Monitor re-establishment for 2 years and remediate where necessary	• Rehabilitation plan • EMP	• Shape surface and cover the surface with a 200mm layer of sandy soil. • Hydro-seed the area with commercially-available grass to establish a cover crop, i.e. vegetation that would prevent wind and water erosion. In the event of hydroseeding not being possible, hand-sowing of grass seed should be implemented with light raking of the seed into the topsoil. • Maintain the fence around the	After establishment of vegetation and for a 2-year period thereafter	Overall responsibility: RAL Monitoring: and ECO EO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						area so that no livestock can enter the rehabilitated area in the early stage of restoration. This restoration would be necessary to prevent erosion regardless of the final land-use being grazing. • Allow the rehabilitated area to reach its own equilibrium over time. • Remove invasive alien vegetation. • Leave in place any *indigenous*		

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						plants that returns.		
	Alien Vegetation	5.0ha	• Alien vegetation proliferation	Monitoring and removal of alien vegetation for three (3) years after rehabilitation	• Rehabilitation plan • CARA, 1989 and Alien and Invasive Species Regulations, 2014	• Monitor reinstated areas throughout the decommissioning phase and for a three (3) year period (refer to Table 5) thereafter, to identify any alien vegetation • Remove all alien vegetation when it germinates to prevent contamination of the seed bank. Removed alien vegetation	Throughout the decommissioning phase and for a 3-year period thereafter	Overall responsibility: RAL Monitoring: and ECO EO

ACTIVITIES	ASPECTS AFFECTED	SIZE AND SCALE OF DISTURBANCE	POTENTIAL IMPACTS	MITIGATION TYPE	STANDARD TO BE ACHIEVED AND COMPLIANCE WITH STANDARDS	MITIGATION MEASURES	TIME PERIOD FOR IMPLEMENTATION	RESPONSIBILITY
						must be disposed of at a licensed landfill.		

Table 3: Management and Mitigation Measures [5]

[5] Refer to Appendix 7 for the roles and responsibilities of each role-player

i. Financial provision

1. Determination of the amount of Financial Provision
Financial provision was determined for remediation and management of latent or residual environmental impacts which may become known in future. The calculation of the financial provision was based on the Financial Provision Regulations, 2015 and took into account the 'Guideline document for the evaluation of the quantum of closure-related financial provision provided by a mine', as developed by the then Department of Minerals and Energy (now DMR) in 2005. Annual or concurrent rehabilitation and decommissioning and closure activities at the end of mining, including rehabilitation and remediation are not included in the financial provision calculation and would be included in the contract cost. Financial provision will need to be reviewed annually, and adjustments made as necessary, to ensure that sufficient quantum is available at the time of closure.
(a) *Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation 22 (2) (d) as described in A(3)(a) herein*
Refer to the Draft environmental management programme for a description of the closure objectives. The baseline environment was considered in setting the objectives, to ensure that the surrounding environment is not detrimentally affected, and that the end land use reflect that of pre-mining conditions.
(b) *Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties*
Landowner consultation was aimed at discussing end land use after rehabilitation. It was agreed that the land would revert to its original state after closure. The closure objectives were developed based on this agreement, amongst others. Landowners and other I&APs will have a chance to review the BAR and EMP and provide comments on it during the 30-day public comment period. Comments will be collated into a CRR which will be submitted to DMR. Should changes to the BAR or EMP be required based on I&AP comments, a request for extension of timeframes will be submitted to DMR to allow for a further comment period on the report.

(c) *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*
Refer to APPENDIX 2: for the rehabilitation plan, which also lists the various actions to be undertaken for rehabilitation, which have been included in Table 3 above.
(d) *Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives*
The rehabilitation plan was developed, and adjusted where necessary, to be in line with the closure objectives and outcomes. The rehabilitation plan was not developed in isolation, and took into account the nature of the sites, the agreed end land use, and other specialist requirements.
(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline
The financial provision has been calculated based on a 6% CPI escalation of the base rates provided in the 2005 financial provision guideline document. The borrow pit is classified as a low risk / Category C mine, with a low sensitivity. Based on these criteria, the financial provision was calculated to be R10 000.00. It is anticipated that, based on past experience of road projects by the Roads Agency Limpopo, the calculated amount is deemed appropriate to meet the requirements listed in section i Determination of the amount of Financial Provision.
(f) Confirm that the financial provision will be provided as determined
The applicant will provide proof of payment or arrangements to provide the financial provision prior to DMR making the final decision on this application.

MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON, INCLUDING

(g) Monitoring of Impact Management Actions *(h) Monitoring and reporting frequency* *(i) Responsible persons* *(j) Time period for implementing impact management actions* *(k) Mechanism for monitoring compliance*
The monitoring measures recommended at the borrow pit, unless otherwise indicated, are listed in Table 4 Roles and responsibilities for the role-players are defined in APPENDIX 8:: • The Contractor must have an Environmental Officer (EO) on site at all times to monitor day-to-day activities in terms of the EMP. • The holder of the Environmental Authorisation should appoint an Environmental Control Officer (ECO) prior to commencement of the contract to undertake monthly site inspections and monitor compliance with the EMP.
(l) *Indicate the frequency of the submission of the performance assessment / environmental audit report.*
The performance assessment must be undertaken every two years during the active operations until closure of the borrow pit has been obtained, as per Regulation 55 of the MPRDR, 2004, unless otherwise indicated by DMR in the Environmental Authorisation.

Table 4: Monitoring compliance and performance assessment[6]

MONITORING OF IMPACT MANAGEMENT ACTIONS, INCLUDING FUNCTIONAL REQUIREMENTS	MONITORING AND REPORTING FREQUENCY	TIME PERIOD FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS	ROLES AND RESPONSIBILITIES	MECHANISM FOR MONITORING COMPLIANCE
Establishment of vegetation	Quarterly for a minimum of two years or until sufficient (70%) groundcover has been established	If after two years vegetation has not established sufficiently, taking into account environmental conditions, such as droughts, revegetation or other remediation measures will need to be undertaken	ECO appointed by the holder of the authorisation to undertake monitoring of vegetation regrowth/ establishment Vegetation specialist appointed by the holder of the authorisation to undertake remediation	Vegetation coverage to be at least 70% of surrounding natural vegetation after two years
Proliferation of alien vegetation	Quarterly for three years	If any invasive alien vegetation is noted, it must be removed immediately. Alien vegetation clearing to be undertaken if noninvasive alien species increase to over 5% of the area	ECO appointed by the holder of the authorisation to undertake monitoring Vegetation specialist appointed by the holder of	Alien vegetation to be less than 5% of overall vegetation in rehabilitated area. No invasive alien vegetation to be present

[6] Refer to Appendix 7 for the roles and responsibilities of each role-player

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			the authorisation to undertake remediation	
Drainage	Before and after each winter period for two years	If ponding is noted during winter, the rehabilitated area will need to be reshaped to improve drainage, followed by revegetation, if required	ECO appointed by the holder of the authorisation to undertake monitoring Contractor appointed by the holder of the authorisation to undertake remediation	No ponding to take place in the rehabilitated area. All rehabilitated areas to be free draining
Soil erosion and stability	Quarterly for two years or until vegetation has established	Remediate within 1 month of noticing erosion or instability, monitoring to continue for at least a further six months afterwards	ECO appointed by the holder of the authorisation to undertake monitoring Contractor appointed by the holder of the authorisation to undertake remediation	No erosion present in the rehabilitated area or immediately adjacent to it, which would have resulted from the rehabilitated area. No subsidence in rehabilitated areas

(m) 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*

The ECO will undertake environmental awareness training with the construction team at the start of the borrow pit project, including an induction on the importance and implications of the EMP. Training shall be conducted, as far as is possible, in the employees' language of choice. Training will be repeated every 6 to 12 months, for the duration of the mining operations, as may be required. Additional requirements for training include repeated non-compliances with the EMP and Environmental Authorisation, and a change of staff at the site. New staff will need to be inducted with associated environmental awareness training by the site agent, on an individual or group basis. A training register will be kept on site which must be signed and dated by all attendees of the training. The ECO will monitor on a monthly basis that this has been undertaken.

The Contractor must at all times have a copy of the EMP on site and must be familiar with its contents, and must implement mitigation measures. Content of the EMP to be communicated to the Contractor by the holder of the Authorisation.

As a minimum, training should include:

- Explanation of the importance of complying with the EMP and Environmental Authorisation.
- Discussion of the potential environmental impacts of the mining activities.
- Employees' roles and responsibilities, including emergency preparedness.
- Explanation of the management and mitigation measures that must be implemented
- Explanation of the specifics of this EMP and its specifications ("No-Go" areas, etc.).
- Explanation of the management structure of individuals responsible for matters pertaining to the EMP.

The following method statements (at least) shall be developed, and communicated to all employees during the environmental training:

- Site camp and working areas, inclusive of waste management and no-go areas.
- Vegetation clearance and alien vegetation management.
- Topsoil management.
- Environmental emergency preparedness.
- Site rehabilitation.

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

Should risks be identified on site that are not dealt with in terms of Table 3, the following steps shall be undertaken to deal with the relevant risk:

- The level of risk shall be determined. The Contractor shall notify the ECO of all medium and high-level risks immediately upon identification thereof.
- Material Safety Data Sheets (MSDS) shall be kept on site for all substances used on site. The MSDS's shall be referred to for clean-up requirements in the case of a spill.
- Emergency numbers shall be visibly kept on site for dealing with fires, floods, major spillages and other emergencies. A method statement for environmental emergencies shall be developed.
- Should the above measures and those stipulated in Table 3 not be sufficient to deal with the identified risk, the ECO shall provide further input into risk management.

(n) Specific information required by the competent authority

among others, confirm that the financial provision will be reviewed annually

The following specific information has been provided:

- Proof of public participation (to be provided with final report).
- The project description contains all relevant information regarding the project, including whether crushing / screening will take place.
- The mine plan was developed in terms of Section 2(2) of the MPRDR, and a section view of the borrow pit has been included in APPENDIX 2:, showing the depth of the borrow pit.
- Reasonable alternatives were assessed for this application. An impact assessment was not undertaken for the alternatives, as the screening process undertaken deemed the alternatives not to be viable.
- Rehabilitation measures include safe slopes and adequate measures for vegetation re-establishment.
- Rehabilitation plans have been designed to ensure that no ponding of water can occur after rehabilitation. Landowners have been informed that the borrow pit may not be rehabilitated to a dam.

2 UNDERTAKING

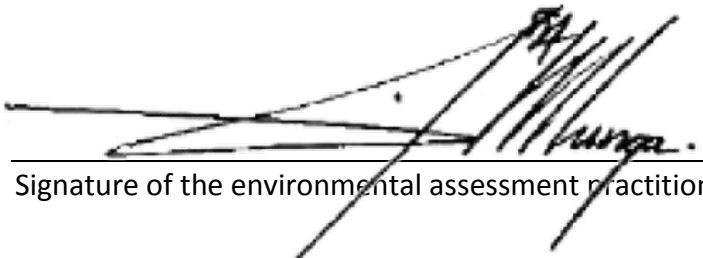
The EAP herewith confirms

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 the 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. ☑



Signature of the environmental assessment practitioner:

P Enviro Holdings

Name of company:

24 April 2019

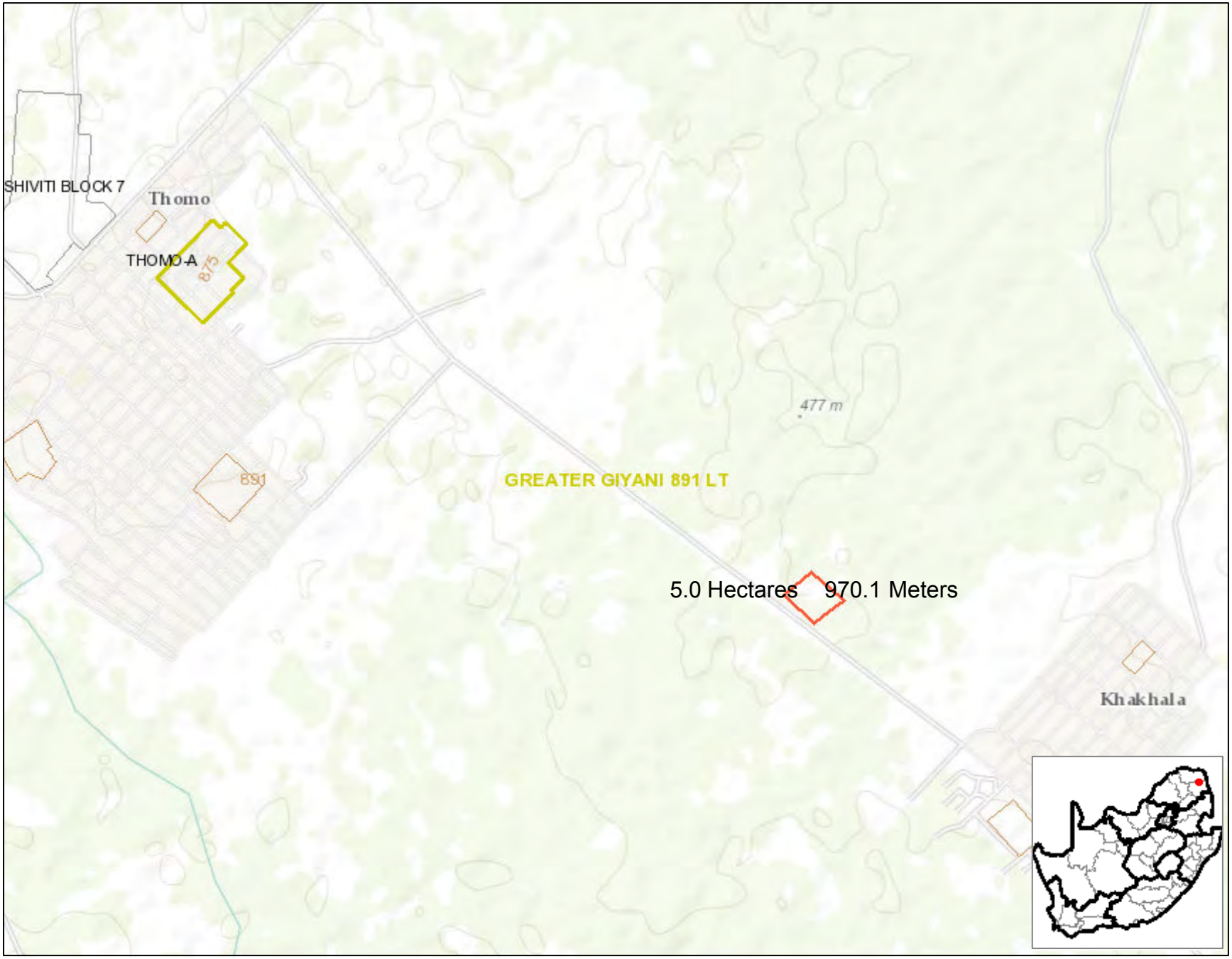
Date:

-END-

APPENDICES

APPENDIX 1: LOCALITY MAP

BORROWPIT 1: UPGRADING OF ROAD D3810 FROM THOMO TO KHAKHALA



Department of Rural development and land reform

Chief Surveyor General Property Search
(April 2018 Version)
February 21, 2019

Legend

- Parent Farm
- Farm Portion Registered - R
- Farm Portion
- Allotment Township
- Holding
- General Plan
- Mineral Rights
- Servitude Line
- Servitude Area

N

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Scale 1:36 112

0 0,45 0,9 1,8 km

Web AppBuilder for ArcGIS
Esri South Africa, Esri, HERE, Garmin, USGS, METI/NASA |

APPENDIX 2: MINE PLAN AND REHABILITATION PLAN

1 INTRODUCTION

1.1 REHABILITATION PLAN

Rehabilitation plan means the operator's written proposal as required and approved by the Department of Mineral Resources for reclamation of the affected land, which shall include but not limited to:

- ✓ Proposed practices to protect adjacent surface resources;
- ✓ Specifications for surface gradient restoration to a surface suitable for the proposed subsequent use of the land after reclamation is completed, and proposed method of accomplishment therefore
- ✓ Manner and type of revegetation or other surface treatment of the affected areas;
- ✓ Method of prevention or elimination or other surface treatment of the affected areas;
- ✓ Method of compliance with air and water pollution prevention laws where applicable;
- ✓ Method of control of contamination and disposal of mining refuse;
- ✓ Method of restoration or establishment of stream channels and stream banks to a condition minimizing erosion, siltation and other pollution;
- ✓ Sketch maps and other supporting documents as may be reasonably required by the Department;
- ✓ A time delineating events to meet the requirement.

The key aims of the rehabilitation are to eliminate unacceptable risks by establishing a safe, stable and non polluting post-mining land surface which supports vegetation growth and the vegetation growth should be sustainable over the long term. It is also targeted at minimizing the downstream impacts on the ecosystem due to the interruption of the drainage system.

The borrow pit operator must perform progressive rehabilitation as material extraction is done. Progressive rehabilitation means rehabilitation done sequentially within a reasonable time after extraction of borrow pit resources is complete. As one area of the pit or borrow pit is being extracted, rehabilitation must be completed in the areas

where the borrow pit reserves have been stopped or exhausted. Progressive rehabilitation is beneficial in many ways as it reduces the open areas within a borrow pit, reduces soil erosion potential and reduces double-handling of soil / waste materials.

The final rehabilitation must take into account the region the borrow pit is located in. The environment affected by the operations shall be rehabilitated, as far as is practicable, to its natural state or to a predetermined state, and agreed to standard or land use which conforms with the concept of sustainable development. The affected environment shall be maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof. The rehabilitation activities shall require the re-planting of vegetation in some areas cleared for the borrow pit activities. This will promote soil stability, improve the visual environment and provide faunal habitat into the operation stage.

The **OBJECTIVE** of rehabilitation is to restore the site to an acceptable satisfactory condition by:

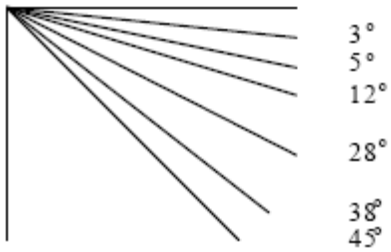
- ✓ Eliminating unacceptable safety and health hazards and ensuring public safety
- ✓ Restoring the site to a condition that is visually acceptable to the community
- ✓ Reclaiming the areas impacted for the future use (e.g. agricultural)
- ✓ Preparing the site to the amenable to support vegetation
- ✓ Removing any contaminated soils
- ✓ Ensuring physical stabilization of the soils (a combination of smoothing and contouring slopes, replacing overburden and topsoil and revegetating)
- ✓ Ensuring that final drainage of the site does not adversely affect neighbouring properties
- ✓ Rehabilitation operations should where possible be carried out concurrently with extraction and as a practical after use of the site should be considered in the pre-excavation planning.

2 BORROW PIT GUIDELINE SPECIFICATIONS

The Department shall approve a rehabilitation plan (as submitted or as modified) only where it finds it adequately provides for those actions necessary to achieve the purpose and requirements of the Mineral and Petroleum Resources Development Act of 2002 (Act 28 of 2002); and in addition, the plan meets the following minimum standards:

The final slopes in all excavations in soil, sand, gravel and other unconsolidated materials shall at such an angle as to minimize the possibility of slides and consistent with the future use of the land. The suggested maximum slopes considered suitable for the following land uses are:

Forestry	38°
Hill grazing	28°
Improved pasture	15°
Some buildings and roads	12°
Rotational cropping	5°
Housing	3°



- ✓ Lesser slopes may be necessary depending on geology, soils and other site specific variables.
- ✓ The land will be cleared of rubbish; surplus materials, temporary structures and equipment, and all parts of the land shall be left in a condition as close as possible to the prior to use.
- ✓ Provisions for safety to person, animals and to adjoining property must be provided.
- ✓ All overburden and spoil shall be left in a configuration which is in accordance with accepted conservation practices and which is suitable for the proposed subsequent use of the land.
- ✓ Suitable drainage ditches or conduits shall be constructed or installed to avoid conditions where small pools of water that are, or are likely to became harmful or foul, collect or remain on the mined area. Ponds shall be considered adequately reclaimed lands when approved by the Department subject to the approval of all other stakeholders. Surface drainage must be designed to minimize erosion during runoff and major rainfall events.

- ✓ The type of vegetative cover and methods of its establishment shall be specified and in every case shall conform to accept and recommended agronomic and reforestation restoration practices.
- ✓ Pits shall be backfilled with clean or inert fill. There shall be no material of deleterious nature (i.e. any material that would be classed as hazardous or waste). Building rubble may only be used with the approval of the Department.
- ✓ The site shall be graded to match or blend with existing contours. In the case of hard rock pits should be multi-benched.

Topsoil stripped from the surface shall be used for final cover to recontoured slopes where practicable. Non usable material including overburden, screenings and rocks, should be placed in the pit bottom and covered with the previously stripped topsoil. Once the site is reclaimed any fences where they exist shall be removed to permit revegetation.

Access and haul roads to the pit must be restored in a mutually agreeable manner where these are considered unnecessary after extraction has been completed.

