



**WorleyParsons**  
resources & energy



**Environmental Management Plan for the use of a  
hard rock quarry and a borrow pit in upgrading the  
National Route 6, section 4, south of and at Penhoek  
Pass between kilometres 52.0 and 66.2**

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**Environmental Management Plan for the Use of a Hard Rock Quarry and a Borrow Pit in Upgrading the National Route 6, section 4, south of and at Penhoek Pass between kilometres 52.0 and 66.2**

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## **APPENDICES**

APPENDIX A – Mining Plan

APPENDIX B – Archaeological Heritage Impact Assessment

APPENDIX C – Palaeontological Impact Assessment



## 1 INTRODUCTION

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WorleyParsons RSA has been appointed by the South African National Roads Agency Limited (SANRAL) as consulting engineers for the upgrade of the National Route 6, section 4, south of and at Penhoek Pass between kilometres 52.0 and 66.2. This section of road is between Queenstown and Jamestown in the Eastern Cape Province. The road upgrade requires road building material from the surrounding area.

It is proposed that material for the construction of the road will be sourced along the N6 from an existing borrow pit (at position 31°28'55"S, 26°42'36"E on portion RE/180 of the farm Valschfontein and an existing hard rock quarry at position 31°16'12"S, 26°43'51"E on portion RE/2/103 of the farm Allemans Poort.

Since both proposed mines complement each other in terms of the material (rock and stone) and since they form part of one application, they are dealt with together in this Environmental Management Programme.

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### 1.1 Legal requirements

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The permitting of the materials sources required for the project will have to be undertaken in accordance with the Regulations pertaining to the Minerals and Petroleum Resources Development Act. Specifically, since this is a SANRAL project, the exemptions provisions of Section 106(1) of the Act will apply. A mining permit will not have to be applied for, but the use of any materials sources would be subject to the preparation of an Environmental Management Plan (EMP) compiled in accordance with Regulation 51 of the MPRDA for the hard rock quarry and the borrow pit that are envisaged to be used. It should be noted that the EMP outlined in this document will result in site-specific legal obligations on the part of the proponent.

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### 1.2 Details of the project proponent

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The South African National Roads Agency Limited  
- Southern Region -  
J F van Staden  
SANRAL House, Southern Life Gardens, 70 Second Avenue, Newton Park, Port Elizabeth, 6001  
PO Box 27230, Greenacres, PE, 6057  
Phone: 041 398 3200, fax: 041 398 3222

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### 1.3 Details of the project manager

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WorleyParsons RSA (Pty) Ltd  
Attn: Morne Botha  
34 Mangold Street, Port Elizabeth, 6045



Phone: 041 391 8811, fax: 041 364 3798

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#### **1.4 Details of the Environmental Assessment Practitioner (EAP)**

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This EMPr was prepared by Dr Norbert Klages who is a senior environmental scientist at Arcus GIBB (Pty). Dr Klages is a certified EAP of the interim Certification Board for Environmental Assessment Practitioners of South Africa. He is also a registered Professional Natural Scientist (Ecological Science) with the South African Council for Natural Scientific Professions (Pr.Sci.Nat. No. 400412/04).

He holds a Bachelor of Science Degree: Hanover University, Germany, 1976, Master of Science (*cum laude*): Kiel University, Germany, 1979 and Doctor of Natural Sciences (*cum laude*): Kiel University, Germany, 1983. The contact details are:

Arcus Gibb (Pty) Ltd, PO Box 63703, Greenacres 6057, Port Elizabeth  
Phone: 041 3927500, fax: 041 3639300, email: coastal@gibb.co.za

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#### **1.5 Specialist studies**

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A Phase 1 Archaeological Heritage Impact Assessment, as well as a Palaeontological Impact Assessment, was undertaken for each mine. These reports can be found in Appendix B and Appendix C, respectively, of this report. The Archaeological Heritage Impact Assessment was compiled by Karen v. Reyneveldt, ArchaeoMaps, while the Palaeontological Impact Assessment, was undertaken John Almond, Natura Viva.

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#### **1.6 Owners of the farms on which the mines are situated**

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Borrow pit on portion RE/180 of the farm Valschfontein  
Pieter Jordaan, Post Box 38, Sterkstroom 5425, phone 045 9669157, cell 0829280442

Hard rock quarry on portion RE/2/103 of the farm Allemans Poort  
Rudi Venter, cell 0824142504, crventer@lantic.net

Presently arrangements are being made for SANRAL to acquire legal title for the two mines. The boundaries of the two pieces of land are given in the Appendix.



## **2 DESCRIPTION OF THE PROPOSED ACTIVITIES**

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### **2.1 The road upgrade**

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The project involves the rehabilitation of National Route 6, section 4, south of and at Penhoek Pass between kilometres 52.0 and 66.2. This section of road is between Queenstown and Jamestown in the Eastern Cape Province.

The section of the road before the Penhoek Pass will only be rehabilitated. The existing road reserve is approximately 32 m. The design cross section for the road will be two 3.7 m lanes with two 2.0 m paved shoulders before the pass.

The scope of the project includes the lengthening of the existing climbing lane from foot of the pass (at km 61.2) to the summit (at km 65.9). The effect of this will be an overall widening of the roadway by approximately 5.0 m. The cross section in the pass will be two 3.5 m lanes in a northerly direction and one 3.7 m lane south with two 1.0 m paved shoulders and a 2.5 m concrete drain.

The horizontal alignment starts on the existing alignment and starts to deviate to the east with 1.6 m over the first straight. Over the first horizontal curve the alignment reverts back to the existing alignment to cross over the existing rail bridge. The alignment then starts to deviate around the second horizontal curve into the pass with a deviation of 2 m to the north to accommodate the climbing lane. The alignment reverts back to the existing at the crest of the pass.

The scope includes the widening of stormwater structures along the entire project where appropriate. All 450 mm diameter pipes will be replaced. No watercourses are being crossed by the road section under investigation, and it is never closer than 32 m from any wetland.

The need for the road upgrade was identified by SANRAL based on the condition of the road and on road safety considerations. The upgrade would bring this section of the N6 up to National Road standard, which is responding to the importance of the road in enabling nation-wide efficient transportation of people and goods.

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### **2.2 Proposed mining activities**

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The road upgrade requires road building material from the surrounding area. The existing road layers do not contain sufficient material for the upgrade. Borrow pit and quarry will provide the additional needed material for general fill, selected fill, as well as subgrade and subbase for the road.

It is proposed that material for the construction of the road will be sourced along the N6 from an existing borrow pit at position 31°28'50"S, 26°42'42"E on portion RE/180 of the farm Valschfontein and an existing hard rock quarry at position 31°16'12"S, 26°43'51"E on portion RE/2/103 of the farm Allemans Poort. The locality and site plans of the proposed borrow pit and quarry are included in the Appendix, and more detailed design drawings of the proposed activities are also provided in the Appendix.



The borrow pit is situated directly adjacent to the proposed works. It is an extension of an existing borrow pit. No written documentation has been traced regarding the previous mining activities at this site. The borrow pit extension will have a rectangular shape of approximately 235 x 225 metres (5.3 ha) and is to be mined for weathered dolerite to a depth of 2 - 5 metres. A total quantity of 100 000 m<sup>3</sup> is needed for subbase and fill material to satisfy the road construction needs. The profile has been designed in such a way that the borrow pit will be self-draining towards the north-east corner. Top soil and overburden will be used for the rehabilitation of the borrow pit. The inclined sections of the side walls, the batter, will have a slope of 1:3. Berms to divert storm water will be piled up on the north-western and south-western edges of the borrow pit. The material will be mined by mechanical means with a frontend loader. No blasting will take place on site.

The rock quarry is situated 20.6 km past the northern end of the proposed road works adjacent to the N6. The existing quarry has an oblong shape of 160 m x 60 m. Access is via a bell-mouth to the north and onto the N6. The quarry, approximately 15 m deep, consist of slightly weathered to unweathered widely jointed dolerite. Material from this quarry was used previously for road construction of the N6. Site investigations have indicated that future quarry extension should proceed in a south-easterly direction. Hard rock, slightly weathered dolerite is exposed at the surface in an area of 100 x 60 metres. Total reserves are estimated at 90 000 m<sup>3</sup>, enough to satisfy the needs for 30 000 m<sup>3</sup> G1/G2 material, 20 000 m<sup>3</sup> G4 material and 10 000 m<sup>3</sup> of surfacing stone for the road upgrade under investigation. The rock face of the quarry will be approximately 10 m high from which material is broken in the shape of terracing by means of blasting. A mobile crusher will be brought on site for the grading of the rock into the required dimensions. As indicated in the detailed layout plan provided in the Appendix the crusher, stock pile areas, site office and other facilities will be placed next to the access road off the N6 inside the fenced mining area (9.87 ha). A table with the land budget for the mining area is given in the detailed layout plan. Since the rock reserves exceed the current demand, SANRAL envisages to make future use of this quarry for road maintenance purposes.