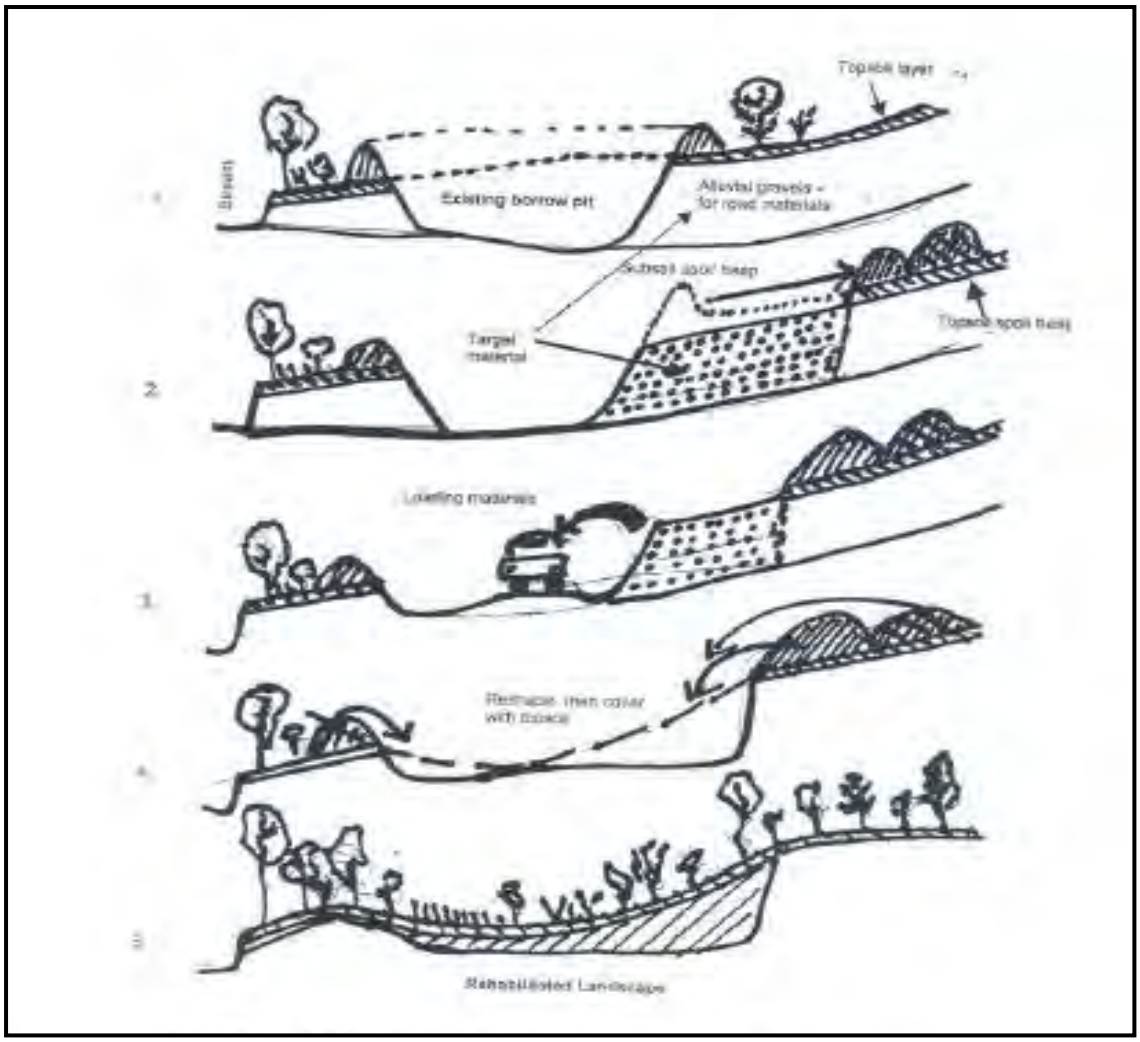


Figure 1: A typical example of borrow pit rehabilitation

3 REHABILITATION OF ACCESS ROADS

- Whenever a borrow pit is suspended, cancelled or abandoned, any access road or portions thereof, constructed by the holder and which will no longer be required by the landowner/tenant, shall be removed and/or rehabilitated to the satisfaction of the owner;
- Any gate or fence erected by the borrow pit operator which is not required by the landowner/tenant, shall be removed and the situation restored to the pre-borrow pit situation;
- Roads shall be ripped or ploughed, and if necessary, appropriately fertilized (based on a soil analysis) to ensure the re-growth of vegetation. Imported road

construction materials which may hamper re-growth of vegetation must be removed and disposed of in an approved manner prior to rehabilitation;

- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the soil must be analyzed and any deleterious effects on the soil arising from the borrow pit be corrected and the area be seeded with a seed mix which is in similar with the vegetation of the area.

4 OFFICES, STORAGES AREA AND PLANT STRUCTURES

- On completion of operations, all buildings, structures or objects on the camp/office site shall be demolished and removed;
- Where office/camp sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped;
- Areas containing French drains shall be compacted and covered with a final layer of topsoil to a height of 10cm above the surrounding ground surface;
- On completion of borrow pit operations, the above areas shall be cleared of any contaminated soil, which must be dumped as per the waste management plan;
- All infrastructure, equipment, plant, temporary housing and other items used during the borrow pit period will be removed from the site;
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the borrow pit area and disposed of at a registered waste disposal facility. It will not be permitted to be buried or burned on the site;
- Photographs of the camp and office sites, before and during the borrow pit and after rehabilitation, shall be taken at selected fixed points and kept on record;
- The surface shall then be ripped or ploughed and the topsoil previously stored shall be spread evenly to its original depth over the whole area. The area shall then be fertilized if necessary (based on a soil analysis);
- The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora;

- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, there might be a need that the soil be analyzed and any deleterious effects on the soil arising from the borrow pit operation be corrected and the area be seeded with a seed mix to his or her specification.

5 REHABILITATION OF EXCAVATION AREAS

- Excavated areas should be kept in a safe and stable manner. No unstable block should be present. Reshaping of the borrow pit may need to be done to ensure that this objective is reached;
- Preventative measures may be necessary during closure to construct adequate drainage structures including ditches and other structures to facilitate the movement of surface water and prevent damming. An assessment will need to be done when mining has ceased to determine if there is a need for such measures. The objective of these measures is to avoid water build-up that affects the physical stability of the slopes and also interferes with the drainage of the whole area;

- The excavated area must serve as a final depositing area for the placement of overburden and gangue during processing;
- Rocks and coarse material removed from the excavation must be dumped into the excavation simultaneously with waste, as described in previous paragraph. Waste will not be permitted to be deposited in the excavations;
- Once excavation parts that can be filled have been refilled with overburden, rocks and coarse natural materials and profiled with acceptable contours and erosion control measures, the topsoil previously stored shall be returned to its original depth over the area;
- The area shall be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora;
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, then there may be a need for the soil to be analyzed and

any deleterious effects on the soil arising from the borrow pit, be corrected and the area be seeded with a vegetation seed mix to his or her specification.

6 REHABILITATION INSPECTION CHECKLIST

Borrow Pit Number: One (1) Holder:

Mine Inspector: _____

OBJECTIVE	INDICATORS	IMPROVEMENTS REQUIRED	COMMENTS
Mining proceed in line with rehabilitation plan? Surface reshaped to obtain stability? Surface reshaped to provide for adequate drainage?	Rehabilitation Plan approved before mining commences. Land stability restored Drainage restored Surface not prone to erosion		
Surface reshaped to give suitable slopes for targeted land use	Surface suitable for future intended use		
Long term visual impacts minimised	Surface blends into surrounding environmental		
All waste removed to licensed landfill	Lease area free of waste		
Reclaim Access end haul roads	i) Roads reclaimed where not needed for future access ii) Access ramps removed		
Site restored to a safe condition	Site safe to humans and animals		
Overburden and spoil restored to pit	Overburden and spoil restored		
Fences removed and in such a way as to permit revegetation	Fence removed and in such a way as to permit revegetation		

Signed: Inspector: _____

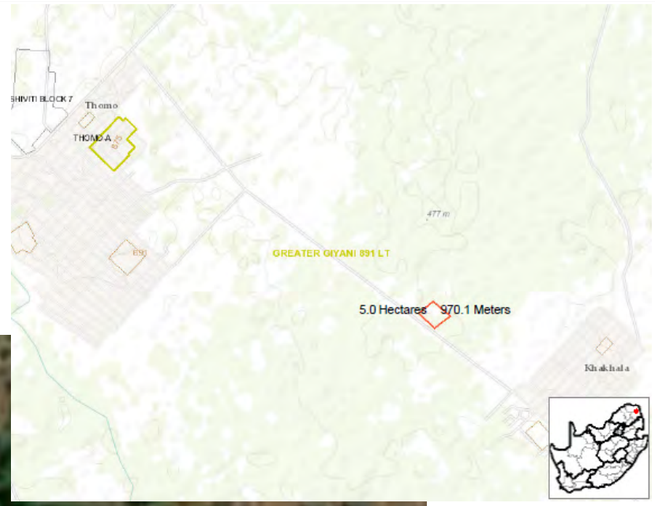
Holder: Name: ----------

Representative: _____

Designation: _____

Signature: _____ Date: _____

BORROWPIT 1: UPGRADING OF ROAD D3810 FROM THOMO TO KHAKHALA



Description

BORROWPIT 1
LAYOUT PLAN

Legend

BORROWPIT

ROAD D3810

1: 2 257

P ENVIRO HOLDINGS
ENVIRONMENTAL CONSULTANTS

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

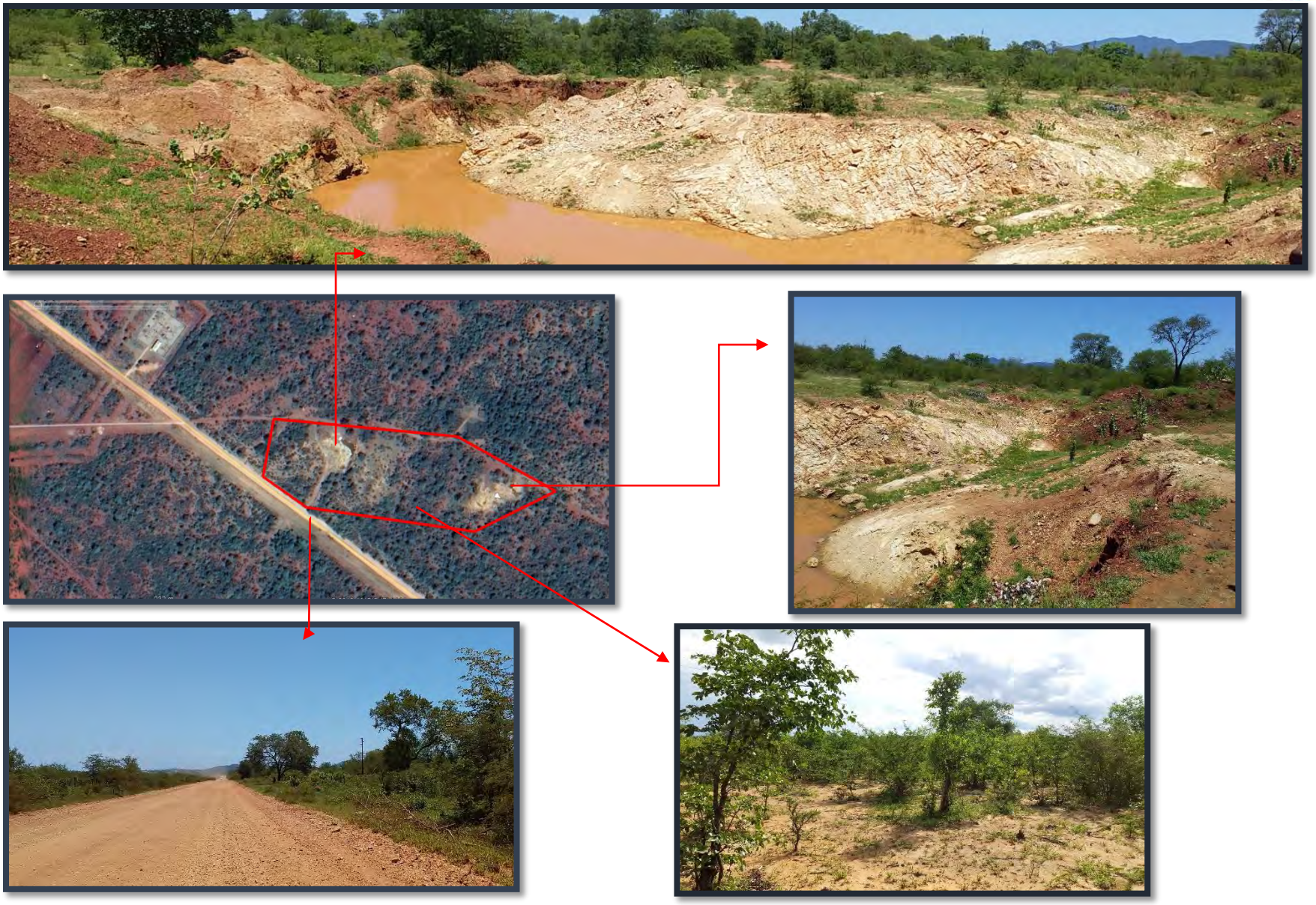
WGS_1984_Web_Mercator_Auxiliary_Sphere

APPENDIX 3: CALCULATION OF QUANTUM FOR FINANCIAL PROVISION

	CALCULATION OF THE QUANTUM						
Applicant:	**Roads Agency Limpopo**				**Ref No.**	**TBA**	
Evaluator	**Mining Permit for the borrow pit on Remaining Portion of Farm Greater Giyani 891 LT**				**Date:**	**Apr-19**	
No.	**Description**	**Unit**	**A**	**B**	**C**	**D**	**E=A*B*C*D**
			Quantity	**Master Rate**	**Multiplication factor**	**Weighting factor 1**	**Amount (Rands)**
	Campsite						
1	Seeding	m2	100,00	1,2	1	1	R 120,00
2 (A)	Ripping of compacted surface	m2	100,00	1,5	1	1	R 150,00
2(B)	Replacement of soils	m2	500,00	1,5	1	1	R 750,00
3	**Rehabilitation of access roads**	**m2**	**10,00**	**15**	**1**	**1**	**R 150,00**
4 (A)	Seeding, planting and fertiliser application	m2	300,00	1,5	1	1	R 450,00
4 (A)	Ripping of compacted surface	m2	1000,00	1	1	1	R 1 000,00
5	Demolition of housing and/or administration facilities	m2	0,00	190	1	1	R 0,00
	Waste disposal	m2	2,00	250	1	1	R 500,00
6	**Maintenance and monitoring**	**m2**	**0,04**	**10000**	**1**	**1**	**R 400,00**
7	Physical weed removal	hrs	4,00	130	1	1	R 520,00
8 (A)	Follow up monitoring	hrs	8,00	100	1	1	R 800,00
8 (B)	Seeding and fertiliser application (this is to promote vegetation	ha	0,00	82700	1	1	R 0,00

	establishment).						
8 (C)	2-3 years of maintenance	hrs	16,00	50	1	1	R 800,00
9	Rehabilitation of subsided areas	ha	0,00	40000	1	1	R 80,00
10	**General surface rehabilitation**		**0,01**	**45000**	**1**	**1**	**R 540,00**
11	Rehabilitation management	hrs	2,00	200	1	1	R 400,00
12	In situ remediation of contaminated soil	m2	2,00	350	1	1	R 700,00
13	Water management	ha	0,04	0	1	1	R 0,00
14	2 to 3 years of maintenance and aftercare	ha	0,04	0	1	1	R 0,00
15 (A)	Specialist study	Sum				1	R 0,00
15 (B)	Specialist study	Sum				1	R 0,00
					Sub Total 1		R 7 360,00
1	Preliminary and General		R 883,20		**weighting factor 2** 1		R 883,20
2	Contingencies		R 736,00				R 736,00
					Subtotal 2		R 8 979,20
					VAT (15%)		R 1 346,88
					Grand Total		**R 10 326,08**

APPENDIX 4: PHOTOGRAPHS



APPENDIX 5: SPECIALIST REPORTS

ECOLOGICAL ASSESSMENT REPORT

PROJECT NO. RAL/T825/2018- DESIGN AND CONSTRUCT 3KM OF ROAD D3810 FROM THOMO TOWARDS KHAKHALA, PHASE A: IMPROVEMENT OF THE STRUCTURAL CAPACITY TO THE PAVEMENT LAYERS AND PHASE B: UPGRADING OF GRAVEL TO BITUMINOUS SURFACE IN THE MOPANI DISTRICT

Basic Ecological Assessment

Compiled by:
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0713
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On Behalf:
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128 Suid Street
P O Box 477,
Polokwane
0787
Tel: 015 2913363

FEBRUARY 2019

Table of Contents

List of Figures and Tables

Indemnity and conditions relating to this project

In order to obtain a comprehensive understanding of; the dynamics of both the flora and fauna of the terrestrial communities within a study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints these long-term studies are not feasible and are mostly based on instantaneous sampling.

Therefore, due to the scope of the work presented in this report, a detailed investigation of all, or part of, the proposed site was not possible and are not perceived as part of the Terms of Reference at a screening level. It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

Furthermore, additional information may come to light during a later stage of the process or development. The consultant(s) and/or specialist investigator(s) do not accept any responsibility for conclusions, suggestions, limitations and recommendations made in good faith, based on the information presented to them and obtained from the surveys or requests made to them at the time of this report.

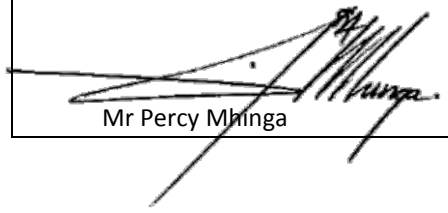
Author

Mr Percy Mhinga has a BSc honours degree in Botany and Environmental Science, specialising in Ecology, Rehabilitation and Invasive Alien Plant Management with 16 years' experience in Southern, West and Central Africa. This experience spans across a broad spectrum of habitats and operations (mining, residential and resort developments, conservation projects, service provision and infrastructure, including power-lines, roads and pipelines), conducting Biophysical and Ecological Assessments and compiling Environmental Management Plans.

Copyright

Declaration of Independence

I, Percy Mhinga, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Project, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.



Mr Percy Mhinga

1 Background and Introduction

1.1 Introduction

In the Limpopo Province and elsewhere, development projects are resulting in the transformation and degradation of large areas of natural land. Habitat transformation, destruction and fragmentation are serious threats posed to the survival of threatened plant, bird, mammal, reptile, amphibian and invertebrate species. Historically, planning and developments did not include the natural environment and consequently lead to the wasteful exploitation, destruction and contamination of many natural environments. In order to prevent further degradation, developments should be planned in such a way, that they make the best possible use of natural resources and avoid degradation of the environment. It is therefore necessary that environmental factors be considered during development planning in order to identify and allocate the areas potential for conservation and development.

The project will include Upgrading/Construction of 3km (From Gravel to Bituminous Surface) Of Road D3810 to Khakhala Village from Road D3641/Thomo Village in the Mopane District Municipality. The activities include construction of storm water culverts structures and other Storm water outlets within watercourses traversing the road

The overall aim of this study is to identify the potential for development within the study area with respect to the existing ecological setting of the area. Looking at the flora and fauna on the site and provide input regarding the impact of the proposed development on the vegetation. This study is a rapid survey to identify possible fatal flaws and/or significant issues associated with proposed development in the study site.

1.2 Terms of Reference

The terms of reference for this assessment were as follows:

- To provide a vegetation survey, including plants species list of each community.
- To provide a Red Data plants species survey and identify suitable Red Data plant habitat.
- To compile a desktop faunal assessment, based on field observations.
- To provide a Red Data faunal survey and identify suitable Red Data faunal habitat.
- To provide an indication of the relative Conservation Importance and Ecological Function of the study area, in terms of vegetation and fauna (to be incorporated into a sensitivity map).
- To assess the impacts of the proposed activity on the ecological integrity of the study area.
- To provide recommendations and ecological mitigation measures for the proposed development if ecologically viable.

1.3 Legislation Framework

Relevant administrative, legal and policy requirements which the developer will be responsible for carrying out during the construction and operation of the development:

1.3.1 Co-operative governance (Constitution Act 108 of 1996)

The constitution states that:
'*… everyone has the right to an environment that is not harmful to their health or well being: and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that 1) prevent pollution and ecological degradation; 2) promote conservation; and 3) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*.'

1.3.2 National Environmental Management Act (No. 107 of 1998)

Any actions taken by the developer must be done in accordance with constitutional principles, the common law, the overarching policy principles set out in section 2 of NEMA and the principles applicable to environmental assessment.

Chapter 1 of NEMA contains the following relevant principles:

"2. Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.

3. Development must be socially, environmentally, and economically sustainable.

4. (a) Sustainable development requires the consideration of all relevant factors including

(i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

(vii) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions

(f) The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.

(g) Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge. […]

(o) The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage."

These and other accepted principles of sustainable development, such as those stated in Agenda 21 (UNCED, 1992), must be adhered to.

1.3.3 Conservation of Agricultural Resources Act 43 of 1983 and Conservation of Agricultural Resources Regulations.

In terms of section 6 of the Act, the Minister may prescribe control measures with which all land users have to comply. The control measure may relate to the following:

- the regulating of the flow pattern of run-off water;
- the control of weeds and invader plants;
- the restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;

1.3.4 Forest Act 122 of 1984

Protected trees

The Forest Act provided for the protection of trees on private land by providing that 'no person may cut, damage, destroy, disturb or remove any *protected tree* from the land in question, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any part or produce thereof'. The Minister was authorised, in respect of any land not forming part of a State forest, to declare a particular tree, a particular group of trees, or trees belonging to a particular species occurring on that land, to be a protected tree or trees (Appendix 6) Regulations published under the Act list 58 species of protected trees to which these prohibitions apply. Although the NFA has repealed the old Forest Act, the majority or regulations promulgated under the Act still remain in force until such time they are replaced by new regulations under the NFA.

1.4 Limitations

In order to obtain a comprehensive understanding of the dynamics of both the flora and fauna of the terrestrial and aquatic communities within a study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints these long-term studies are not feasible and are mostly based on instantaneous sampling. Therefore, due to the scope of the work presented in this report, a detailed investigation of all, or part of, the proposed site was not possible and are not perceived as part of the Terms of Reference at a screening level. It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

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2 Regional Setting

2.1 Site Location

2.1.1 Locality

The site project transverse from west to east of Thomo Village

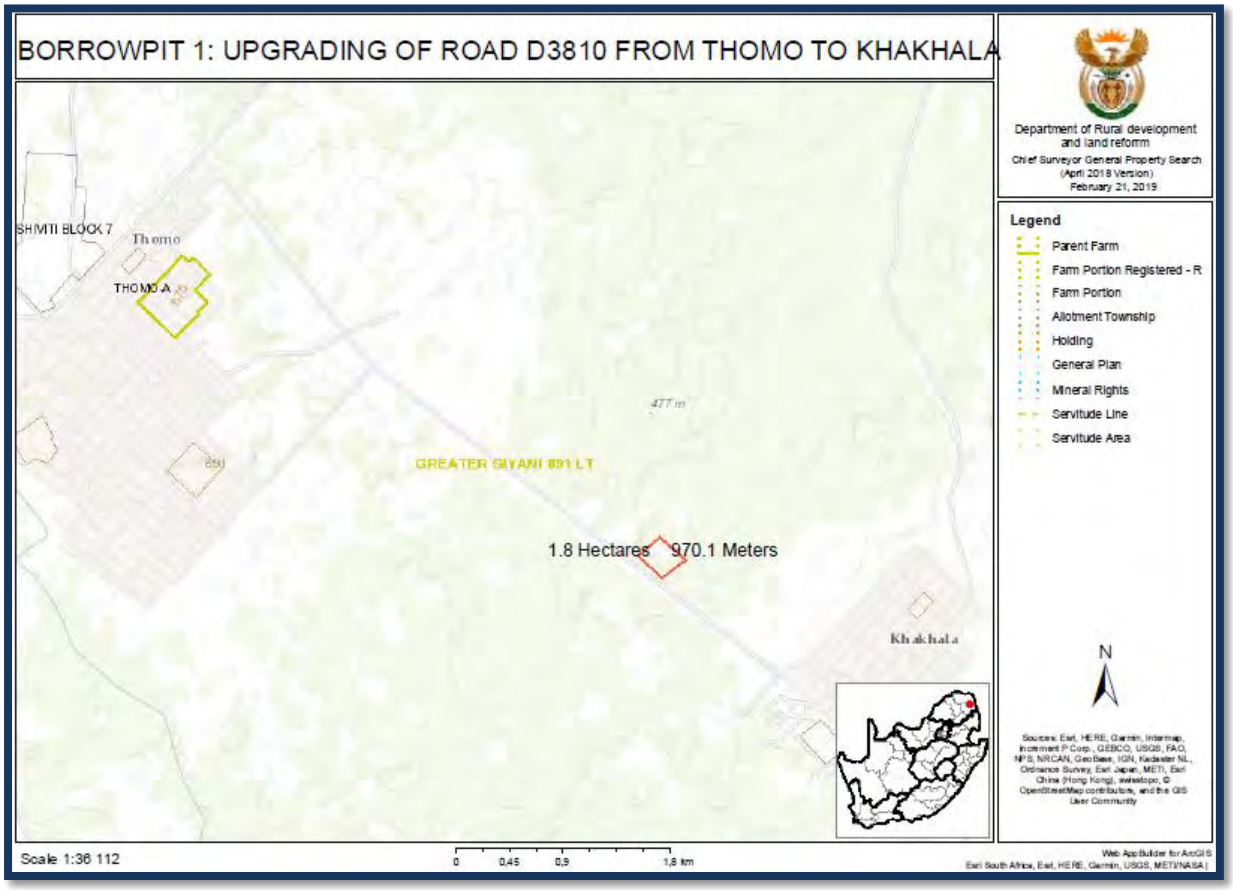
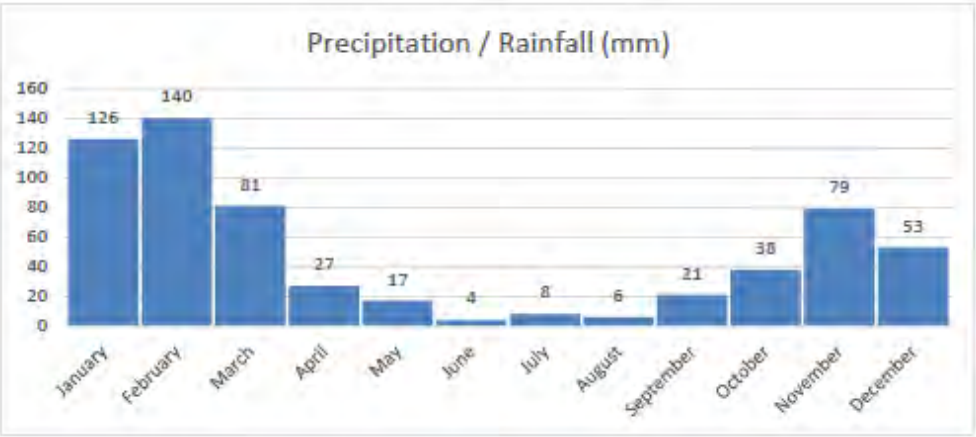


Figure 2-1: Locality Map (Source ©Google, 2019)

2.1.2 Climate

The climate of the area includes summer rainfall with very dry winters. The Mean Annual Rainfall is about 400 – 600 mm with infrequent frost in winter. The chart below shows the average rainfall values for Giyani per month. It receives the lowest rainfall (0mm) in June and the highest (95mm) in January. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Giyani range from 16.9°C in June to 26°C in January. The region is the coldest during June when the mercury drops to 9.3°C on average during the night. Consult the chart below for an indication of the monthly variation of average minimum daily temperatures.



2.1.3 Topography

The site is relatively flat, sloping gently towards the east

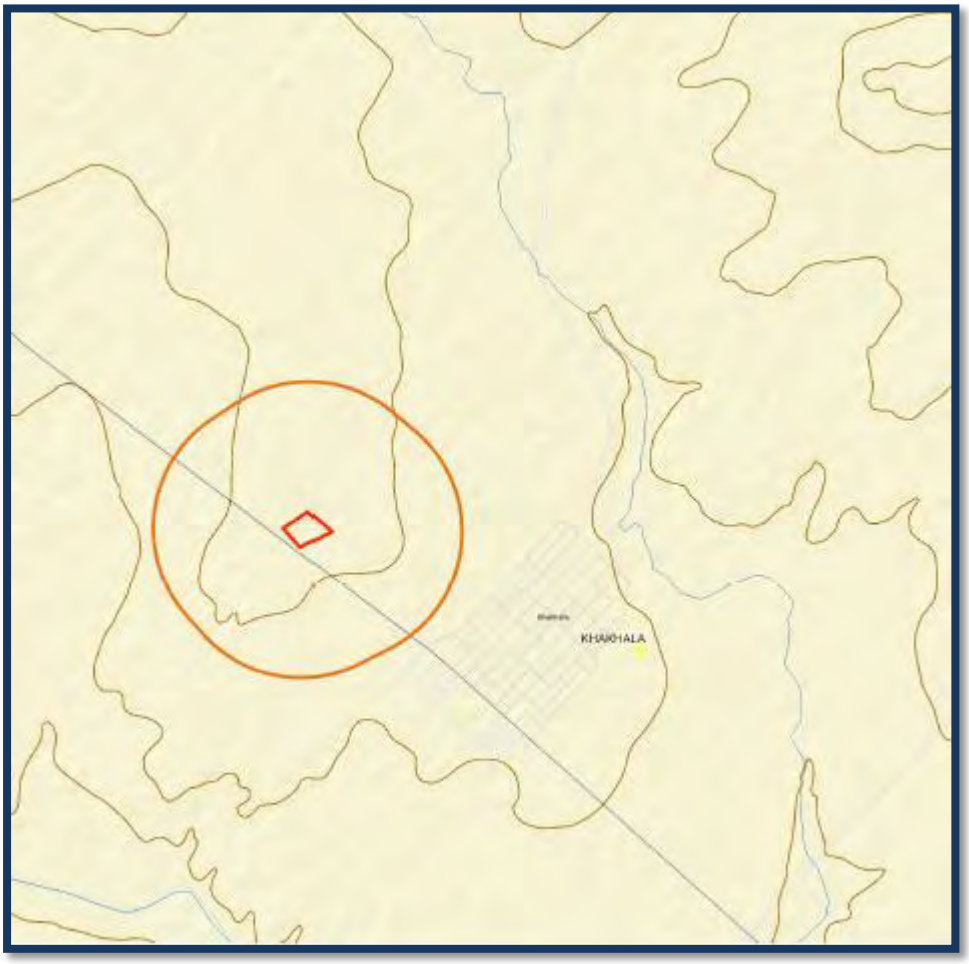


Figure 2-2: Elevation Profile of the site, along the centre lines across the site (Source ©Google, 2019)

2.1.4 Geology

The site falls within the Giyani Group, previously known as the Sutherland greenstone belt. It crops out within the Goudplaats Gneiss from Shangoni eastwards. The Rocks consist of ultramafic schists, and amphibolite with interbedded banded ironstone. Weathers surfaces are brown to blackish. The rock consists of alternating quartz – and iron-rich bands, and the individual bands.

2.1.5 Wetlands and water resources

The project occurs on lowlands and at the bottoms of valleys/plateaus of the Letaba catchment and Shingwedzi River and act as areas of natural drainage. The road crosses natural drainage lines (watercourses) at two distinct areas at about 2.5 Km and 3.7Km respectively. An artificial erosion gully has also formed towards the end of the road, as a result of the road interception of natural flow.

Figure 2-3: land image showing the position of Water Crossings (water courses) at positions A,B

Figure 2-4: Water Crossing A: view from the horizontal alignment of the road

Figure 2-5: Water Crossing B: View from the horizontal alignment of the road

2.1.6 Protected Areas and Nature reserves

No protected areas will be directly affected by the proposed development. Numerous Protected Areas and Nature reserves are located in close vicinity of the site and include:

- Kruger National Park: 20 km East.
- Man'gombe Nature Reserve 8 km South.

2.1.7 Land Use

The site is adjacent to residential development and is an open land mostly used for communal livestock grazing, and exploitation activities causing degradation of the land. These activities include illegal dumping, firewood collection and small scale agricultural activities associated with mismanagement of open land approximate to human settlements.

Figure 2-6: view of the Horizontal alignment of the road, showing the position of the bypass parallel to the existing road

Figure 2-7: Road Section where the bypass will affect a small scale agricultural plots

2.1.8 Heritage and cultural resources

The site has been transformed and lost to the existing road reserve. Formal and well-marked graves are identified within in the boundary of a home stand at approximately 1.5km point. Mitigation measures must be implemented to protect this site, measures must include demarcation of the site and protection of the boundary fenced in consultation with the concerned household.

2.2 Vegetation of Southern Africa (Mucina and Rutherford, 2006)

The site appears to be present within a single vegetation unit, although it is described by Mucina and Rutherford (2006) as Lowveld Rugged Mopaneveld vegetation unit, It occurs in mainly plains and slightly undulating plains with medium-low (1-2 m) shrubs dominated overwhelmingly by mulistemed Colophospermum mopane. Tree forms of mopane are rare. The grass layer is well developed. Vegetation consists of three main variations depending on topographical position: (1) lower, middle footslopes, (2) middle slopes and convex uplands on usually deeper soils, and (3) concave terrain with soils with very high clay content. The vegation unit is well conserved in the Kruger National Park.

Important taxa include:

- **Tall trees**: Acacia nigrescens, Philenoptera violacea, Sclerocarya birrea subsp. caffra;
- **small trees**: Acacia exuvialis, A. tortilis subsp. heteracantha, Combretum apiculatum, C. imberbe, Commiphora glandulosa, C. mollis, Dalbergia melanoxylon, Kirkia acuminata, Terminalia phanerophlebia, T. pruniaides;
- **tall shrubs**: Colophospermum mopane (d), Combretum hereroense, Flueggea virosa, Grewia bicolor. Hibiscus calyphyllus, H. micranthus, Maerua parvifolia, Tephrosia polystachya;
- **low shrubs**: Clerodendrum ternatum, Dicoma tomentosa, Neuracanthus africanus;
- **woody climber**: Combretum mossambicense;
- **herbaceous climber**: Rhynchosia totta; graminoids: Aristida congesta, Bothriochloa radicans, Cenchrus ciliaris, Enneapogon cenchroides, Fingerhuthia africana, Heteropogon contortus, Panicum maximum, Schmidtia pappophoroides, Setaria incrassata, Themeda triandra, Urochloa mosambicensis; and
- **herbs**: Heliotropium steudneri, Leucas glabrata, Phyllanthus asperulatus; **geophytic herb**: Sansevieria hyacinthoides.

2.3 National Biodiversity Assessment (NBA, 2011)

No National Biodiversity Assessment (NBA, 2011) *Endangered* or *Critically Endangered* Ecosystems are affected by the proposed development. The Vegetation unit, Lowveld Rugged Mopane veld is classified as *Least Threatened* as per the National Biodiversity Assessment (2011)

2.4 Limpopo Conservation Plan (LEDET, 2013)

According to the Limpopo Conservation Plan (2013) the majority of the road section falls within an area where the natural extent of the vegetation is not remaining. No further loss of natural habitat should be allowed, and land in this category currently in a degraded state should be rehabilitated or restored to a natural or semi---natural state once the current land- use has ceased; Maintain current land uses where these play a role in supporting ecological processes; Ensure land use changes do not impact negatively on ecological processes. The maintenance of connectivity between CBAs, continued ecosystem functioning within the CBA corridors, and the prevention of degradation of adjacent

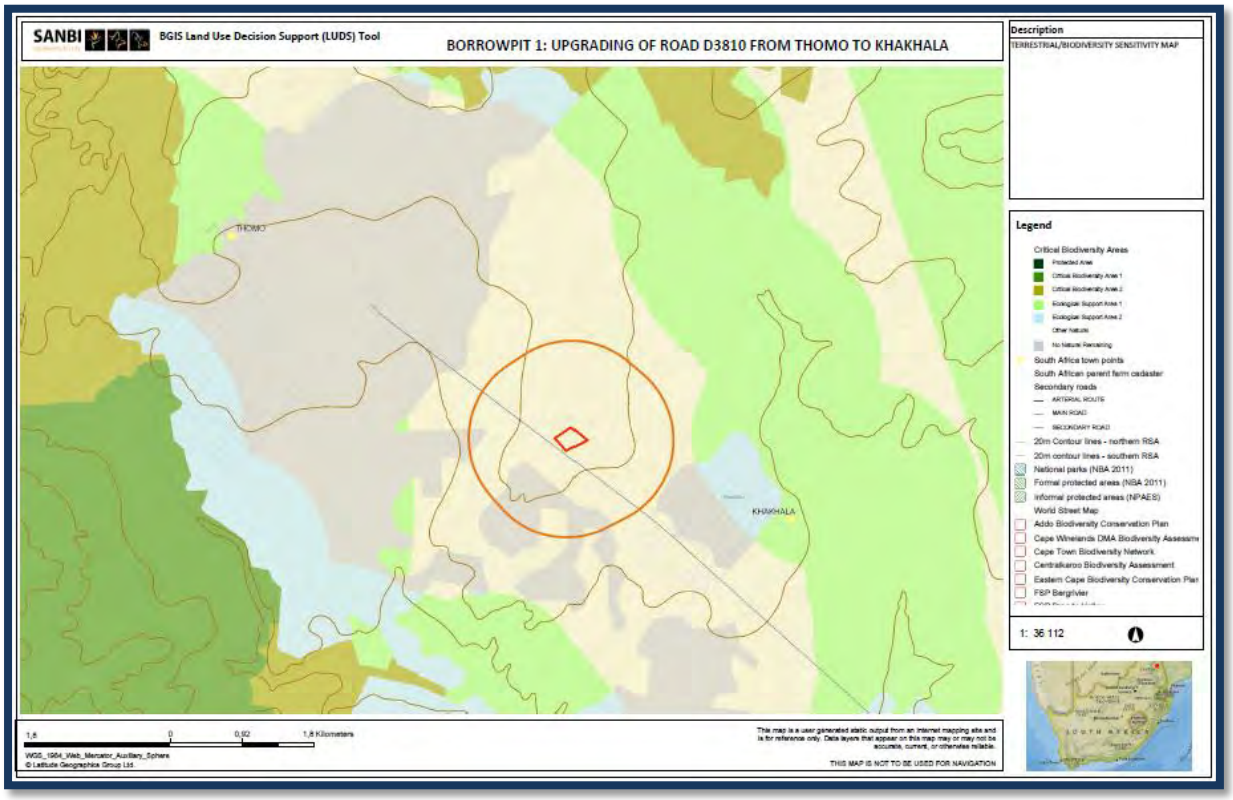


Figure 2-8: Critical Biodiversity Area Map in terms of Limpopo Conservation Plan (2013)

3 Ecological Site Assessment

3.1 Vegetation and Flora

The on-site vegetation is relatively completely transformed and is predominantly degraded to no ground cover in some areas, However intact and good ground cover with bush clumps in most of the areas within the road reserve. Where there are still patches of ground cover, this is dominated by tree cover with well-developed canopy and the grass strata is well developed. The site is surrounded settlement and existing road itself. Do to the presence of the road reserve, No Habitat diversity is practical and no conservation of biodiversity is practical.

Outside of the road reserve is extensively utilised, not only for communal livestock grazing but for intensive long-term transformation for agricultural activities, harvesting of other natural resources such as fuel wood and timber. The vegetation is thus of a degraded nature, with diversity being poor. The presence of some weedy species was noted, and is most likely due to its proximity to settlement areas and other disturbances. None of these were at high densities or especially invasive.

Floral diversity is low, and completely transformed due to extensive utilisation and degradation, with just a grass cover. However the following protected tree species exist on the foot print of the development

Figure 3-1: Mopani schrubs and Acacia erioloba Species to be removed on the path of the road construction

3.1.1 Protected tree Species

- No species were recorded or that potentially can occur on site that are protected in terms of the Transvaal Nature Conservation Ordinance (TNCO)
- Tree species, *Sclerocarya birrea subsp. caffra* is protected in terms of the National Forests Act (1998, 2012) was recorded within the site, and will need to be removed on the path of the road alignment
- Tree species, *Combretum imberbe* is protected in terms of the National Forests Act (1998, 2012) was recorded within the site, and will need to be removed on the path of the bypass road alignment
- No Red listed species of concern or local endemics recorded. It should be noted, that their presence is totally dismissed.
- No Problematic or invasive alien flora species were observed during the site visit

Figure 3-2: *Some of the protected tree species of the Sclerocarya birrea* and Combretum imberbe to be removed on the path of the road construction

3.2 Fauna

3.2.1 Mammals

No large mammals are likely to occur within the site due to its proximity to inhabited areas and disturbed nature. Small mammals with a *Vulnerable* Conservation status that may occur in the vicinity of the site include:

- *Atelerix frontalis* - South African Hedgehog

3.2.2 Birds

The bird diversity for the site was not assessed, although the site would provide habitat for bird species with an affinity to the Mopaneveld, which is largely conserved in the neighbouring Kruger National Park. large areas of natural habitat have been altered.

Table 3-1: CHECKLIST: BIRDS OF SOUTHERN AFRICA

Scientific name	Common name	Status *	Wetlands	Woodland	Grassland	SA RDB **
Tachybaptus ruficollis	Little Grebe	CR				
Phalacrocorax carbo	Whitebreasted Cormorar	CR				
Phalacrocorax africanus	Reed Cormorant	CR				
Anhinga melanogaster	Darter	UCR				
Pelecanus onocrotalus	White Pelican	CR				(Near Threatened)
Pelicanus rufescens	Pinkbacked Pelican	UCV				
Ardea cinerea	Grey Heron	CR				
Ardea melanocephala	Blackheaded Heron	CR				
Ardea purpurea	Purple Heron	CR				
Ardea goliath	Goliath Heron	UCR				
Nycticorax nycticorax	Blackcrowned Night Hero	CR				
Egretta garzetta	Little Egret	CR				
Bubulcus ibis	Cattle Egret	CR				
Egretta ardesiaca	Black Egret	UIAM				
Egretta intermedia	Yellowbilled Egret	UCR				
Egretta alba	Great White Egret	UCR				
Ixobrychus minutus	Little Bittern	UCM				
Scopus umbretta	Hamerkop	CR				
Anastomus lamelligerus	Openbilled Stork	CR				(Near Threatened)
Mycteria ibis	Yellowbilled Stork	UCR				Near Threatened
Ciconia episcopus	Wollynecked Stork	UCR				(Near Threatene
Platalea alba	African Spoonbill	UCR				
Bostrychia hagedash	Hadeda Ibis	CR				
Plegadis falcinellus	Glossy Ibis	CR				
Threskiornis aethiopicus	Sacred Ibis	CR				
Phoenicopterus ruber	Greater Flamingo	CV				Near Threatened
Phoeniconaiai minor	Lesser Flamingo	UV				Near Threatened

Scientific name	Common name	Status *	Wetlands	Woodland	Grassland	SA RDB **
Dendrocygna viduata	Whitefaced Duck	CR				
Dendrocygna bicolor	Fulvous Duck	UCR				
Thalassornis leuconotus	Whitebacked Duck	UCR				
Anas undulata	Yellowbilled Duck	UCR				
Anas erythrorhyncha	Redbilled Teal	CR				
Anas hottentota	Hottentot Teal	UCR				
Nettapus auritus	Pygmy Goose	CR				Near Threatened
Plectropterus gambensis	Spurwinged Goose	CR				
Alopochen aegyptiacus	Egyptian Goose	UCR				
Sarkidiornis melanotus	Knobbilled Duck	UCR				
Polmaetus bellicosus	Martial Eagle	UCR				Vulnerable
Haliaeetus vocifer	African Fish Eagle	CR				
Circaetus cinereus	Brown Snake Eagle	UCR				
Cincaetys pectoralis	Blackbreasted Snake Eagl	UCR				
Buteo buteo	Common Buzzard	CPM				
Kaupifalco monogrammicus	Lizard Buzzard	UCR				
Circus ranivorus	African Marsh harrier	UCR				
Milvus parasitus	Yellowbilled Kite	CIAM				
Elanus caerulus	Blackshouldered Kite	CR				
Micronisus gabar	Gabar Goshawk	UCR				
Polyboroides typus	Gymnogene	CR				
Francolinus shelleyi	Shelley's Francolin	CR				
Francolinus sephaena	Crested Francolin	CR				
Francholinus afer	Rednecked Francolin	CR				
Numida meleagris	Helmeted Guineafowl	CR				
Amaurornis flavirostris	Black Crake	CR				
Actophilornis africana	African Jacana	CR				
Porphyrio porphyrio	Purple Gallinule	CR				
Gallinula chloropus	Moorhen	UCR				
Vanellus senegallus	Wattled Plover	UCR				
Vanellus coronatus	Crowned Plover	CR				
Vanellus lugubris	Lesser Blackwinged Plove	CR				
Charadrius percuarius	Kittlitz's Plover	CR				
Charadrius tricollaris	Threebanded Plover	CR				
Tringia nebularia	Common Greenshank	CPM				
Tringa hypoleucos	Common Sandpiper	CPM				
Tringa glareola	Wood Sandpiper	CPM				
Tringia stagnatilis	Marsh Sandpiper	CPM				
Calidris minuta	Little Stint	CPM				
Philomachus pugnax	Ruff	CPM				
Himantopus himantopus	Stilt (blackwinged)	CR				
Recurvirostris avosetta	Avocet	CR				
Glareola pratincola	Collared Pratincole	CR				
Chlidornias leucopterus	Whitewinged Tern	CPM				
Streptopelia semitorquat	Ring-necked Dove	CR				

Scientific name	Common name	Status *	Wetlands	Woodland	Grassland	SA RDB **
Streptopelia capicola	Cape Turtle Dove	CR				
Streptopelia senegalensis	Laughing Dove	CR				
Turtur chalcospilos	Emerald-spotted Dove	CR				
Treron calva	Green pigeon	CR				
Poicephalus cryptoxanthu	Brownheaded Parrot	CR				
Corythaixoides concolor	Grey Lourie	CR				
Chrysococcyx klaas	Klaas's Cuckoo	CR				
Chrysococcyx caprius	Diedric's Cuckoo	CIAM				
Centropus burchelli	Burchell's Coucal	CR				
Tyto alba	Barn Owl	UCR				
Cypsiurus parvus	Palm Swift	CR				
Apus affinis	Little swift	CR				
Colius striatus	Speckled Mousebird	CR				
Urocolius indicus	Redeyed Mousebird	CR				
Megaceryle maxima	Giant Kingfisher	UCR				
Ceryle rudis	Pied Kingfisher	CR				
Alcedo cristata	Malachite Kingfisher	CR				
Halcyon albiventris	Brownhooded Kingfisher	UCR				
Halcon chelicuti	Striped Kingfisher	CR				
Merops pusillus	Little Bee-eater	CR				
Merops persicus	Bluecheeked Bee-eater	CPM				
Merops bullockoides	Whitefronted Bee-eater	UCR				
Merops apiaster	European Bee-eater	CPM				
Coracias caudata	Lilacbreasted Roller	CR				
Upupa epops	African Hoopoe	CR				
Phoeniculus purpureus	Redbilled Woodhoopoe	CR				
Phoeniculus cyanomelas	Greater Scimitarbill	CR				
Tockus alboterminatus	Crowned Hornbill	CR				
Lybius torquatus	Blackcollared Barbet	CR				
Indicator indicator	Greater Honeyguide	UCR				
Mirafra rufocinnamomea	Flappet Lark	CR				
Mirafra africana	Rufousnaped Lark	CR				
Hirundo rustica	European Swallow	CPM				
Hirundo smithii	Wiretailed Swallow	UCR				
Hirundo abyssinica	Lesser Striped Swallow	UCR				
Hirundo rustica	Barn Swallow	CPM				
Riparia paludicola	Brownthroated Martin	UCR				
Psalidoprocne holomelas	Black Saw-wing	UCR				
Dicrurus adsimilis	Forktailed Drongo	CR				
Dicrurus ludwigii	Squaretailed Drongo	CR				
Corvus albus	Pied Crow	CR				
Turdoides jardineii	Arrowmarked Babbler	CR				
Andropadus importunus	Sombre Bulbul	CR				
Pycnonotus barbatus	Blackeyed Bulbul	CR				
Turdus libonyanus	Kurrichane Thrush	CR				