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## 2.3 Alternatives

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Nearly all proposed road construction will occur within the existing road reserve of approximately 32 m width. In order to achieve the desired road geometry for the climbing line on the pass, on the uphill side very small parts (a few 100 m<sup>2</sup>) of private land falling into Gelegenfontein 179, Valschfontein 180 and Penhoekberg 181 will have to be acquired by SANRAL through expropriation. This is in process. An alternative site or route for the road was not considered to be a viable option as it would have a much higher impact. Therefore, a route/site alternative was not assessed for this project.

Likewise, material for the construction of the road will be sourced from an existing borrow pit and an existing hard rock quarry along the N6. Therefore the alternative of opening new sources of material was dismissed in having a much greater impact on the environment. There are no feasible alternatives to the proposed method of open cast mining.

Only the preferred alternative will be dealt with in this EMP as other alternatives have been eliminated in the planning phase of this project.





### **3 BASELINE INFORMATION**

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#### **3.1 Geology and soils**

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The mines are underlain by sedimentary and igneous rocks, which together constitute the Karoo Supergroup. Generally, the rocks of the borrow pit are part of the Molteno Formation, whereas the rocks surrounding of the quarry belong to the Elliot Formation. The rock earmarked for quarrying is a dark grey, medium grained dolerite intrusion.

Soils are generally shallow and weakly developed. Crop and horticultural production in most of Inkwanca (borrow pit) and Maletswai (rock quarry) Local Municipalities is severely limited (even with irrigation) due to the dominant soil types.

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#### **3.2 Topography**

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The borrow pit lies in a wide flat valley at a mean altitude of 1585 metres falling slightly from 1594 m in the southwestern corner to 1578 m in the northeastern corner. In the north and in the east, the Salpeterberg and the Penhoekberg rise to 1937 m and 2019 m, respectively.

The rock quarry lies in mountainous country at the right hand edge of the small Holspruit River at a height of 1690 m. In the north, mountains rise to 1857 m and 1843 m, respectively.

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#### **3.3 Climate**

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According to the Environmental Potential Atlas of the Eastern Cape (DEAT 2000) the study area receives between 379 mm and 574 mm of rain per year. Half a metre of rain a year is regarded as the minimum amount required for sustainable (dryland) crop production. Hence life stock farming (sheep and cattle) prevails in the area.

The area is well known for its large amplitude in temperatures ranging from 40 °C to -10 °C. The higher lying areas of experience winter snow and severe frost.

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#### **3.4 Air quality**

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Air quality is typically excellent at both mining sites and is only very slightly affected by exhaust emissions from vehicles passing by on the N6.





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### 3.5 Ground and surface water

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The borrow pit falls into quaternary catchment S10A, which eventually drains into the Kei River. The hard rock quarry falls into the quaternary catchment D13H, which eventually drains into the Orange River.

The small Holspruit River flows past the hard rock quarry some 120 m to the north on the other side of the N6. A dam with dimensions of 980 x 390 m is present 1.9 km to the south-east of the borrow pit. Water accumulates in the deepest parts of the existing borrow pit on a seasonal basis.

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### 3.6 Noise

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The identified borrow pit and the hard rock quarry are both situated in close proximity to the N6 which is a source of noise. Human noise receptors of mining activities are far removed from the borrow pit with the nearest homestead being 1.5 km distant. Noise receptors at the hard rock quarry are two cottages occupied by farm labourers at a distance of 90 m to the east, while a second homestead is present approximately 450 m in the same direction. The two cottages are to be relocated elsewhere on the farm Allemans Poort under the contract with the farmer prior to the commencement of mining at the hard rock quarry so that its occupants are not unduly affected by blasting noise and by flyrock.