Scientific name	Common name	Status *	Wetlands	Woodland	Grassland	SA RDB **
Erythropygia quadrivirgat	Eastern Bearde Scrubrobin	UCR				
Anthoschopus caroli	African Penduline Tit	CR				
Acrocephalus gracilirostri	Cape Reed Warbler	CR				
Sylvietta rufescens	Longbilled Crombec	CR				
Phylloscopus trochilus	Willow Warbler	CPM				
Cisticola juncidis	Fantailed Cisticola	CR				
Cisticola cheniana	Rattling Cisticola	CR				
Cisticola galactotes	Blackbacked Cisticola	CR				
Cisticola natalensis	Croacking Cisticola	UCR				
Cisticola erythrops	Redfaced Cisticola	CR				
Cisticola fluvicapilla	Neddicky	CR				
Prinia subflava	Tawnyflanked Prinia	CR				
Muscicapa striata	Spotted Flycatcher	CPM				
Melaenornis pammelaina	Southern Black Flycatche	CR				
Melaenornis pallidus	Pale Flycatcher	CR				
Batis molitor	Chinspot Batis	CR				
Motacilla aguimp	Pied wagtail	CR				
Anthus novaeseelandiae	African Pipit	CR				
Macronyx croceus	Yellowthroated Longclaw	CR				
Telophorus sulphureopectus	Orangebreasted Shrike	CR				
Laniarius ferrugineus	Southern Boubou	CR				
Lanius collurio	Redbacked Shrike	CPM				
Dryoscopus cubla	Blackbacked Puffback	CR				
Nilaus afer	Brubru	CR				
Tchagra australis	Threestreaked Tchagra	CR				
Tchagra senegala	Blackcrowned Tchagra	CR				
Lamprotornis nitens	Glossy Starling	CR				
Lamprotornis chalybeus	Gr.Blue-eared Starling	CR				
Cinnyricinclus leucogaster	Violet-backed Starling	CIAM				
Nectarinia bifasciata	Purplebanded Sunbird	CR				
Nectarinia mariquensis	Marico Sunbird	CR				
Nectarinia senegalensis	Scarletchested Sunbird	CR				
Nectarinia talatala	Whitebellied Sunbird	CR				
Ploceus xanthopterus	Brownthroated Weaver	UCR				
Passer diffusus	Greyheaded Sparrow	CR				
Ploceus ocularis	Spectacled Weaver	CR				
Ploceus cucullatus	Village Weaver	CR				
Ploceus velatus	Masked Weaver	CR				
Ploceus intermedius	Lesser Masked Weaver	CR				
Ploceus subaureus	Yellow Weaver	CR				
Quelea quelea	Redbilled Quelea	CR				
Euplectes orix	Red Bishop	CR				
Euplectes axillaris	Redshouldered Widow	CR				
Euplectes albonotatus	Whitewinged Widow	CR				

Scientific name	Common name	Status *	Wetlands	Woodland	Grassland	SA RDB **
Pytilla melba	Melba Finch	CR				
Lagonotosticta senegala	Redbilled Firefinch	UCR				
Uraeginthus angolensis	Blue Waxbill	CR				
Estrilda astrild	Common Waxbill	UCR				
Sporoaeginthus subflavus	Orangebreasted waxbill	UCR				
Vidua chalybeata	Steelyblue widowfinch	UCR				
Spermestes cucullatus	Bronze Mannikin	CR				
Vidua macroura	Pintailed Whydah	UCR				
Serinus mozambicus	Yellow-eyed Canary	CR				
Serinus citrinipectus	Lemonbreasted Canary	UCR				(Near Threatened

* Y = recorded, CR = Common resident, UCR = Uncommon resident, CPM = Common Palearctic migrant, UCPM = Uncommon Palearctic migrant, IAM = IntraAfrican migrant, RIAM = Rare IntraAfrican migrant

3.2.2.1 Reptiles

No listed reptiles were recorded within the QDS's for the site. It is likely that species typical of inhabited areas will be present. South African endemics possibly occurring include; *Distant's Ground Agama,* and *Transvaal Gecko*. The site has a predominant grassy habitat with some remnant thornveld components that would support reptiles that favour this habitat (such as burrowing and arboreal species).

Amphibian species will most likely be comprised of both seasonal species as well as more permanent species in the river. No red listed species were recorded to occur in the vicinity.

Table 3-2: CHECKLIST: AMPHIBIANS OF SOUTHERN AFRICA.

Taxon	Common name	Habitats **	Restricted SA RDB + CITES
CLASS: AMPHIBIA			
ORDER: ANURA			
FAMILY: ARTHROLEPTIDAE			
SUBFAMILY: ARTHROLEPTINAE			
Arthroleptis stenodactylus	Shovel-footed squeaker	W	
FAMILY: BUFONIDAE			
Bufo gutturalis	Guttural toad	W, G	
Bufo garmani	Olive toad	W, G	
Bufo maculatus	Flat-backed toad	W	
Schismaderma carens	Red toad	W, G	
FAMILY: HYPEROLIIDAE			
Afrixalus fornasinii	Greater leaf-folding frog	A, W	
Afrixalus aureus	Golden leaf-folding frog	A, W	Restricted
Hyperolius argus	Argus reed frog	A, W	
Kassina maculata	Red-legged kassina	A	
Kassina senegalensis	Bubbling kassina	A, W, G	

Taxon	Common name	Habitats **	Restricted SA RDB + CITES
FAMILY: MICROHYLIDAE			
Phrynomantis bifasciatus	Red-banded frog	W, G	
Breviceps adspersus	Bushveld rain frog	W	
FAMILY: HEMISIDAE			
Hemisus marmoratus	Mottled shovel-nosed frog	W	
FAMILY: PIPIDAE			
Xenopus muelleri	Tropical platanna	A, W, G	
FAMILY: RANIDAE			
Phrynobatrachus acridoides	East African puddle frog	A, W	
Phrynobatrachus mababiensis	Dwarf puddle frog	A, W	
Phrynobatrachus natalensis	Natal puddle frog	A, W	
Ptychadena anchietae	Plain grass frog	A, W, G	
Ptychadena oxyrhynchus	Sharp-nosed grass frog	A, W, G	
Ptychadena pumilio	Dwarf grass frog	A, W, G	
Ptychadena mossambica	Mozambique grass frog	A, W, G	
Ptychadena mascareniensis	Mascarene grass frog	A, G	
Hildebrandtia ornata	Ornate frog	W, G	
Pyxicephalus edulis	African bullfrog	W, G	
Tomopterna krugerensis	Knocking sand frog	W, G	
Tomopterna cryptotis	Tremelo sand frog	W, G	
FAMILY: RHACOPHORIDAE			
Chiromantis xerampelina	Grey tree frog	W	

Table 3-3: CHECKLIST: REPTILES OF THE SOUTHERN AFRICA

Taxon	Common name	Restricted SA RDB + CITES
SUBORDER: LACERTILIA		
INFRAORDER: GEKKOTA		
FAMILY: GEKKONIDAE		
SUBFAMILY: GEKKONINAE		
Hemidactylus mabouia	Tropical house gecko	
Hemidactylus platycephalus	Flat-headed house gecko	
Lygodactylus capensis capensis	Cape dwarf gecko	
INFRAORDER: ANGUIMORPHA		
FAMILY: VARANIDAE		
Varanus albigularis	Rock monitor	
Varanus niloticus	Nile monitor	Cites II
INFRAORDER: IGUANIA		
FAMILY: CHAMAELEONIDAE		
Chamaeleo dilepis dilepis	Flap-necked chameleon	Cites II
FAMILY: AGAMIDAE		
Acanthocercus atricollis	Tree agama	
Agama armata	Ground agama	
INFRAORDER: SCINCOMORPHA		
FAMILY: LACERTIDAE		
Nucras intertexta	Spotted sandveld lizard	
Ichnotropis capensis	Cape rough-scaled lizard	
Ichnotropis squamulosa	Common rough-scaled lizard	
FAMILY: SCINCIDAE		
SUBFAMILY: ACONTINAE		
Typhlodsaurus aurantiacus aurantiacus	Golden blind burrowing skink	
SUBFAMILY: SCINCINAE		
Scelotes arenicolus	Zululand dwarf durrowing skink	
SUBFAMILY: LYGOSOMATINAE		
Lygosoma afrum	Peter's writhing skink	
Lygosoma sundevallii	Sundervall's writhing skink	
Mabuya depressa	Eastern coastal skink	
Mabuya varia	Variable skink	
Mabuya striata	Striped skink	
Panaspis wahlbergi	Common snake-eyed skink	
FAMILY: GERRHOSAURIDAE		
Gerrhosaurus major major	Southern rough-scaled plated lizard	
SUBORDER: AMPHISBAENIA		
FAMILY: AMPHISBAENIDAE		
Zygaspis vandami arenicola	Van Dam's wormlizard	
Dalophia pistillum	Blunt-tailed wormlizard	
SUBORDER: SERPENTES		

Taxon	Common name	Restricted SA RDB + CITES
INFRAORDER: SCOLECOPHIDIA		
FAMILY: LEPTOTYPHLOPIDAE		
Leptotyphlops incognitus	Eastern thread snake	
FAMILY: TYPHLOPIDAE		
SUBFAMILY: TYPHLOPINAE		
Typhlops fornasinii	Fornasini's blind snake	
Rhinotyphlops schlegelii	Schlegel's blind snake	
INFRAORDER: HENOPHIDIA		
FAMILY: BOIDAE		
SUBFAMILY: PYTHONINAE		
Python natalensis	Southern African python	Vul + Cites II
INFRAORDER: CAENOPHIDIA		
FAMILY: ATRACTASPIDIDAE		
SUBFAMILY: ATRACTASPININAE		
Atractaspis bibronii	Southern burrowing asp	
SUBFAMILY: APARALLACTINAE		
Aparallactus lunulatus	Reticulated centipede-eater	
Amblyodipsas polylepis polylepis	Purple-glossed snake	
Amblyodipsas microphthalma	Small-eyed snake	
Xenocalamus bicolor bicolor	Common quill-snouted snake	
FAMILY: COLUBRIDAE		
SUBFAMILY: LAMPROPHIINAE		
Lamprophis capensis	Southern brown house snake	
Lycophidion capense capense	Cape wolf snake	
Mehelya capensis capensis	Cape file snake	
SUBFAMILY: NATRICINAE		
Natriciteres sylvatica	Forest marsh snake	
Natriciteres olivacea	Olive marsh snake	
SUBFAMILY: COLUBRINAE		
Crotaphopeltis hotamboeia	White-lipped cat snake	
Philothamnus angolensis	Angola green snake	
Philothamnus holplogaster	Southern green snake	
Philothamnus natalensis	Natal green snake	
Philothamnus s. semivariegatus	Variegated bush snake	
Telescopus semiannulatus semiannulatus	Tiger snake	
Dispholidus typus	Boomslang	
Thelotornis capensis	Cape twig snake	
Dasypeltis medici medici	East African egg-eater	
Dasypeltis scabra scabra	Common egg-eater	
SUBFAMILY: Incerta sedis		
Pseudaspis cana	Mole snake	
Prosymna stuhlmanni	Stuhlmann's shovel-snouted snake	
SUBFAMILY: PSAMMOPHIINAE		
Psammophis subtaeniatus orientalis	Eastern stripe-bellied sand snake	
Psammophis brevirostris brevirostris	Short-snouted grass snake	

Taxon	Common name	Restricted SA RDB + CITES
Psammophis mossambicus	Olive grass snake	
FAMILY: ELAPIDAE		
SUBFAMILY: ELAPINAE		
Elapsoidea sundevallii longicauda	Long-tailed garter snake	
Elapsoidea boulengeri	Boulenger's garter snake	
Aspidelaps scutatus fulafula	Eastern shield snake	
Naja annulifera	Snouted cobra	
Naja melanoleuca	Forest cobra	
Dendroaspis polylepis	Black mamba	
FAMILY: VIPERIDAE		
SUBFAMILY: CAUSINAE		
Causus defilippii	Snouted night adder	
SUBFAMILY: VIPERINAE		
Bitis arietans arietans	Puff adder	
ORDER: CHELONIA		
SUBORDER: CRYPTODIRA		
FAMILY: TESTUDINIDAE		
SUBFAMILY: TESTUDININAE		
Kinixys belliana belliana	Bell's hingeback tortoise	Cites II
SUBORDER: PLEURODIRA		
FAMILY: PELOMEDUSIDAE		
SUBFAMILY: PELOMEDUSINAE		
Pelusios subniger subniger	Pan hinged terrapin	
Pelusios sinuatus	Serrated hinged terrapin	
Pelusios castanoides castanoides	Yellow-bellied hinged terrapin	Peripheral
ORDER: CROCODYLIA		
FAMILY: CROCODYLIDAE		

3.2.2.2 Invertebrates

No IUCN Red listed butterflies were recorded within the QDS for the site (Henning, et al. 2009)

4 Impact Assessment

The following impacts are expected as a result of the proposed road upgrade during the construction and operational phases:

1. Loss of vegetation and habitat fragmentation.
2. Loss of floral species of special concern.
3. Increased risk of alien invasion.
4. Increased risk of soil erosion.
5. Loss of faunal habitat.
6. Loss of faunal species of special concern.

Impact Nature and Description: 1. Loss of vegetation and habitat fragmentation as a result of site development	
Comment	The site is degraded to varying degrees within the footprint and surrounding area.
Status	Negative
Extent	Localised
Duration	Permanent
Magnitude	Low
Probability	Definite
Significance (WOM[1])	Medium
Significance (WM[2])	Low
Reversibility	Low
Irreplaceability	Low
Mitigation	1. Vegetation clearing to be kept to required footprint.
Cumulative Impacts	Vegetation clearing and fragmentation will result in minimal cumulative loss of vegetation and habitat
Residual Impacts	Loss of vegetation cover is unavoidable and permanent

Impact Nature and Description: 2. Loss of floral species of special concern	
Comment	Two species of special concern are present, these will be lost to the development
Status	Negative
Extent	Localised
Duration	Permanent
Magnitude	Low
Probability	Definite
Significance (WOM)	Medium
Significance (WM)	Low
Reversibility	Medium
Irreplaceability	Low
Mitigation	1. Vegetation clearing to be kept to the required footprint 2. Relevant permits to be obtained before construction for flora. 3. Large trees should not be removed unnecessarily where they fall within road verges.
Cumulative Impacts	Clearing will result in minimal cumulative loss of species of special concern and associated habitat
Residual Impacts	Loss of flora is unavoidable and permanent for footprint

[1] WOM: Without Mitigation

[2] WM: With Mitigation

Impact Nature and Description: 3. Increased risk of alien invasion	
Comment	The site is largely free of invasive exotic species, however, disturbances as a result of construction may introduce propagules (seeds) of weeds and other alien species which could proliferate after construction.
Status	Negative
Extent	Localised
Duration	Long-term
Magnitude	Low
Probability	Probable
Significance (WOM)	Medium
Significance (WM)	Low
Reversibility	High
Irreplaceability	Low
Mitigation	1. Topsoil should be stockpiled and replaced after construction is completed. 2. Disturbed areas should be appropriately rehabilitated after construction is completed. 3. Regenerating weeds and other exotic species should be removed after completion.
Cumulative Impacts	Increased disturbances relating to small scale farming expansion are likely to increase proliferation of weeds and other exotic invasive species.
Residual Impacts	Some weed and alien species are likely to persist.

Impact Nature and Description: 4. Increased soil erosion risk	
Comment	Removal of vegetation cover and soil disturbances during construction may result in some erosion during construction, especially if during rainy periods.
Status	Negative
Extent	Localised
Duration	Short-term
Magnitude	Low
Probability	Unlikely (Due to the flat nature of the site)
Significance (WOM)	Very Low
Significance (WM)	Insignificant
Reversibility	High
Irreplaceability	Low
Mitigation	1. Topsoil should be stockpiled and replaced after construction is completed. 2. Disturbed areas should be appropriately rehabilitated after construction is completed. 3. Stormwater control measures to be implemented, especially where erosion may occur, and along water courses.
Cumulative Impacts	Increased disturbances relating to construction are likely to increase risk of erosion, especially where adjacent to watercourses.
Residual Impacts	Some erosion is likely to persist as a result of ongoing human and animal related disturbances during operational phase.

Impact Nature and Description: 5. Loss of faunal habitat as a result of site development

Comment	The site is largely degraded within the footprint and it provides limited habitat for faunal species common to Thornveld.
Status	Negative
Extent	Localised
Duration	Long-term
Magnitude	Low
Probability	Definite
Significance (WOM)	Medium
Significance (WM)	Low
Reversibility	Medium
Irreplaceability	Low
Mitigation	1. Vegetation clearing to be kept to the required footprint 2. Trees should not be removed unnecessarily where they fall within road verges and erven.
Cumulative Impacts	Construction will result in cumulative loss of vegetation and faunal habitat and habitat fragmentation.
Residual Impacts	Loss of vegetation cover and animal habitat is unavoidable and long-term

Impact Nature and Description: 6. Loss of faunal species including species of special concern	
Comment	The site is largely natural within the footprint and it provides limited habitat for faunal species common to Thornveld.
Status	Negative
Extent	Localised
Duration	Long-term
Magnitude	Low
Probability	Probable
Significance (WOM)	Medium
Significance (WM)	Low
Reversibility	Medium
Irreplaceability	Low
Mitigation	1. Relevant permits to be obtained before construction for fauna. 2. A faunal search and rescue operation to be implemented before construction commences
Cumulative Impacts	Activity will result in minimal cumulative loss of faunal species.
Residual Impacts	Loss of vegetation cover and animal habitat is unavoidable and long-term

5 Conclusions and Recommendations

The site is categorised as an area of ecological importance, Due to the low to no diversity of indigenous plant and possible faunal species on the site, the impact is deemed to be of low on a local scale. This ecological zone has, however due to the disturbed nature is classified as being of low Sensitivity and Conservation Importance.

The vegetation unit within the site is well represented and, although not well conserved outside of the study area, it is not considered a significantly threatened ecosystem at this time. Thus, from a regional perspective, the impact is also expected to be low.

All impacts are expected to be localised and of low significance after mitigation.

- All impacts are expected to be localised and of low to moderate significance after mitigation.
- All necessary permits for relocation or destruction of protected fauna and flora are to be obtained timeously BEFORE construction commences and a fauna and flora search and rescue is to be implemented.
- Sensitive No-Go areas to be clearly demarcated during construction phase.
- Any overburden and stockpiled topsoil from the construction footprint should be used during rehabilitation and site closure, rather than imported topsoil.
- Standard site clearing and rehabilitation practices to be applied as per Environmental Management Plan (EMP) guidelines provided in the section below.

5.1 Specific Environmental Specifications: Site Clearing, Re-Vegetation and/or Rehabilitation

The following general guidelines should be followed for the planting and establishment of vegetation in areas that are disturbed during the construction phase, including:

- Slopes
- Disused roads
- Unused storage areas

Rehabilitation refers to the re-establishment of indigenous vegetation with a similar species composition to that which occurred prior to the disturbance. It differs from landscaping, which focuses on the establishment of commercially available plants with the express purpose of obtaining adequate ground cover, and with little regard to the species composition.

5.1.1 Plant Species

Limited literature is available on the selection of suitable indigenous species found within the Limpopo area for re-vegetation and their means of propagation and establishment. Consequently, it is not possible at this stage to provide a detailed list suitable for use on indigenous plant species. Due to this constraint, the following shall apply:

- A wide cross section of all potentially suitable species (particularly grasses) should be used in the re-vegetation programme, in order to achieve adequate cover.
- Disturbed areas should be stabilized and rehabilitated, using those species found to be suitable.
- Additional suitable shrubs, herbaceous species and trees must be planted in order to increase the diversity of rehabilitated areas once adequate cover has been achieved.

5.1.2 Nursery

Harvested seed:

- Indigenous seed can be harvested from areas that are free from alien/invasive vegetation, either at the site prior to clearance, or from suitable neighbouring sites.
- Following harvesting, the seed should be dried under cool airy conditions. The seed must be insect-free and should be stored in containers under cool conditions free of rodents or insects. Wet, mouldy or otherwise damaged seeds are unacceptable.
- Seeds harvested by hand from selected species should be treated and stored separately.

5.1.3 Whole plants

- It will be preferable to establish an on-site nursery (or nurseries) to propagate and supply indigenous plants for rehabilitation.
- Indigenous plants, cuttings and seeds must be collected, propagated and/or stored in a suitable area.
- Nursery plants should be grown from locally obtained seed.
- Plants can to be obtained from areas that are cleared of vegetation or from sites approved by an Environmental Control Officer (ECO).
- In less sensitive and large scale areas, commercially available seed may be suitable. The ECO and/or a rehabilitation specialist should determine and approve the use of commercial seeds.

5.1.4 Mulch

- Mulch should be used in all areas where re-vegetation has taken place.
- Mulch may be obtained either from stockpiled vegetation obtained from the clearing operations, or from areas that are to be denuded of vegetation during any construction or mining activities.
- All mulch must be free of alien species.
- The vegetative material should be reduced by either mechanical means (chipper) or by hand-axing, to sticks no longer than 100 mm.
- Brush-cut mulch must be stored for as short a period as possible, and seed released from stockpiles should be collected for use in the rehabilitation process.
- Compost from a local source can also be utilized as mulch during re-vegetation and rehabilitation of the site, but such compost must be approved of by the ECO to avoid the spread of weeds.
- The compost must be well decayed, friable and free from weed seeds.
- Seed free, half-composted material, such as mulled-bark, should be used as an additive to extend indigenous mulch. No more than 50% compost should be used under these circumstances.
- Wood chips (including bark), which are half composted and have not been treated with preservatives can also be utilized as mulch during re-vegetation and rehabilitation of the site.
- The chips should be no longer than 50 mm in length or breadth.
- Chips should not be made from wood treated with preservatives.
- Half-composted chips should be utilized in preference to non-composted chips.

5.1.5 Slope Stabilizer and Anti-erosion Material

Measures and method statements for slope stabilization and the use of any anti-erosion material should be developed and could include:

- Biodegradable netting/matting
- Log terraces
- Mulch Stabilization
- Compost stabilization
- Sodding and grassing

5.1.6 Fertiliser

No fertiliser should be used on re-vegetated sites

5.1.7 Traffic on Vegetated Areas

- No construction equipment, vehicles or unauthorized personnel should be allowed onto areas that have been vegetated. Only persons or equipment required for the preparation of areas, application of fertilizer and spreading of topsoil should be allowed to operate on these areas.

5.1.8 Site-specific Nursery

- On-site nursery facilities should be erected for the holding of rescued plant material, and the propagation of appropriate species for re-vegetation. The nursery should be suitably located and constructed under the supervision of the ECO.
- The site-specific nursery should be utilized for the cultivation and maintenance of the stocks of living plant material that is required for the re-vegetation and rehabilitation of the site.
- Soil used to cultivate or grow plants should be obtained locally.
- The area where plants are stored should be kept free of weeds.

Within areas indicated as having a high sensitivity, the following shall apply:

- Plant search, rescue and the collection of seed should be conducted.
- The species to be translocated should be determined by a suitably qualified botanist or ecologist prior to the initiation of any works or site clearing operations in the sensitive areas. A preliminary list of potential species of special concern is provided.
- Geophytes (or bulbs) should be collected and, either planted out in seed trays or bags (depending on size) or where appropriate, as determined by the ECO or rehabilitation specialist. These are then to be stored under cool dry conditions at the nursery.
- During plant search and rescue, as much seed as possible should be removed from all indigenous plants in the affected area.
- Seeds should be stored in waterproof containers, free of insects and away from rodents in a cool area, and/or sown directly into the desired area to allow for self-germination as the seasons dictate and/or sown at the storage site/nursery.
- Where possible, the seed collection programme shaould be ongoing to allow for the sowing of seed directly into newly prepared soil in the re-vegetation areas, as and when these areas are ready to receive seed.

5.1.9 Vegetation Clearance

Site Clearance:

- The ECO must be present during vegetation clearing in areas of high and very high sensitivity.
- All cleared areas must be stabilized as soon as possible.
- Areas that are, in the reasonable opinion of the ECO and rehabilitation specialist, less stable, should be stabilized immediately following vegetation clearance.
- Indigenous vegetation from different topsoil types should be stockpiled separately, each to be returned to its respective parent topsoil type.
- Cleared vegetation should be chipped, mulched and stockpiled for future use.
- Stockpile sites should be identified and approved by the ECO.

Topsoil Removal and Stockpiling

- Prior to any earthmoving operations, the site manager must strip and stockpile all topsoil within the works area for subsequent use in the rehabilitation and re-vegetation of the site.
- All topsoil must be stripped and stockpiled separately from subsoil for subsequent use during rehabilitation and re-vegetation.
- The topsoil must be stripped to a depth stipulated by the ECO.
- Topsoil from different soil types should be stockpiled separately and replaced in the same areas from which they were taken.
- The ECO will identify a suitable site for stockpiling, which must not be in areas demarcated as being of high sensitivity.
- Topsoil should be treated with care and precautions taken to prevent unnecessary handling and compaction. In particular, topsoil should not be subject to compaction greater than 1 500kg/m² and not be pushed by a bulldozer for more than 50m. Trucks may not be driven over the stockpiles.
- Unless otherwise instructed, topsoil should not be mixed with any other type of material, nor contaminated with machine oils or any other pollutant.
- Topsoil stockpiles should not exceed 2m in height. It must be ensured that the material does not blow or wash away. If the topsoil is in danger of being washed or blown away, it should be covered with a suitable material, such as mulch and/or seed it with a fast-growing annual grass.
- Topsoil areas shall be demarcated in order to ensure the safekeeping of topsoil and to separate different stockpile types.
- Soil should be stockpiled for as short a period as possible (no greater than 1 – 2 years if possible).
- Stockpiles should be monitored at monthly intervals to identify invasive plants, which shall be removed when they germinate, to prevent contamination of the seed bank.

- Stockpiles must not be covered with materials such as plastic that may cause it to compost, or kill any seeds.
- Before indigenous vegetation clearing or soil removal for stockpiling begins, the alien invasive weeds present must be removed

Preparation of Ground Surfaces for Rehabilitation

- Prior to rehabilitation of the site, all remnants of building materials, concrete foundations, timber and other foreign debris must be removed from the site.
- Before replacing topsoil, all visible weeds must be removed from the placement area and topsoil.
- Compacted soil should be ripped along the contour and hand-trimmed. Topsoil is then be spread evenly over the surface.
- The final prepared surface should not be smooth, but furrowed to follow the natural contours of the land.
- Topsoil should be spread evenly over the surface to a depth specified by the ECO.

Slope Modification and Stabilization

- Cut and fill slopes should be shaped and trimmed to approximate the natural condition and contours as closely as possible and, where possible, be undulating. Levels incongruous to the surrounding landscape should be reshaped using a grader and other earthmoving equipment.
- All cut and fill slopes should be left as rough as possible, and contain ledges to facilitate the accumulation of topsoil. The ledges should be dug at random to appear natural.
- Any eroded areas deeper than 500mm should be either trimmed down by back cutting the slope face or repaired with soil or any other approved method to the satisfaction of the ECO.
- Any slopes containing downward rip marks must be re-landscaped to avoid soil erosion.
- All steep slopes must be stabilised.

5.1.10 Timing of Planting

- If possible, reseeding should occur just prior to/or during the wet season, with replanting occurring just prior to/or during the wet season.
- If planting and reseeding occurs in a dry period, it may be necessary to irrigate plants to ensure their successful establishment.

5.1.11 Establishment of Vegetation

- In the event of dry periods, irrigation may be required in areas recently planted, in order to improve seed germination or seedling establishment.
- All seeded or planted areas, and all shrubs or trees planted, may need to be irrigated.
- Determination of the need to irrigate shall rest with the ECO and rehabilitation expert.
- No fertilizer must be used in the re-vegetation of pristine areas.
- The use of fertilizers shall be carefully controlled by the ECO.
- The site manager shall be responsible for controlling all alien/invasive species.

6 References

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GEO TECHNICAL REPORT

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TEST RESULTS

ENDECON UBUNTU ENGINEERING
P O BOX 477
FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

Project : GA - THOMO
Your Ref :
Our Ref : J24451A
Date Reported : 19/02/2019

SIEVE ANALYSIS, ATTERBERG LIMITS, CBR, UCS(SANS 3001:GR1,GR10,GR12,GR30,GR40)

SAMPLE NO.	Q80	Q81	Q82	Q83
HOLE NO.	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
ROAD NO.	BORROW PIT	BORROWP IT	BORROW PIT	BORROW PIT
DEPTH				
CHAINAGE				
LAYER TYPE				
STABILISED WITH	NATURAL	NATURAL	NATURAL	NATURAL
SUPPLIER				
CURING METHOD	4 DAYS	4 DAYS	4 DAYS	4 DAYS
DESCRIPTION	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL
SIEVE ANALYSIS (% PASSING)				
100 mm		100	100	100
75 mm	100	94	97	94
63 mm	90	91	97	85
50 mm	84	85	88	83
37.5 mm	79	78	78	79
28.0 mm	75	75	70	73
20.0 mm	67	70	62	68
14.0 mm	60	64	54	63
5.0 mm	44	47	40	46
2.0 mm	35	38	32	37
0.425 mm	27	30	24	28
0.075 mm	21	24	19	22
SOIL MORTAR				
COARSE SAND <2.0mm >0.425mm	23	21	25	24
FINE SAND <0.425mm >0.075mm	17	16	16	16
MATERIAL <0.075mm	60	63	59	60
CONSTANTS				
GRADING MODULUS	2.17	2.08	2.25	2.13
PRA CLASSIFICATION	A-1-b(0)	A-1-b(0)	A-1-b(0)	A-1-b(0)
COLTO CLASSIFICATION	G6	G7	G7	G7
TRH CLASSIFICATION	G7	G7	G7	G7
LIQUID LIMIT (%)	25	26	27	26
PLASTICITY INDEX (0.425mm)	SP	5	4	SP
LINEAR SHRINKAGE (%)	1.5	2.5	1.5	1.0
MOD AASHTO				
MAXIMUM DRY DENSITY (kg/m^3)	2076	2185	2041	2064
OPTIMUM MOISTURE CONTENT(%)	7.3	7.2	8.9	7.3
MOULDING MOISTURE (%)	7.0	6.9	8.7	7.2
TYPE OF TEST	CBR	CBR	CBR	CBR
CBR-UCS @ 100% MOD AASHTO	41	39	31	36
CBR-UCS @ 98% MOD AASHTO	33	28	25	29
CBR-UCS @ 97% MOD AASHTO	30	24	22	26
CBR-UCS @ 95% MOD AASHTO	25	18	17	21
CBR-UCS @ 93% MOD AASHTO	19	15	16	16
CBR-UCS @ 90% MOD AASHTO	12	12	14	10

CBR-UCS @ % MOD AASHTO derived from calculation.

% SWELL AT [MOD][NRB][PROC]	0.36	0.76	0.82	0.30	0.56	0.74	0.46	0.61	0.84	0.31	0.45	0.63

Remarks :

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TEST RESULTS

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Attention: LUFUNO

Project : GA - THOMO
Your Ref :
Our Ref : J24451B
Date Reported : 19/02/2019

SIEVE ANALYSIS, ATTERBERG LIMITS, CBR, UCS(SANS 3001:GR1,GR10,GR12,GR30,GR53)

SAMPLE NO.	Q80	Q80A	Q81	Q81A
HOLE NO.	SAMPLE 1	SAMPLE 1	SAMPLE 2	SAMPLE 2
ROAD NO.	BORROW PIT	BORROW PIT	BORROW PIT	BORROW PIT
DEPTH				
CHAINAGE				
LAYER TYPE				
STABILISED WITH	2.0% CEM II, 32.5N	4.0% CEM II, 32.5N	2.0% CEM II, 32.5N	4.0% CEM II, 32.5N
SUPPLIER	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD
CURING METHOD	RAPID	RAPID	RAPID	RAPID
DESCRIPTION	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL
SIEVE ANALYSIS (% PASSING)				
100 mm			100	100
75 mm	100	100	94	94
63 mm	90	90	91	91
50 mm	84	84	85	85
37.5 mm	79	79	78	78
28.0 mm	75	75	75	75
20.0 mm	67	67	70	70
14.0 mm	60	60	64	64
5.0 mm	44	44	47	47
2.0 mm	35	35	38	38
0.425 mm	27	27	30	30
0.075 mm	21	21	24	24
SOIL MORTAR				
COARSE SAND <2.0mm >0.425mm	23	23	21	21
FINE SAND <0.425mm >0.075mm	17	17	16	16
MATERIAL <0.075mm	60	60	63	63
CONSTANTS				
GRADING MODULUS	2.17	2.17	2.08	2.08
PRA CLASSIFICATION	A-1-b(0)	A-1-b(0)	A-1-b(0)	A-1-b(0)
COLTO CLASSIFICATION	C4	C4	-	C3
TRH CLASSIFICATION	C4	C4	-	C3
LIQUID LIMIT (%)	-	-	-	-
PLASTICITY INDEX (0.425mm)	NP	NP	NP	NP
LINEAR SHRINKAGE (%)	0.0	0.0	0.0	0.0
MOD AASHTO				
MAXIMUM DRY DENSITY (kg/m^3)	2056	2056	2083	2083
OPTIMUM MOISTURE CONTENT(%)	6.8	6.8	7.0	7.0
MOULDING MOISTURE (%)	6.6	6.9	6.6	6.9
TYPE OF TEST	UCS (MPa)	UCS (MPa)	UCS (MPa)	UCS (MPa)
CBR-UCS @ 100% MOD AASHTO	0.77 MPa.	1.15 MPa.	0.55 MPa.	1.74 MPa.
CBR-UCS @ 98% MOD AASHTO	0.60 MPa.	0.97 MPa.	0.47 MPa.	1.46 MPa.
CBR-UCS @ 97% MOD AASHTO	0.53 MPa.	0.90 MPa.	0.43 MPa.	1.34 MPa.
CBR-UCS @ 95% MOD AASHTO	0.42 MPa.	0.76 MPa.	0.37 MPa.	1.12 MPa.
CBR-UCS @ 93% MOD AASHTO	0.33 MPa.	0.65 MPa.	0.32 MPa.	0.94 MPa.
CBR-UCS @ 90% MOD AASHTO	0.23 MPa.	0.51 MPa.	0.25 MPa.	0.72 MPa.

CBR-UCS @ % MOD AASHTO derived from calculation.

DEVIATION FROM TEST METHOD: UCS reported to nearest 0.01 MPa.

Remarks :

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TEST RESULTS

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Project : GA - THOMO
Your Ref :
Our Ref : J24451B
Date Reported : 19/02/2019

SIEVE ANALYSIS, ATTERBERG LIMITS, MOD AASHTO, UCS, ITS(SANS 3001:GR1,GR10,GR12,GR30,GR53,GR54)

SAMPLE NO.	Q80	Q80A	Q81	Q81A
HOLE NO.	SAMPLE 1	SAMPLE 1	SAMPLE 2	SAMPLE 2
ROAD NO.	BORROW PIT	BORROW PIT	BORROW PIT	BORROW PIT
DEPTH				
CHAINAGE				
LAYER TYPE				
STABILISED WITH	2.0% CEM II, 32.	4.0% CEM II, 32.	2.0% CEM II, 32.	4.0% CEM II, 32.
SUPPLIER	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD
CURING METHOD	RAPID	RAPID	RAPID	RAPID
DESCRIPTION	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL
SIEVE ANALYSIS (% PASSING)				
75 mm	100	100	94	94
63 mm	90	90	91	91
50 mm	84	84	85	85
37.5 mm	79	79	78	78
28.0 mm	75	75	75	75
20.0 mm	67	67	70	70
14.0 mm	60	60	64	64
5.0 mm	44	44	47	47
2.0 mm	35	35	38	38
0.425 mm	27	27	30	30
0.075 mm	21.1	21.1	24.2	24.2
SOIL MORTAR				
COARSE SAND <2.0mm >0.425mm	23	23	21	21
FINE SAND <0.425mm >0.075mm	17	17	15	15
MATERIAL <0.075mm	60	60	64	64
CONSTANTS				
GRADING MODULUS	2.2	2.2	2.1	2.1
PRA CLASSIFICATION	A-1-b(0)	A-1-b(0)	A-1-b(0)	A-1-b(0)
LIQUID LIMIT (%)	-	-	-	-
PLASTICITY INDEX	NP	NP	NP	NP
LINEAR SHRINKAGE (%)	0.0	0.0	0.0	0.0
MOD AASHTO				
MAXIMUM DRY DENSITY (kg/m^3)	2056	2056	2083	2083
OPTIMUM MOISTURE CONTENT(%)	6.8	6.8	7.0	7.0
MOULDING MOISTURE (%)	6.6	6.9	6.6	6.9
UCS				
1. COMPACTION (%) : UCS (MPa)	100.0 : 0.78	99.9 : 1.14	100.0 : 0.55	100.0 : 1.75
2. COMPACTION (%) : UCS (MPa)	100.0 : 0.78	100.0 : 1.14	99.9 : 0.55	100.0 : 1.75
3. COMPACTION (%) : UCS (MPa)	99.9 : 0.77	99.8 : 1.15	100.0 : 0.55	100.0 : 1.75
AVERAGE COMP.(%) : UCS (MPa)	**100.0 : 0.78**	**99.9 : 1.14**	**100.0 : 0.55**	**100.0 : 1.75**
INDIRECT TENSILE STRENGTH				
1. COMPACTION (%) : ITS (kPa)	100.0 : 110.00	100.0 : 220.00	100.0 : 80.00	100.0 : 180.00
2. COMPACTION (%) : ITS (kPa)	100.0 : 110.00	100.0 : 220.00	100.0 : 90.00	100.0 : 180.00
3. COMPACTION (%) : ITS (kPa)	100.0 : 100.00	9.9 : 220.00	100.0 : 80.00	100.0 : 180.00
AVERAGE COMP.(%) : ITS (kPa)	**100.0 : 110.00**	**70.0 : 220.00**	**100.0 : 80.00**	**100.0 : 180.00**

Remarks :

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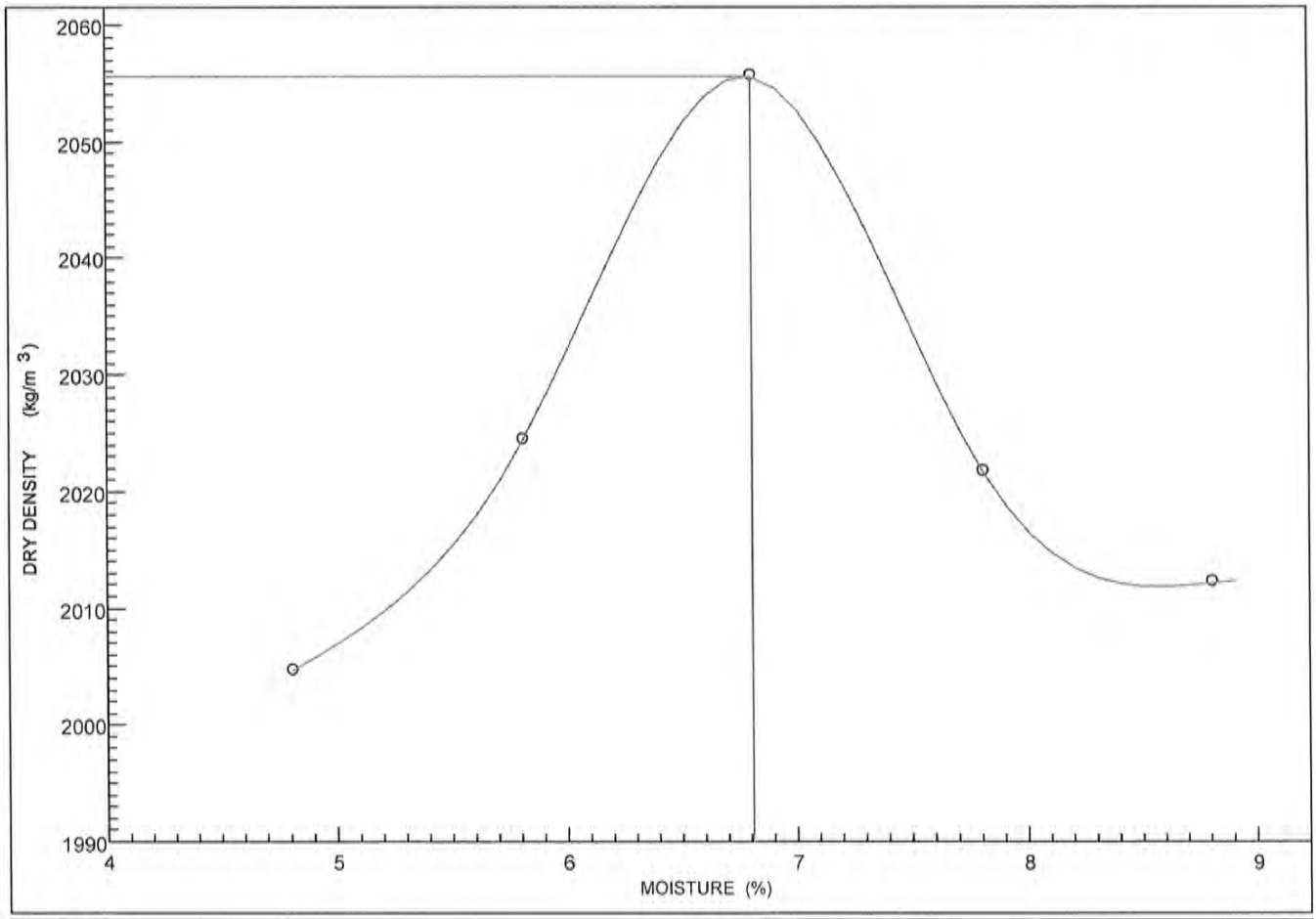
Project : GA - THOMO
Your Ref :
Our Ref : J24451
Date Reported : 19/02/2019

MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q80A	Hole No. : SAMPLE 1	Depth (mm) :
Origin : BORROW PIT	Stabilized With : SURE ROAD 32.5N	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 6.8
Maximum Dry Density (kg/m^3): 2056

Point No.	1	2	3	4	5			
Moisture (%)	4.8	5.8	6.8	7.8	8.8			
Density (kg/m^3)	2005	2024	2056	2022	2012			



Remarks :

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0700
Attention: LUFUNO

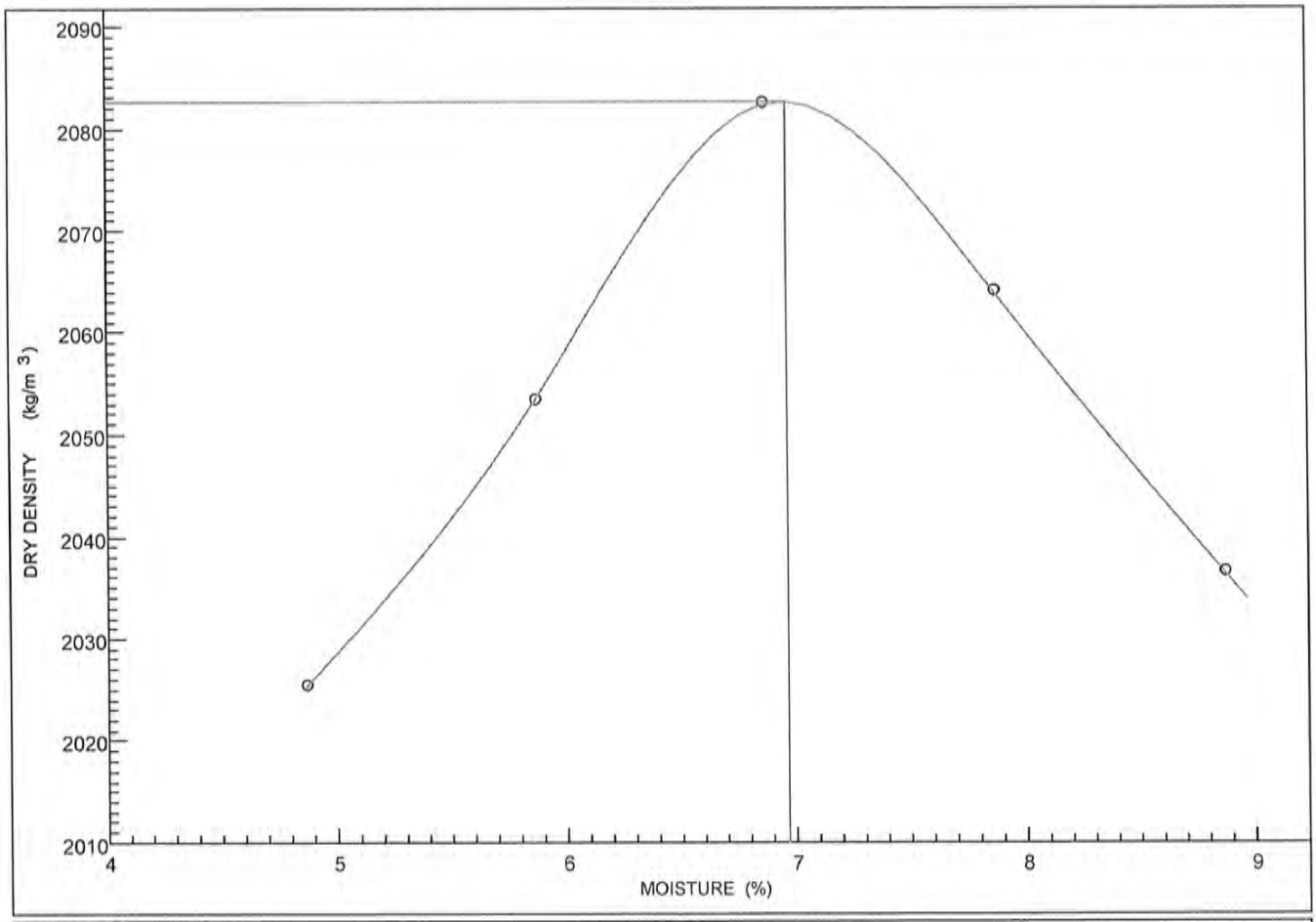
Project : GA - THOMO
Your Ref :
Our Ref : J24451
Date Reported : 19/02/2019

MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q81A	Hole No. : SAMPLE 2	Depth (mm) :
Origin : BORROW PIT	Stabilized With : SURE ROAD 32.5N	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 7.0
Maximum Dry Density (kg/m^3): 2083

Point No.	1	2	3	4	5			
Moisture (%)	4.9	5.9	6.9	7.9	8.9			
Density (kg/m^3)	2025	2053	2082	2064	2036			



Remarks :

FORM: A7

4.4.0(SGS)(2016.08.31)

Technical Signatory : POLLOCK CHUENE

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- CIVIL ENGINEERING SERVICES -
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P O BOX 1576, LADANNA 0704
Tel. : 015 293 1377 / 015 293 1835
Fax : 015 293 0922
Email : pollock.chuene@sgs.com

TEST RESULTS

ENDECON UBUNTU ENGINEERING
P O BOX 477
FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

Project : GA - THOMO
Your Ref :
Our Ref : J24451C
Date Reported : 19/02/2019

SIEVE ANALYSIS, ATTERBERG LIMITS, CBR, UCS(SANS 3001:GR1,GR10,GR12,GR30,GR53)

SAMPLE NO.	Q82	Q82A	Q83	Q83A
HOLE NO.	SAMPLE 3	SAMPLE 3	SAMPLE 4	SAMPLE 4
ROAD NO.	BORROW PIT	BORROW PIT	BORROW PIT	BORROW PIT
DEPTH				
CHAINAGE				
LAYER TYPE				
STABILISED WITH	2.0% CEM II, 32.5N	4.0% CEM II, 32.5N	2.0% CEM II, 32.5N	4.0% CEM II, 32.5N
SUPPLIER	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD
CURING METHOD	RAPID	RAPID	RAPID	RAPID
DESCRIPTION	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL
SIEVE ANALYSIS (% PASSING)				
100 mm	100	100	100	100
75 mm	97	97	94	94
63 mm	97	97	85	85
50 mm	88	88	83	83
37.5 mm	78	78	79	79
28.0 mm	70	70	73	73
20.0 mm	62	62	68	68
14.0 mm	54	54	63	63
5.0 mm	40	40	46	46
2.0 mm	32	32	37	37
0.425 mm	24	24	28	28
0.075 mm	19	19	22	22
SOIL MORTAR				
COARSE SAND <2.0mm >0.425mm	25	25	24	24
FINE SAND <0.425mm >0.075mm	16	16	16	16
MATERIAL <0.075mm	59	59	60	60
CONSTANTS				
GRADING MODULUS	2.25	2.25	2.13	2.13
PRA CLASSIFICATION	A-1-b(0)	A-1-b(0)	A-1-b(0)	A-1-b(0)
COLTO CLASSIFICATION	C4	-	-	C3
TRH CLASSIFICATION	C4	-	-	C3
LIQUID LIMIT (%)	-	-	-	-
PLASTICITY INDEX (0.425mm)	NP	NP	NP	NP
LINEAR SHRINKAGE (%)	0.0	0.0	0.0	0.0
MOD AASHTO				
MAXIMUM DRY DENSITY (kg/m^3)	2016	2016	2019	2019
OPTIMUM MOISTURE CONTENT(%)	7.5	7.5	7.9	7.9
MOULDING MOISTURE (%)	7.2	7.4	7.8	8.1
TYPE OF TEST	UCS (MPa)	UCS (MPa)	UCS (MPa)	UCS (MPa)
CBR-UCS @ 100% MOD AASHTO	0.91 MPa.	1.22 MPa.	0.73 MPa.	1.83 MPa.
CBR-UCS @ 98% MOD AASHTO	0.80 MPa.	1.10 MPa.	0.60 MPa.	1.49 MPa.
CBR-UCS @ 97% MOD AASHTO	0.75 MPa.	1.05 MPa.	0.55 MPa.	1.35 MPa.
CBR-UCS @ 95% MOD AASHTO	0.66 MPa.	0.94 MPa.	0.45 MPa.	1.10 MPa.
CBR-UCS @ 93% MOD AASHTO	0.58 MPa.	0.85 MPa.	0.37 MPa.	0.89 MPa.
CBR-UCS @ 90% MOD AASHTO	0.47 MPa.	0.73 MPa.	0.27 MPa.	0.66 MPa.

CBR-UCS @ % MOD AASHTO derived from calculation.

DEVIATION FROM TEST METHOD: UCS reported to nearest 0.01 MPa.

Remarks :

FORM: A1

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Tel. : 015 293 1377 / 015 293 1835
Fax : 015 293 0922
Email : pollock.chuene@sgs.com

TEST RESULTS

ENDECON UBUNTU ENGINEERING
P O BOX 477
FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

Project : GA - THOMO
Your Ref :
Our Ref : J24451C
Date Reported : 19/02/2019

SIEVE ANALYSIS, ATTERBERG LIMITS, MOD AASHTO, UCS, ITS(SANS 3001:GR1,GR10,GR12,GR30,GR53,GR54)

SAMPLE NO.	Q82	Q82A	Q83	Q83A
HOLE NO.	SAMPLE 3	SAMPLE 3	SAMPLE 4	SAMPLE 4
ROAD NO.	BORROW PIT	BORROW PIT	BORROW PIT	BORROW PIT
DEPTH				
CHAINAGE				
LAYER TYPE				
STABILISED WITH	2.0% CEM II, 32.	4.0% CEM II, 32.	2.0% CEM II, 32.	4.0% CEM II, 32.
SUPPLIER	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD	PPC SURE ROAD
CURING METHOD	RAPID	RAPID	RAPID	RAPID
DESCRIPTION	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL	LIGHT YEL. BROWN SANDY GRAVEL
SIEVE ANALYSIS (% PASSING)				
75 mm	97	97	94	94
63 mm	97	97	85	85
50 mm	88	88	83	83
37.5 mm	78	78	79	79
28.0 mm	70	70	73	73
20.0 mm	62	62	68	68
14.0 mm	54	54	64	64
5.0 mm	40	40	47	47
2.0 mm	32	32	37	37
0.425 mm	24	24	28	28
0.075 mm	19.1	19.1	22.7	22.7
SOIL MORTAR				
COARSE SAND <2.0mm >0.425mm	24	24	23	23
FINE SAND <0.425mm >0.075mm	16	16	15	15
MATERIAL <0.075mm	60	60	62	62
CONSTANTS				
GRADING MODULUS	2.2	2.2	2.1	2.1
PRA CLASSIFICATION	A-1-b(0)	A-1-b(0)	A-1-b(0)	A-1-b(0)
LIQUID LIMIT (%)	-	-	-	-
PLASTICITY INDEX	NP	NP	NP	NP
LINEAR SHRINKAGE (%)	0.0	0.0	0.0	0.0
MOD AASHTO				
MAXIMUM DRY DENSITY (kg/m^3)	2016	2016	2019	2019
OPTIMUM MOISTURE CONTENT(%)	7.5	7.5	7.9	7.9
MOULDING MOISTURE (%)	7.2	7.4	7.8	8.1
UCS				
1. COMPACTION (%) : UCS (MPa)	99.9 : 0.91	100.0 : 1.23	99.9 : 0.73	99.9 : 1.82
2. COMPACTION (%) : UCS (MPa)	100.0 : 0.91	100.0 : 1.22	99.8 : 0.73	99.8 : 1.83
3. COMPACTION (%) : UCS (MPa)	100.0 : 0.91	100.0 : 1.23	100.0 : 0.73	100.0 : 1.83
AVERAGE COMP.(%) : UCS (MPa)	**100.0 : 0.91**	**100.0 : 1.23**	**99.9 : 0.73**	**99.9 : 1.83**
INDIRECT TENSILE STRENGTH				
1. COMPACTION (%) : ITS (kPa)	100.0 : 110.00	100.0 : 220.00	100.0 : 380.00	99.9 : 680.00
2. COMPACTION (%) : ITS (kPa)	99.9 : 110.00	100.0 : 220.00	99.9 : 380.00	99.8 : 680.00
3. COMPACTION (%) : ITS (kPa)	100.0 : 110.00	100.0 : 220.00	100.0 : 380.00	100.0 : 680.00
AVERAGE COMP.(%) : ITS (kPa)	**100.0 : 110.00**	**100.0 : 220.00**	**100.0 : 380.00**	**99.9 : 680.00**

Remarks :

FORM: D1

4.4.0(SGS)(2016.08.31)

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Email : pollock.chuene@sgs.com

TEST RESULTS

ENDECON UBUNTU ENGINEERING
P O BOX 477
FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

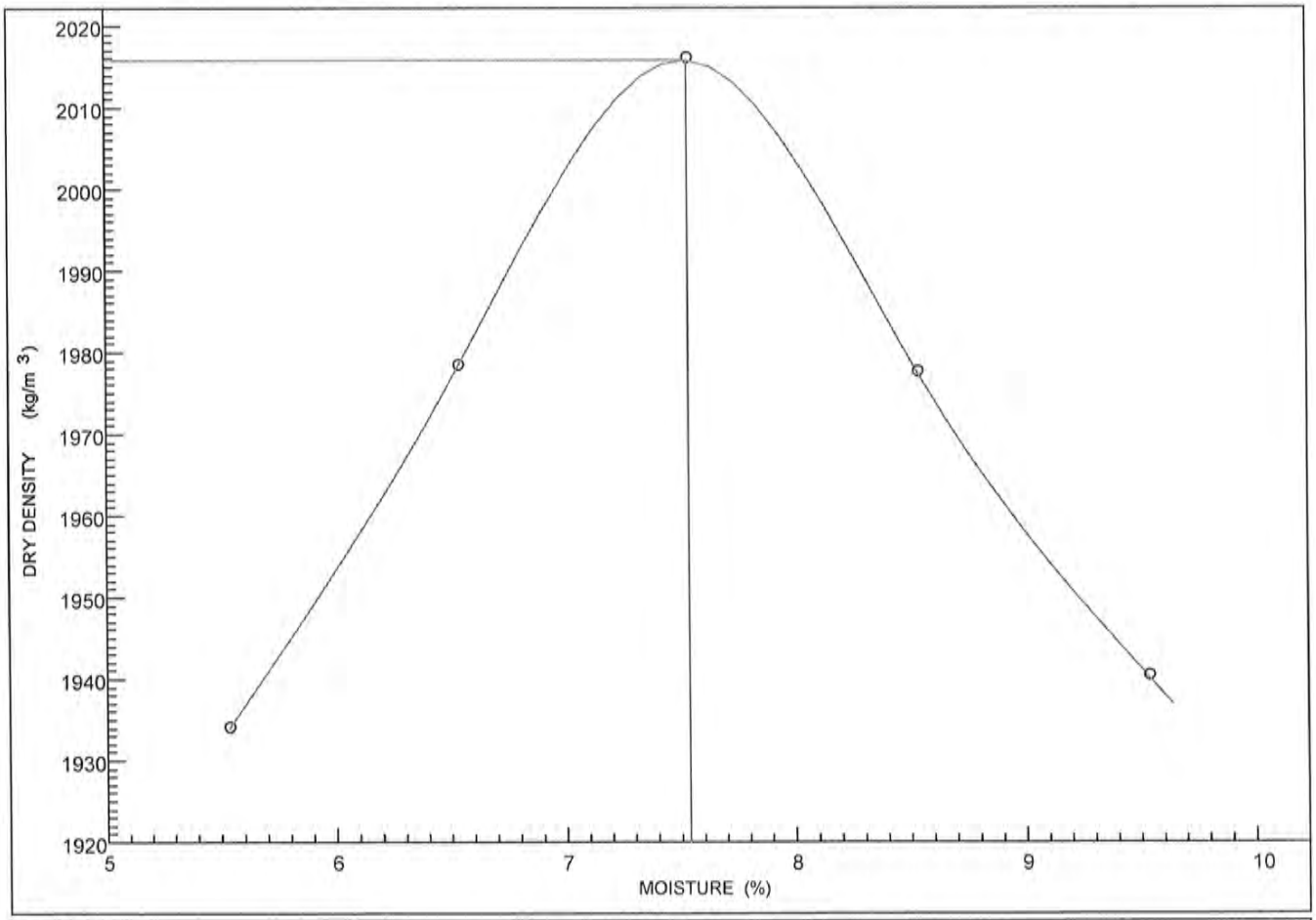
Project : GA - THOMO
Your Ref :
Our Ref : J24451
Date Reported : 19/02/2019

MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q82A	Hole No. : SAMPLE 3	Depth (mm) :
Origin : BORROW PIT	Stabilized With : SURE ROAD 32.5N	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 7.5
Maximum Dry Density (kg/m^3): 2016

Point No.	1	2	3	4	5			
Moisture (%)	5.5	6.5	7.5	8.5	9.5			
Density (kg/m^3)	1934	1978	2016	1977	1940			



Remarks :

FORM: A7

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TEST RESULTS

ENDECON UBUNTU ENGINEERING
P O BOX 477
FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

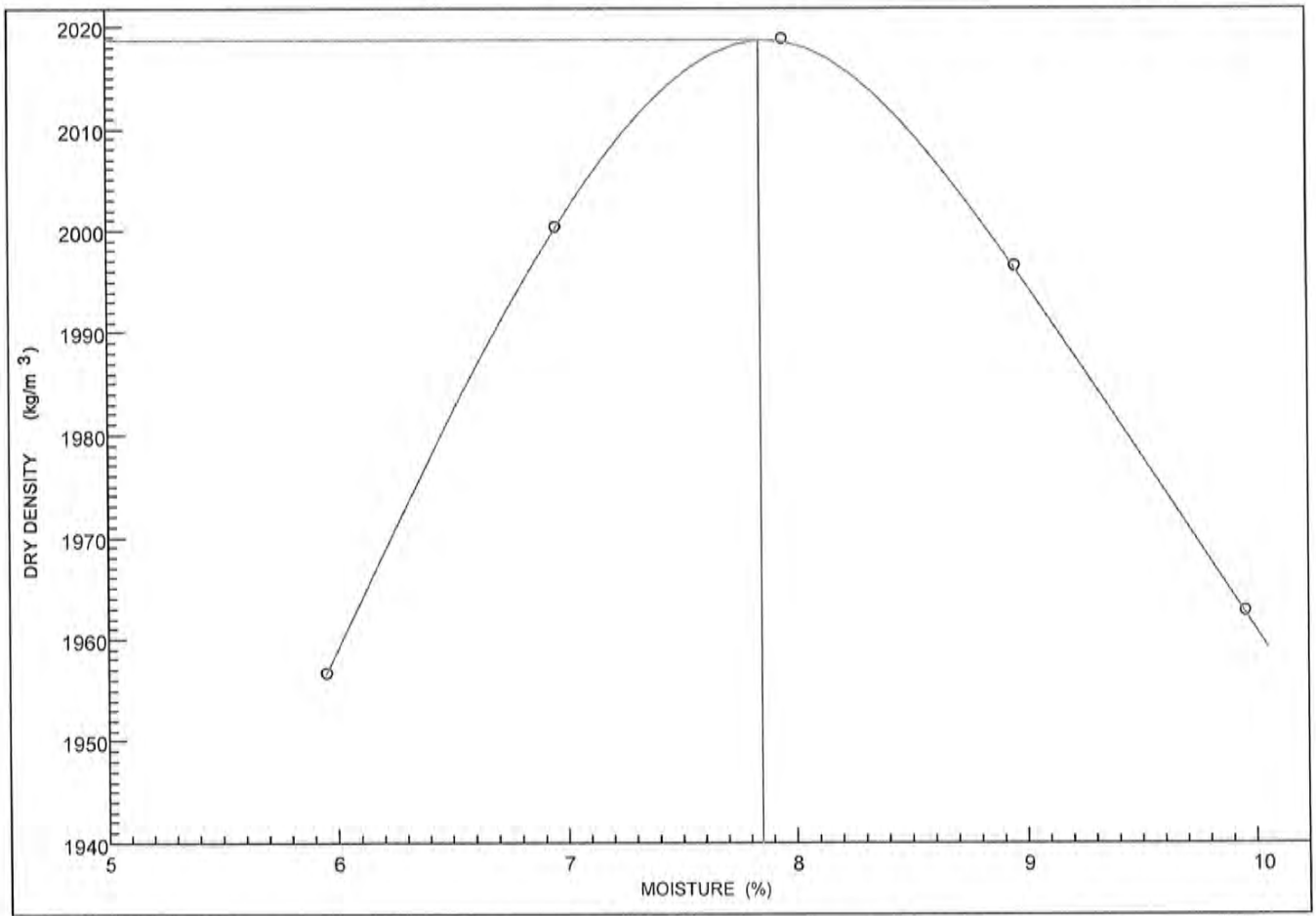
Project : GA - THOMO
Your Ref :
Our Ref : J24451
Date Reported : 19/02/2019

MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q83A	Hole No. : SAMPLE 4	Depth (mm) :
Origin : BORROW PIT	Stabilized With : SURE ROAD 32.5N	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 7.9
Maximum Dry Density (kg/m^3): 2019

Point No.	1	2	3	4	5			
Moisture (%)	6.0	7.0	8.0	9.0	10.0			
Density (kg/m^3)	1957	2000	2019	1996	1963			



Remarks :

FORM: A7

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TEST RESULTS

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FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

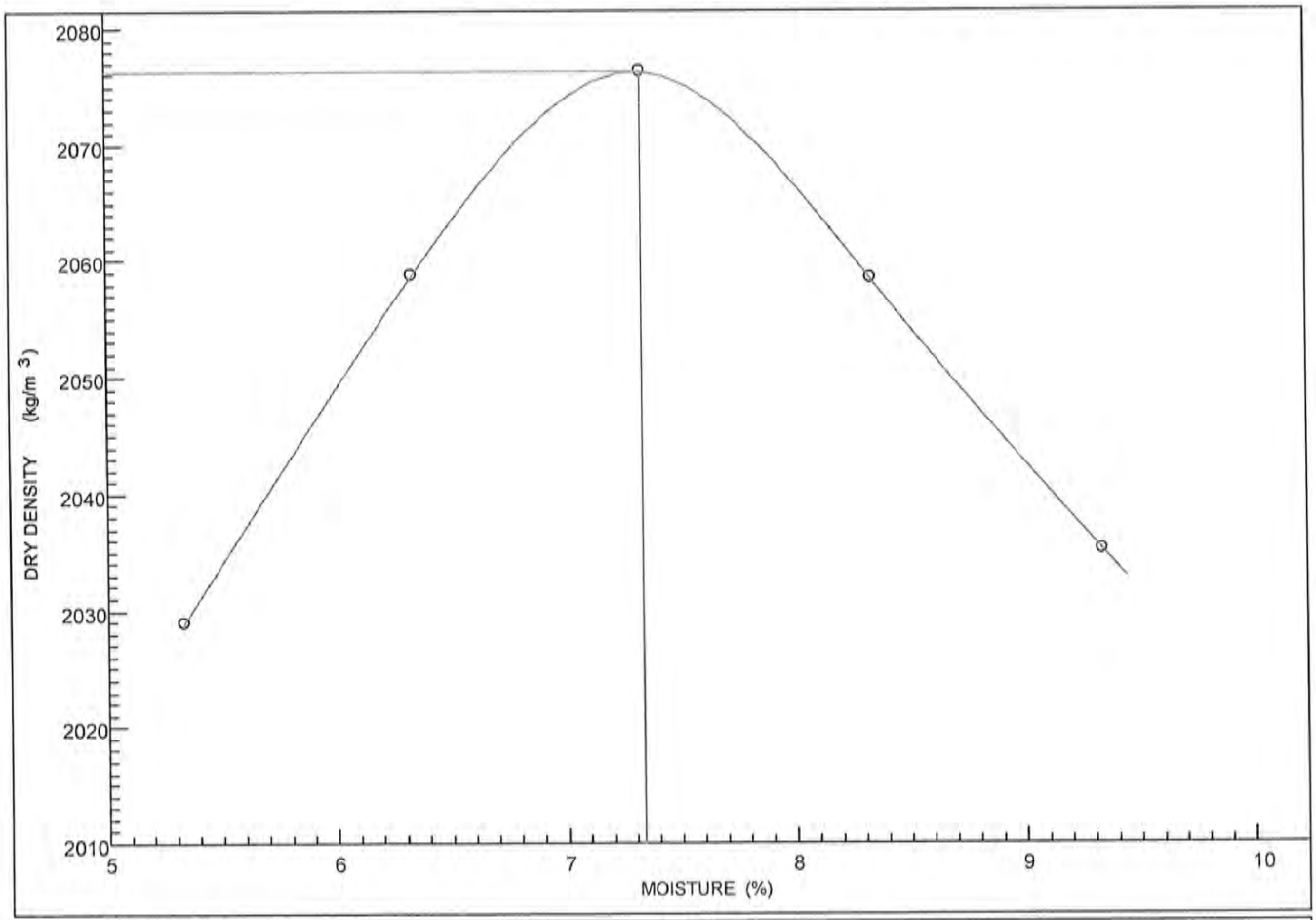
Project : GA - THOMO
Your Ref :
Our Ref : J24451
Date Reported : 19/02/2019

MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q80	Hole No. : SAMPLE 1	Depth (mm) :
Origin : BORROW PIT	Stabilized With : NATURAL	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 7.3
Maximum Dry Density (kg/m^3): 2076

Point No.	1	2	3	4	5			
Moisture (%)	5.3	6.3	7.3	8.3	9.3			
Density (kg/m^3)	2029	2059	2076	2058	2035			



Remarks :

FORM: A7

4.4.0(SGS)(2016.08.31)

Technical Signatory : POLLOCK CHUENE

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- CIVIL ENGINEERING SERVICES -
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Tel. : 015 293 1377 / 015 293 1835
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TEST RESULTS

ENDECON UBUNTU ENGINEERING
P O BOX 477
FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

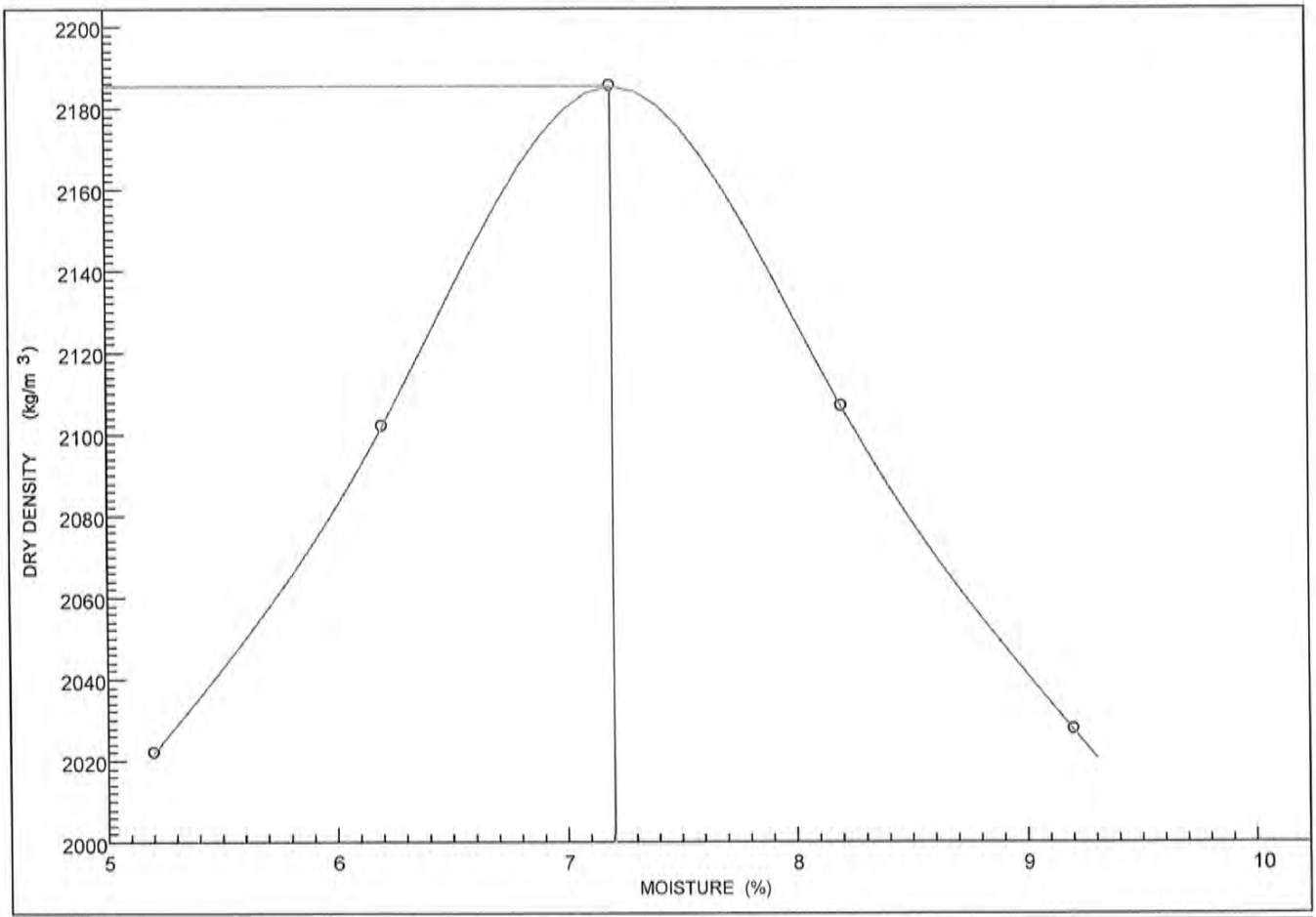
Project : GA - THOMO
Your Ref :
Our Ref : J24451
Date Reported : 19/02/2019

MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q81	Hole No. : SAMPLE 2	Depth (mm) :
Origin : BORROW PIT	Stabilized With : NATURAL	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 7.2
Maximum Dry Density (kg/m^3): 2185

Point No.	1	2	3	4	5			
Moisture (%)	5.2	6.2	7.2	8.2	9.2			
Density (kg/m^3)	2022	2102	2185	2106	2027			



Remarks :

FORM: A7

4.4.0(SGS)(2016.08.31)

Technical Signatory : POLLOCK CHUENE

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- CIVIL ENGINEERING SERVICES -
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TEST RESULTS

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P O BOX 477
FAUNA PARK POLOKWANE
0700
Attention: LUFUNO

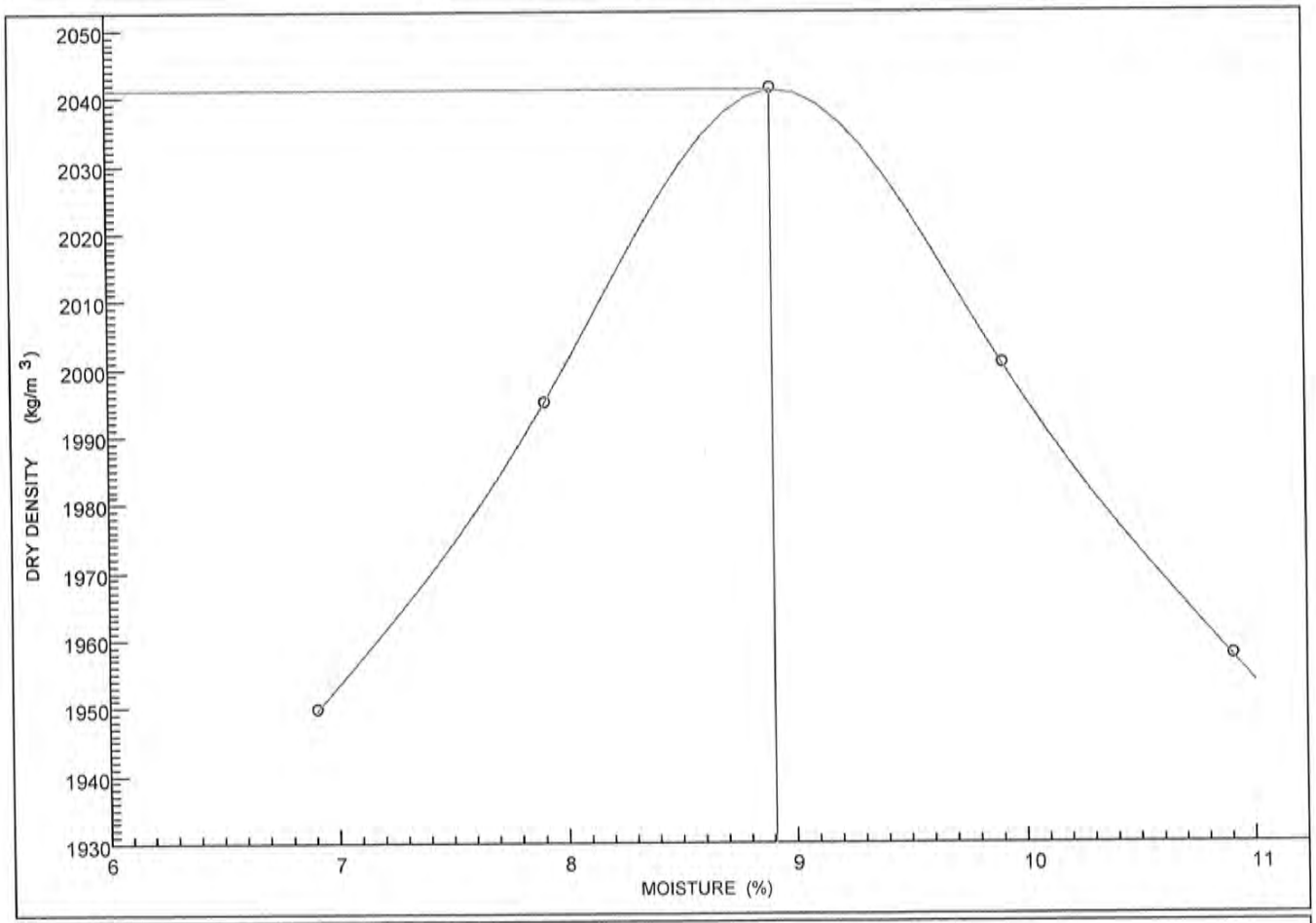
Project : GA - THOMO
Your Ref :
Our Ref : J24451
Date Reported : 19/02/2019

MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q82	Hole No. : SAMPLE 3	Depth (mm) :
Origin : BORROW PIT	Stabilized With : NATURAL	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 8.9
Maximum Dry Density (kg/m^3): 2041

Point No.	1	2	3	4	5			
Moisture (%)	6.9	7.9	8.9	9.9	10.9			
Density (kg/m^3)	1949	1995	2041	2000	1957			



Remarks :

FORM: A7

4.4.0(SGS)(2016.08.31)

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Fax : 015 293 0922
Email : pollock.chuene@sgs.com

TEST RESULTS

ENDECON UBUNTU ENGINEERING P O BOX 477 FAUNA PARK POLOKWANE 0700 Attention: LUFUNO	Project : GA - THOMO Your Ref : Our Ref : J24451 Date Reported : 19/02/2019

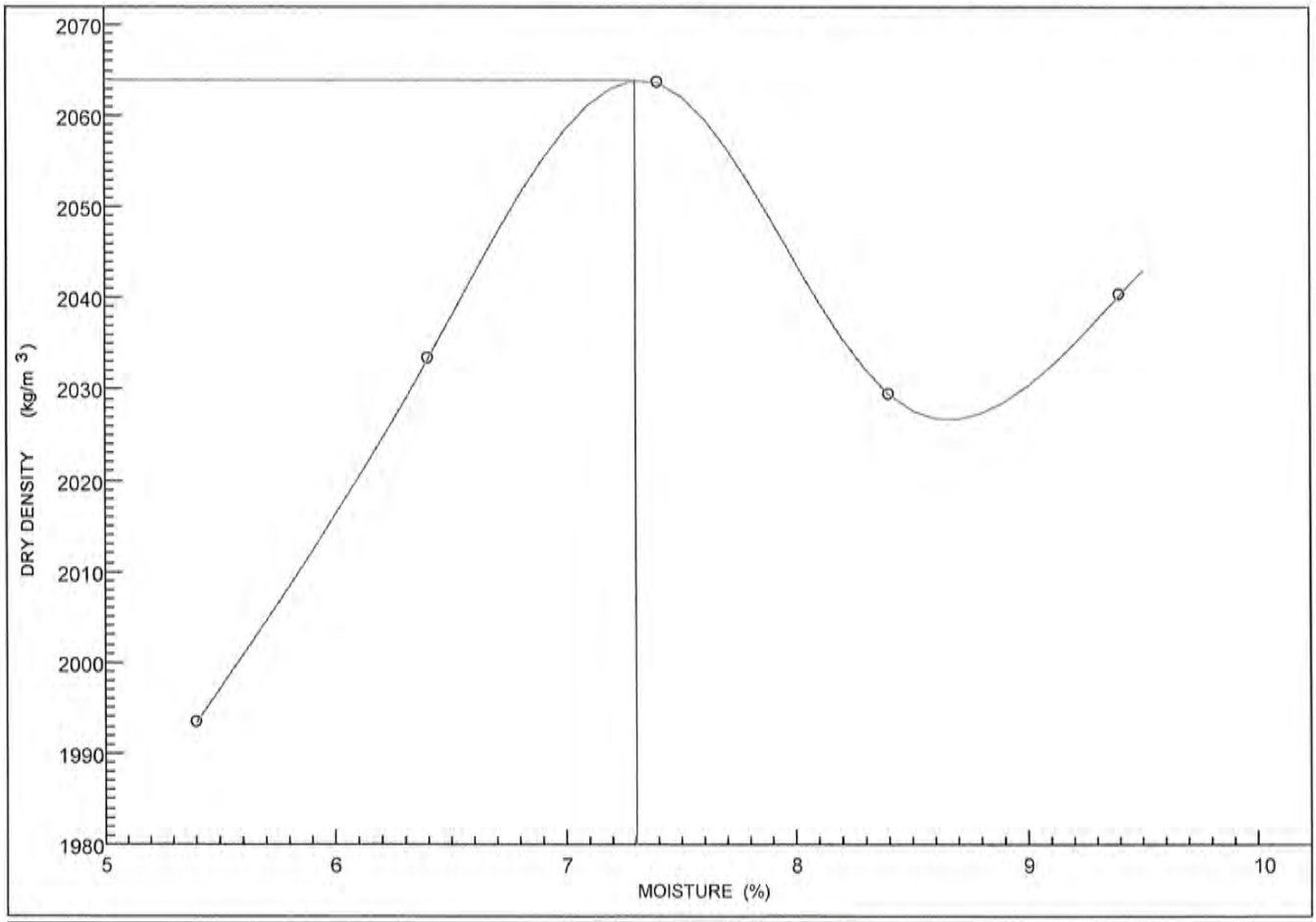
MOISTURE / DENSITY RELATIONSHIP (SANS 3001: GR30)

Sample No.: Q83	Hole No. : SAMPLE 4	Depth (mm) :
Origin : BORROW PIT	Stabilized With : NATURAL	Compaction Energy : MOD AASHTO
Material Description : LIGHT YELLOWISH BROWN SANDY GRAVEL		

Optimum Moisture Content (%) : 7.3

Maximum Dry Density (kg/m^3): 2064

Point No.	1	2	3	4	5			
Moisture (%)	5.4	6.4	7.4	8.4	9.4			
Density (kg/m^3)	1993	2033	2064	2029	2040			



Remarks :

FORM: A7

4.4.0(SGS)(2016.08.31)

Technical Signatory : POLLOCK CHUENE

APPENDIX 6: PUBLIC PARTICIPATION

INTERESTED AND AFFECTED PARTY DATABASE

SECTOR	NAME	SURNAME	COMPANY NAME/ORGANISATION	POSITION
Commenting Authorities	Victor	Mongwe	Department of Economic Development, Environment and Tourism (LEDET)	Director
	Vhonani	Nethononda	Department of Water and Sanitation(DWS)	Licensing
	Richard	Selemela	Department of Agriculture, Forestry and Fisheries (Limpopo Department of Agriculture)	Director
	M. L	Maloko	Mopane District Municipality	
			Greater Giyani Municipality	
Ward Councillor	Basani	Mashele	Greater Giyani Municipality	Ward Councillor
Land Owner/ Headman	Hon.Ben.Gezani	Baloyi	Khakhala Royal Council	Chief
COMMUNITY MEMBERS				

Environmental Impact Assessment for

APPLICATION OF MINING PERMITS FOR BORROWPITS TO BE USED FOR CONSTRUCTION OF ROAD D3810 FROM THOMO TOWARDS KHAKHALA

STAKEHOLDER PARTICIPATION AND INTERESTED AND AFFECTED PARTIES

Name & Surname	Affiliation or Organization	Tel. No	Mobile No.	E-mail Address	Signature
BENNERT BALOYI	KHAKHALA COUNC	0784261013	N/A	N/A	[illegible]
Anndria chauke	Khakhala Council	0632802818	N/A	N/A	[illegible]
Mkhan T.J	Khakhala Coun	0780238501	n/A	n/A	[illegible]
SHIHOLE T.F	KHAKHALA COUNCI	073 4085 423	N/A	N/A	[illegible]
VALOYI M.B	KHAKHALA CHP	5839812 664	N/A	[illegible]@webmail co.za	[illegible]

Page 2 of 2

SITE NOTICES

ADVERTISEMENT

BASIC ASSESSMENT APPLICATION FOR BORROW PIT 1 & 2 - MATERIALS SOURCING FOR CONSTRUCTION / UPGRADING FROM GRAVEL TO TAR OF ROAD D3810 FROM THOMO TO KHAKHALA IN THE MOPANI DISTRICT

PUBLIC PARTICIPATION PROCESS

Notice is hereby given in terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) Regulations, as amended, and the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002), as amended (MPRDA) and the Mineral and Petroleum Resources Development Regulations, as amended for the commencement of a Basic Assessment process and associated Public Participation Process.

APPLICANT: ROADS AGENCY LIMPOPO SOC LTD

PROJECT T825/2018- Design and Construct 3km of Road D3810 from Thomo Village to Khakhala Village, Phase A: Improvement of the Structural Capacity to the Pavement Layers and Phase B: Upgrading of Gravel to Bituminous Surface. As part of this, Borrow Pits must be identified, and an environmental authorisation obtained, for the mining of material. The proposed project is for the Borrow Pits situated along Road D3810, for which a Basic Assessment process will be undertaken.

LOCATION: At Khakhala Village on the Remainder of Farm Greater Giyani 891 LT

APPLICATION FOR ENVIRONMENTAL AUTHORISATION REQUIRED: This project is undertaken in terms of the following (to be confirmed during the application process):

• GNR327 (Listing Notice 1): Listed Activities 20 & 21

OPPORTUNITY TO PARTICIPATE: A Basic Assessment Report (BAR) has been compiled and released for a 30-day public comment and review period from 08 March to 08 April 2019. A copy of the BAR is available to registered Interested and Affected Parties (IAPs)

FOR MORE INFORMATION CONTACT PENVIRO HOLDINGS:

CONTACT: PERCY MHINGA

Tel: 015 295 9025
Fax: 086 535 6159
Email: mhinga@penviro.co.za
Address: P. O Box 11228, Bendor Park, Polokwane, 0713

Regional league weekend results

The South African Football Association (SAFA) Mopani SAB League, stream A and B weekend results.

Saturday, stream A: Gezani United FC 1, Simon Liverpool FC 0; Gwambe Hungry Lion 1, Timangweni FC 1; Hatsama Peace Makers 2, Ralela Flying Birds FC 0; Jackson Young Stars FC 4, John Mabasa UFA 0; Mmboni Junior Chiefs 2, Mokwakwaila Golden City FC 3; Silawa Hotspurs FC 0,

Matsena Giant Killers 0; Sugar Cane FC 5, Lemondokop United FC 1; Wilson Express FC 6, Mamayoha Golden Arrows 1.

Sunday : Matsena Giant Killers 1,Timangweni FC 1; Mmboni Junior Chiefs 0, Silawa Hotspurs FC 2; Wilson Express FC 3, Sugar Cane FC 2.

Saturday, stream B : Ballon Black Vultures 1, Try Again 1; Baobab Zero Fake 8 , Lulekani United FC 0; Burgersdorp United 5, Maatau 0;

City Carlton FC 2, Goal Fighters 0; Foskor Callies FC 4, Hureisic Inter Milan 2; Julesburg Arsenal FC 1, Real Madrid FC 0; Mariveni River Stars 2, Khujwane Peace Makers 3; Mariveni United FC 1, Emmanuel I. Breakers 0; The Rock FC 2, Abino Video Kids FC 0.

Sunday : City Carlton FC 2, Foskor Callies FC 3; Julesburg Young Killers 0, Mariveni United FC 0.

Hot KLG fixtures his weekend

The league matches of the hot and highly competitive Kaizer Letsoalo Games (KLG) Soccer League this weekend will offer a great opportunity for clubs and players to test their readiness for the upcoming Ma-Afrika Freedom Tournament in two weeks time.

According to the Administrator of KLG Sport, the Ma-Afrika Freedom Tournament will kick off on Freedom Day, 27 April and wrap up on May Day, 01 May. The performance of several new teams in the league programme has sharpened the interest of most spectators to see them in a tournament situation. Teams that come to mind include United FC, Lenyenye Gunners and Young Fighters.

Other old teams that have shown clear indications of doing well are the likes of Lephepane Rovers, Royal Celtic, Leswika Classic, Makhubiduni CCV,Manamela Naughty Boys, Rita All Stars, Moime Liverpool, Bokgaga Naughty Boys, Napscom and Golden Aces. However, in a tournament, anything is possible. The draw for the opening rounds of the tournament will be conducted next week Sunday,

10 March.

The KLG Premier and Super division teams have been scheduled for different sports grounds in the settlements of Lephepane, Tlhabine, Makhubiduni, Nabane, Mokomotji, Rita, Moime, Pulaneng, Khujwana,Bokgagaand Mokgoloboto.

Fixtures: KLG Premier Division; Saturday:Mogoboya Junior Chiefs v Lephepane Rovers (Moruleng), Mapantsula v Makhubiduni CCV (Mapantsula ground), Manamela Naughty Boys v Hotbeans (Mmotonewa Ga-Manamela), Sevilla SC v Mokomotji Highlanders (Nabane), Golden Aces v RamalemaCosmsos (Nyekhetlha), Napscom v Leswika Classic (Napscom).

Sunday:Long Valley v Rita All Stars (Mathanzima-Ditsieng), Lephepane Rovers v Bubs (Soccer City), Khopho All Stars v Mmaphala Peter United (Mapantsula), Mogoboya Junior Chiefs v Napscom (Moruleng).

Fixtures: KLG Super Division;KLG Super Green Stream; Saturday: Bahlabine v Bancock (Mosoroni), Bokgaga Naughty Boys Rakoma (Bokgaga), Myakayaka Fast XI v Pulaneng Flying Eagles (Myakayaka)

Sunday: Bokgaga Juventus v Mogapeng Young Chiefs (Bessie Maake), Mothoponi v Monatic (Mothoponi).

KLG Super Yellow Stream; Saturday:Lenyenye Gunners v Moime Celtic (Napscom), Moime Liverpool Mohlaba Cross Super Eagles (Moime).

Sunday: United FC v Khujwana(Charles Mathonsi), Mahlogwe v Khopho Young Stars (Mahlogwe).

VICTORIOUS: Mariveni United team.

Amanandos dent Iron Breakers' flickering title hopes

The 23rd minute first half goal helped Mariveni United to defeat the second placed Emmanuel Iron Breakers by 1-0 in an exhilarating SAFA Mopani SAB League Stream B clash at Nkowankowa Stadium on Saturday.

The Amanandos as United are commonly known's win against Iron Breakers made it four in a row and maintained their ninth points gab on the log Leaders, The Rock FC, which mathematically makes them possible title contenders with five games remaining as their game against Baobab Zero Fake is still pending after Zero Fake supporters disrupted the game towards fulltime while United leading 2-1.

United, who still fourth position despite the victory, started the game pressing high giving the Iron breakers no room to breathe in the middle of the park, trying to score an early goal, with their first attempt on goal came on the opening seven minute after, Mariveni's forward Edwin Berreta's timid effort was dealt with easy by the visitors' goalkeeper, Hluwani Khoza.

The Nkambako outfit, Iron Breakers defenders seemed to have no answers for Berreta, who unsettled them timeously and again as he saw his chance, few seconds after the first one, being parried away by a goalkeeper after miraculously leaving the defender for dead with some fancy moves coming from the left.

The wayward Mariveni striker could have simply found the back of the net in the 9th minute after he benefited from a sleek through pass but he toe poked the ball over the goal post with only the goalkeeper to beat.

Meanwhile Iron Breakers failed to capitalize on the opportunity they created after Oscar Nyambi found a way to bypass defenders on the right wing with only goalkeeper to beat, he opted fora final pass inside the box but the oncoming defenders cleared the ball.

Subsequent to the Iron Breakers missed chance, Ntshuxeko Ngobeni slotted in the only goal of the game for Amanandos in the 23rd minute after a brilliant pass from Berreta inside the box, to reduce the seven points gabbetween them andIron breakers to six and two points adrift of the third placed Baobab Zero Fake.

Glover Mathebula missed opportunity to level matters on the stroke of half time when his effort was excellently saved by the charging goalkeeper,

Hlulani Mbhumbhi, after the striker broke through from Mariveni defenders.

However both teams failed to have much impact in the second half as United seemed content with the lead as they sat back tried to catch Iron Breakers, who came back as the better side after the break, on the counter attack as the game strode to full time.

In the meantime, The Rock FC rubbed salt on the wound as they defeated their opponent, Abino Video Kids FC, who is sitting at the opposite end of the log with no points after 32 games by 2-0 on Saturday to keep their title hopes alive with 85 points, three points clear from Emmanuel Iron Breakers.

APPENDIX 7: IMPACT SIGNIFICANCE CRITERIA

Biodiversity

Vegetation will be permanently removed during the planning and construction phase, which will be a significant local environmental impact. Most animal species will leave this area of land due to the removal of vegetation and the presence of humans on the site. No Critical Biodiversity Areas or Freshwater Ecosystem priority areas have been identified within the project area. There are no red data species within the project area.

Table 1: Impacts on Biodiversity

Criteria	Rating
Extent	Local
Duration	short term
Intensity	Low
Probability of occurrence	Definite
Significance	Low
Degree of confidence	Medium
Significance pre-mitigation	Medium
Significance post mitigation	Low

Table 2: Impacts on Visual Impact

Nature of the impact	Negative and positive
Criteria	Rating
Extent	Local
Duration	Short term
Intensity	Low
Probability of occurrence	Definite
Significance	Low
Degree of confidence	Medium
Significance pre-mitigation	Low
Significance post mitigation	Low

Table 3: Impacts on Archaeological /Heritage Resources

Nature of the impact	Negative
Criteria	Rating
Extent	Local
Duration	Short term
Intensity	High
Probability of occurrence	Probable
Significance	Low
Degree of confidence	Medium
Significance pre-mitigation	High
Significance post mitigation	Low

Table 4: Impacts on Soil

Nature of the impact	Negative
Criteria	Rating
Extent	Local
Duration	Short term
Intensity	Medium
Probability of occurrence	Probable
Significance	Low
Degree of confidence	Medium
Significance pre-mitigation	Low
Significance post mitigation	Low

Noise

There will be an elevation in noise levels due to the movement excavation machinery and trucks that will be used.

Table 5: Impacts on noise

Nature of the impact	Negative
Criteria	Rating
Extent	Short
Duration	Short term

Intensity	Low
Probability of occurrence	Probable
Significance	Low
Degree of confidence	Low
Significance pre-mitigation	Low
Significance post mitigation	Low

Air quality

Air quality could be negatively affected by the operation at the proposed borrow pit because of the exhaust gases from machinery and vehicles on site. Particulate matter will also negatively affect the air quality in the area as dust will be emitted by the operation.

Table 6: Impacts on Air quality

Nature of the impact	Negative
Criteria	Rating
Extent	Local
Duration	Short term
Intensity	Low
Probability of occurrence	Probable
Significance	Low
Degree of confidence	Medium
Significance pre-mitigation	Low
Significance post mitigation	Low

Table 7: Impacts on health and safety

Nature of the impact	Negative
Criteria	Rating
Extent	Local
Duration	Short term
Intensity	Low
Probability of occurrence	Probable
Significance	Low
Degree of confidence	Low
Significance pre-mitigation	Low
Significance post mitigation	Low

Table 8: Impacts on waste

Nature of the impact	Negative
Criteria	Rating
Extent	Local
Duration	Short term
Intensity	Low
Probability of occurrence	Probable
Significance	Low
Degree of confidence	Low
Significance pre-mitigation	Low
Significance post mitigation	Low

Socio-economic

The proposed activity will have a positive impact on the local socio-economic structure through job creation and the skills development of its employees.

Table 9: Socio-Economic impacts

Nature of the impact	Negative and positive
Criteria	Rating
Extent	Local
Duration	Long term
Intensity	High
Probability of occurrence	Probable
Significance	Low
Degree of confidence	Medium
Significance pre-mitigation	Low
Significance post mitigation	Low

Water resources

Spillage of petrochemical and potentially hazardous chemicals may cause ground water pollution. The proposed borrow pit may change the runoff patterns of the landscape and less water will run to streams and rivers as it will stay in the borrow pit.

Table 10: Impact on water resources

Nature of the impact	Negative
Criteria	Rating
Extent	Regional
Duration	Long term
Intensity	Medium
Probability of occurrence	Probable
Significance	High
Degree of confidence	Low
Significance pre-mitigation	High
Significance post mitigation	Low

Assessment of potential cumulative impacts.

The cumulative impacts associated with the proposed project are as follows:

- An increase in traffic on the local roads of the area during the construction phase of the proposed project which may have a cumulative impact on the following:
    - Ambient air quality in the area may be negatively affected with an increase in vehicles and machinery in the area, and
- Noise levels in the area will increase as the cumulative impact of the increase in vehicles and machinery in the area will entail higher noise levels.
- There will be an influx of people in the area during the construction and operational phases;
- Additional water and electrical supply to the area.

However these cumulative impacts are not of a permanent nature and will not remain after the closure of the borrow pit.

Activity	Potential Impact	Aspect Affected	Phase	Mitigation Type	Standard to be achieved.
Loading, hauling and transportation of material to required points of use	- No impact on traffic is anticipated; - None of the loading, hauling or transportation of material will take place on public roads, only existing farm roads; - There is existing access to the borrow area. No new roads are required. This impact is considered insignificant.	Traffic impact	Pre mining		
Nuisance impacts due to pre mining and mining activities	- There are not communities or nearby residents to the borrow pit site.	Cultural Environment	Pre mining Mining		
Excavations	- There are no heritage resources on site	Heritage Resources	Pre mining Mining		
Surface disturbance Stockpiling of topsoil	- Excavations and removal of topsoil may cause erosion on and offsite;	Soil Resources	Pre mining Mining Rehabilitation		

Activity	Potential Impact	Aspect Affected	Phase	Mitigation Type	Standard to be achieved.
	- Topsoil could be lost if not properly stored or rehabilitated post completion of works; - Soils could become compacted and affected their ability to host vegetation (movement of vehicles				
Labourers on site	Domestic waste could lead to other visual impacts and loss of natural habitat. Waste must be collected and disposed of in the same manner as for other construction waste.	Waste Management	Pre mining Mining		
Excavations	Danger of people or fauna entering the mining area and getting injured.	Health and Safety impacts	Mining		
	The mining activities is an essential aspect of the township development	Socio-economic impact			

Activity	Potential Impact	Aspect Affected	Phase	Mitigation Type	Standard to be achieved.
	which may have a potential positive impact on the local socio-economic environment through potential but limited employment opportunities; No short or long-term negative impact associated with the borrow pit on the socio-economic environment is anticipated.				

APPENDIX 8: ROLES AND RESPONSIBILITIES

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting.

List of identified impacts requiring monitoring programmes.

- Visual impacts
- Soil Resources (Storm water and erosion impacts)
- Air Quality (dust generated from excavations and haulage)
- Impact on Flora (ecological)
- Noise impacts
- Waste impacts
- Safety impacts
- Heritage impacts

Functional requirements for monitoring programmes.

The project manager will conduct monitoring on continued bases. Monitoring reports must be compiled by the project manager (or appointed ECO). The compliance of this EMP is to be audited every 3 months.

Roles and responsibilities for the execution of monitoring programmes.

The following role-players have been identified for the execution of the monitoring and management programmes as described in this report:

1) The Applicant

2) Project Manager

3) The Contractor

4) Environmental Control Officer (ECO)

Roles and responsibilities

The practical implementation of the EMP is the responsibility of the Project Manager/Contractor. It is the responsibility of the Applicant to ensure that the Project Manager/ Contractor employees and contractors are capable of complying with all the statutory requirements which must be met in order to mine, which includes the adherence and implementation of the EMP.

The applicant shall ensure that all contractors are contractually bound to adhere to the Environmental Management Programme. All contractors, sub-contractors and suppliers have to give assurance that they understand the Environmental Management Programme and that they undertake to comply with its conditions.

Applicant

Roads Agency Limpopo will be the Mining Permit holder and will be overall responsible entity. The environment affected by the mining operations shall be rehabilitated by the holder, as far as practicable, for future residential development. The affected environment shall be maintained in a stable condition that will not be detrimental to the safety or health of humans and animals and that will not pollute the environment or lead to the degradation thereof.

It is the responsibility of the holder of the mining permit to ensure that the manager on site and the employees are capable of complying with the statutory requirements which must be met in order to mine, which includes the implementation of this EMP.

Responsibilities of the applicant include:

- Establish and maintain a regular and proactive communications with the project manager (PM) and the environmental control officer (ECO);
- Review and comment on environmental reports produced by the ECO; and
- Ensure the EMP is reviewed and updated as necessary.

Project Manager

It will be the PM's responsibility to ensure that conditions set out in this document, as well as all related environmental specifications, are complied with. The PM will ensure that the approved EMP is included in the contract documentation issued to prospective contractors.

Responsibilities of the PM will include:

- Be familiar with the content of the EMP;
- Communicate to the contractor the advice of the ECO and the contents of the ECO reports;
- Review and approve working drawings;
- Issue site instruction, giving effect to the ECO requirements where applicable;
- Review complains received and take appropriate action
- Maintain record of complaints from public and communicate these to the contractor and ECO;
- Discuss with the ECO the application of penalties for non-compliance with the environmental specifications and other possible enforcement measures where necessary;
- Implement temporary work stoppages as advised by the ECO where serious noncompliance have occurred; and facilitate proactive communication between all role players in the interest of effective environmental management.

The Contractor

- Must be familiar with the environmental specifications contained in the EMP and subsequent revisions;

- Comply with the environmental specifications contained in the EMP and subsequent revisions;
- Prepare method statements, programme of activities and plants for the submission to the PM (and ECO);
- Review the site inspection reports and implement recommendations contained therein;
- Notify the PM and ECO, verbally and in writing immediately in the event of any accidental infringements of the environmental specifications and ensure appropriate remedial action takes place;
- Notify the PM and ECO, verbally or in writing at least 10 working days prior to the activity he/she deems may have significant adverse environmental impact, so that mitigatory measures may be implemented timeously;
- Ensure environmental awareness among employees and sub-contractors so that they are fully aware of, and understand, the environmental specifications and the need for them;
- Maintain a register for environmental training for site staff and sub-contractor staff for the duration of the contract;
- Undertake the required works within the designated working areas;
- Communicate and liaise frequently with the PM and ECO to ensure effective environmental management.

Environmental Control Officer

It will be the environmental control officer's (ECO) duty to monitor compliance of the environmental conditions and the specifications attached to the mining of gravel, hence the overall role of the ECO is to be the custodian for the implementation, integration and maintenance of the EMP in accordance to contractual requirements. The ECO will be required to liaise with the PM on the level of compliance with the EMP achieved by the contractor on a regular basis for the duration of the contract.

Responsibilities of the ECO:

- Advise the PM on the interpretation and enforcement of the environmental specifications, including discussions on non-compliances;
- Supply environmental information as and when required;
- Review and approve method statements produced by the contractor with the PM;
- Demarcate sensitive areas and pass instructions to the PM concerning works in these areas.
- To monitor any basic physical changes to the environment as a consequence of the construction works – e.g. evidence of erosion, dust generation and silt loading in runoff;
- To undertake regular audits of the construction works. These audits are to take place every three months and the ECO is to generate quarterly audit reports.

These reports are to be forwarded to the PM, who will see to the further distribution;

- To communicate frequently and openly with the Contractor and the PM to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts;
- To advise the PM on remedial actions for the protection of the environment in the event of any accidents or emergencies during the phases of mining, and to advise on appropriate clean-up activities;
- Review complaints received and make instructions as necessary;
- Identify and make recommendations for minor amendments to the EMP as and when appropriate; and
- Ensure that the Contractor, his employees and/or sub-contractors have received the appropriate environmental awareness training prior to commencing activities.

Committed time frames for monitoring and reporting.

Responsibility	**Task**	**Frequency**
Contractor	Visual inspection	Daily
Project Manager	Visual inspection	Weekly
ECO	Site inspection	Monthly
	Site Audit Report	Every three months

It is anticipated that progress reporting should be undertaken every 3 months and submitted to DMR for the mining activities.

The Contractor is to conduct visual inspections daily during the course of operations with the project manager conducting a visual inspection of each of the site on a weekly basis.

An Environmental Control Officer (ECO) must be appointed to audit the contractor to ensure compliance to the EMP. The borrow pit is to be inspected by the contractor and the ECO on a monthly basis to ensure compliance to the EMP and other relevant regulations, requirements and best practices.

The audits shall aim at addressing environmental issues identified on site and to provide recommendations through the audit reports.

The audit reports shall be provided to the applicant, the Project Managers/Engineers, and the Department of Mineral Resources (DMR) and a copy of the audit report shall be available on site at all times.

TECHNICAL AND MANAGEMENT OPTIONS FOR MITIGATION OF IMPACTS

1 INTRODUCTION

These technical and management processes have been developed to enable the applicant to mitigate negative environmental impacts and to provide a proactive approach to managing identified environmental risks. They provide systematic and explicit mitigation and monitoring measures for the proposed borrow pit so as to ensure that they are implemented during the planning, construction, operational and decommissioning phase of the project. It also mandates the company to internalise the environmental impacts that would otherwise be a social cost.

2 COMPLIANCE WITH LEGISLATION

In addition to the Mineral and Petroleum Resources Development Act, the other relevant legislative provisions that should be adhered to are:

- National Environmental Management: Waste Management Act (Act 59 of 2008)
- National Environmental Management: Air Quality Act (Act 39 of 2004)
- National Heritage Resources Act (Act 25 of 1999)
- Hazardous Substances Act (Act 15 of 1973)
- Environment Conservation Act (Act 73 of 1989)
- Occupational Health and Safety Act (Act 85 of 1993)
- National Water Act (Act 36 of 1998)
- Conservation of Agricultural Resources Act (Act 43 of 1983)
- Explosives Act (Act 26 of 1956)
- National Forest Act, (Act 84 of 1998)
- National Veldt and Forest Fire Act (Act 101 of 1998)

3 PERMITS AND PERMISSIONS

All pertinent permits, approvals and agreements are to be obtained before activities commence on site and the conditions are to be strictly adhered to.

4 GENERAL SITE ESTABLISHMENT

Access at the borrow pit shall be controlled and adequate precautions taken to prevent unauthorized entry to the borrow pit. A fence or other barrier should be erected to restrict access.

- The area must be clearly demarcated along its boundaries.
- Permanent beacons must be firmly erected and maintained in their correct position throughout the life of the operation.
- Resultant operations shall only take place within this demarcated area.
- Borrow pit boundaries shall be signposted and laid out so as to be clearly visible and identifiable.
- Adequate precautions shall be taken to protect persons present at, or in the vicinity of, the borrow pit from risks that may arise from borrow pit operations.

5 MANAGING SOCIAL IMPACT RELATED ISSUES

- The community should be adequately informed in advance of activities being done at the borrow pit that are likely to affect them.
- Labour recruitment should occur in a manner that is objective, transparent, and wherever possible, provide opportunities for people from the local area.
- Priority should be given to the local supplier of goods and services, which meet requirements of project procurement.
- Effective two-way public disclosure and public consultation should be implemented to allay community perceptions. There should be an opportunity provided for the resolution of grievances or complaints received and recorded from individuals in the community.

6 SPECIFIC MITIGATION MEASURES

6.1 MANAGING SOIL IMPACTS

These measures are targeted at managing soil erosion, soil contamination, compaction of soil and removal of topsoil:

- The area that is stripped of vegetation should be kept to an absolute minimum;
- Contractor shall at all times carefully consider what machinery is appropriate to the task while minimizing the extent of environmental damage and unnecessary movements should be prohibited;
- The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process. The soil is to be stored and the soil stockpiles shall not be higher than 2 m or stored for a period longer than one year. The slopes of soil stockpiles shall not be steeper than 1 vertical to 2.5 horizontal;
- Topsoil shall be stored separately from subsoil and other overburden material;
- No vehicles shall be allowed access onto the stockpiles after they have been placed;
- Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation;
- The contractor shall apply soil conservation measures to the stockpiles to prevent erosion;
- Ensure regular maintenance of equipment to prevent diesel and hydraulic spillages;
- Where possible ensure low work surface gradients so that run-off flows at a controlled rate so as to minimize channeling and soil erosion during high rainfall;

- At the end of operations, all disturbed areas shall be re-vegetated.

6.2 LOSS OF VEGETATION

- Clearance of vegetation should be restricted to the absolute minimum required to facilitate access and undertake borrow pit activities. Disturbance of topsoil and vegetation rootstock must be minimized as far as possible.
- Trees larger than 2m should not be removed unless it is absolutely necessary and cannot be avoided.
- No protected species must be removed without a permit. A final walkthrough must be done by an ecologist to ensure that the areas where vegetation is to be cleared do not have protected species.
- Any alien species identified should be cleared.
- Burning of any waste material is not permitted under any circumstances.
- Rehabilitation strategies following operational activities must ensure that appropriate indigenous plant species are used and should be done as per rehabilitation plan

6.3 DUST AND VEHICLE FUMES

- Avoid unnecessary excessive vehicle movement.
- Limit vehicle speeds on un-surfaced roads.
- Rehabilitate disturbed areas with vegetation as soon as operation is completed.
- Maintain equipment and vehicles in good working order to avoid excessive emissions
- Borrow pit working floors should be sprayed with water from time to time to reduce dust emission during operations
- Use rubber curtains/other material to limit dust during screening should be considered.

- Spray roads, material stockpiles and screening areas with water if dust becomes problematic.
- No fires should be allowed on the borrow pit site.

6.4 BLASTING (IF ANY)

- All blasting and handling of blasting materials should be done in accordance with the Explosives Act and the Mine Health and Safety Act
- A risk assessment has to be that takes into account the safety of the people, infrastructure and the surrounding environment. A pre and post blasting survey should be done.
- A blasting time schedule shall be distributed to all surrounding villages indicating the time and date for blasting activities. It is recommended that blasting takes place between 1200hrs and 1500hrs.
- At all times blasting shall be carried out that ground vibration, air blast and scatter are kept within such limits as to avoid damage to adjacent structures/machinery etc already placed at the works. Any fly rock should be cleared after blasting.

6.5 WASTE DISPOSAL

- All personnel must be instructed to dispose of waste in a proper manner.
- Suitable receptacles shall be available at all times and conveniently placed for the disposal of waste.
- No waste shall under any circumstance be disposed of in the veldt. No burning of waste is permitted on site and the borrow pit area must be protected from illegal dumping of waste.
- All used oils, grease or hydraulic fluids shall be placed in appropriate impervious containers and these receptacles will be removed from the site on a regular basis for disposal at a registered or licensed disposal facility or sent for recycling/reuse with a registered facility.

- Spills should be cleaned up immediately by removing the spillage together with the polluted soil and by disposing of them at a recognized facility. In areas where the spills are some, an absorbent agent can be used and the area treated
- Contaminated materials and residues from machinery maintenance and other sources contaminated with hazardous waste should be stored in proper containers that avoid seepage to ground.
- The reduce, reuse, recycle waste management philosophy will be used where possible.
- Only authorized registered waste disposal contractors should be hired for collection of waste for all waste streams.

6.6 SOCIAL IMPACTS

- Effective two-way public disclosure and public consultation should be implemented to allay community perceptions. There should be an opportunity provided for the resolution of grievances or complaints received and recorded from individuals in the community.
- Community should be adequately informed of activities being done at the borrow pit that are likely to affect them.
- Labour recruitment should occur in a manner that is objective, transparent, and wherever possible, provide opportunities for people from the local area.
- The activities of contractors, consultants, and company employees should be routinely reviewed to ensure good community relations are being maintained. The project proponent should use its influence as employer to encourage responsible behaviour among employees.

6.7 STABILITY OF EXCAVATIONS

- Excavations shall take place only within the approved demarcated borrow pit area and appropriate barriers should be put as necessary.

- The borrow pit operator shall ensure that a place of work, whether temporary or permanent in or near the excavation has a structure and solidity appropriate to its use is operated, supervised and maintained, so as to withstand the environmental forces anticipated and be safe.
- The borrow pit operator shall ensure that material is not placed, stacked or used at the borrow pit near the edge of any excavation, where it is likely to endanger people at work and equipment or where it is likely to cause collapse of the side of the excavation.
- Excavations should be routinely inspected. If cracks occur in any structure they need to be investigated to ascertain if there is a risk to safety
- Overburden rocks and coarse material shall be placed concurrently in the excavations or stored adjacent to the excavation, if practicable, to be used as backfill material once the mineral or gravel has been excavated.
- An appropriate drainage provisions must be constructed as necessary to accommodate the surface water movement. If the water table is reached during excavations appropriate pumping facilities should be provided.
- Excavated areas should be kept in a safe and stable manner. No unstable block should be present. Reshaping of the borrow pit may need to be done to ensure that this objective is reached. The profiling should be done to match the surrounding landscape
- The borrow pit should be finished in such a manner that it is self draining
- Top soil should be put back on the surfaces and the areas re-vegetated.

6.8 VISUAL IMPACTS

- The excavated area must serve as a final depositing area for the placement of overburden. Rocks and coarse material removed from the excavation must be dumped into the excavation.
- Once excavation parts that can be filled have been refilled with overburden, rocks and coarse natural materials, the borrow pit shall be profiled with acceptable contours and erosion control measures, the topsoil previously stored shall be returned to its original depth over the area. The profiling

shall be done to match the surrounding landscape as far as is reasonable possible.

- The area shall be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the there may be need for the soil to be analyzed and any deleterious effects on the soil arising from the borrow pit, be corrected and the area be seeded with a vegetation seed mix to his or her specification.

6.9 EQUIPMENT USED ON SITE

- Only well-maintained vehicles and equipment should be operated onsite and all machinery should be serviced regularly during the borrow pit operation.
- The maintenance of vehicles and some equipment used for any purpose during the borrow pit operation will take place only in the maintenance workshops which are not located on the borrow pit. No vehicle may be extensively repaired in any place other than in the maintenance yard
- A maintenance schedule should be prepared in order to ensure that equipment is in is best form so as to no cause unnecessary pollution such as noise, emissions and makes effective use of energy.
- Equipment used in the borrow pit process must be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid.
- Machinery or equipment used on the borrow pit area must not constitute a pollution hazard. No equipment leaking oil should be used. Drip tray should be used to prevent pollution

6.10 NOISE

- Construction activities required outside normal working hours must be approved by the Project Manager, and where necessary, advance warning provided to adjacent residents.

- Noise levels exceeding 85dB shall only be permitted where approved and with appropriate advanced warning to adjacent residents (minimum of 2 days) being provided.
- Noise that could cause a major disturbance should only be carried out during daylight hours and with advance warning provided as above.
- Adequate ear protection should be provided to employees in noisy areas
- No amplified music shall be allowed at the site.
- Construction vehicles and plant to be in good working order.