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### 3.7 Fauna and flora

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The original vegetation type at the borrow pit site was Tsomo Grassland (Vulnerable) but this was fully transformed when the quarry was opened. The grasses of the genera *Aristida*, *Cynodon*, *Digitaria*, *Eragrostis*, *Heteropogon*, *Hyparrhenia* and *Themeda* are typical for Tsomo grassland. The herbs *Argyrolobium*, *Aster*, *Berkheya*, *Commelina*, *Cyanotis*, *Gazania*, *Helichrysum*, *Oxalis* and *Pelargonium* occur. Low shrubs of the species *Felicia muricata*, *Helichrysum odoratissimum*, *Senecio burchellii*, *Sutera pinnatifida* and *Tephrosia capensis*, as well as *Euryops floribundus* are present.

The original vegetation type at the hard rock quarry site was Stormberg Plateau Grassland, formerly known as the Stormberg Plateau Sweet Veld. Sweet grassland is dominated by *Themeda*, *Pennisetum* and *Merxmuellera*. The Robies Cocksfoot *Tetrachne dregei* is conspicuous on doleritic soil.

The fauna within the area has been affected to varying extents since the advent of commercial farming. Large mammals have largely been hunted out, but bird populations have been less affected in this regard. Recently, with the growth in the popularity of game farming this status quo has been reversed to a limited extent.

Threatened mammals that could occur in the greater study area are the African Weasel (Data Deficient [DD]), South African Hedgehog (Near Threatened [NT]),



Slater's Golden Mole (DD), greater Musk Shrew (DD), Lesser Grey-brown Musk Shrew (DD), White-tailed Rat (Endangered [EN]), and Slogget's Rat (DD).

No reptiles or amphibians of conservation concern were identified at the study area. The bird fauna is not regarded as vulnerable to the mining activities.

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## 3.8 Heritage resources

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### 3.8.1 Paleontological resources

The **hard rock quarry** located some 20 km south of Jamestown is excavated into a large dolerite sill intrusive into the Elliot Formation that shows well-developed polygonal columnar jointing and coarse-grained, pink- and grey-speckled dolerite facies. Good examples of baked country rocks were not seen at this locality and extension of this quarry is unlikely to have any significant impact on fossils preserved within these sediments.

Thermally metamorphosed Molteno sediments – pale greenish-grey, flinty, porcellanous hornfels and quartzites - are encountered adjacent to the N6 just south of the foot of Penhoek Pass as well as in the **borrow pit**. This borrow pit is largely excavated into Karoo dolerite which here shows excellent examples of onion-skin weathering, *sabunga* (weathered dolerite grit) and corestone formation. The Molteno Formation country rocks here have been extensively baked, blocky weathering and are deeply weathered; they are very unlikely to yield useful fossil material.

Dolerite outcrops within the study area are in themselves of no palaeontological significance since these are high temperature igneous rocks emplaced at depth within the Earth's crust. Should, against expectations, substantial fossil remains be exposed during mining, such as vertebrate bones and teeth, plant-rich fossil lenses or dense fossil burrow assemblages, the ECO should safeguard these, preferably *in situ*, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.

### 3.8.2 Archaeological resources

Middle Stone Age archaeological heritage resources, as defined and protected by the National Heritage Resources Act 1999, were identified in low densities at and near the proposed **borrow pit**. The Middle Stone Age was a period of African prehistory. It is generally considered to have begun around 500 000 years ago and ended around 50 - 25 000 years ago. The flake and blade tools present at and near the proposed borrow pit were made by prehistoric humans from rough grained dolerite and are difficult to discern by the untrained eye.

The archaeological specialist study commissioned for this project has rated the low density occurrence of these artefacts at the locale a SAHRA Low Significance and a Generally Protected C Field Rating. The occurrence will be directly impacted on by the proposed development. It is recommended that development proceeds as applied for and that the occurrence be destroyed under a SAHRA Site Destruction Permit. Notwithstanding the intended destruction under permit of the Middle Stone Age artefacts, should , against expectations, substantial other heritage resources be exposed during mining, e.g. human remains, the ECO should safeguard these and



alert SAHRA immediately so that appropriate action can be taken by a professional archaeologist.

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### **3.9 Social and economic environment**

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The road upgrade will improve the condition of the road and road safety. This is a benefit to all road users and to the local community in particular.

The proposed mining operations may create employment opportunities for locals, although the direct benefit is likely to be small owing to the specialised skills needed. The local farming communities will be temporarily inconvenienced by heavy truck traffic transporting road building material from the mines to the road construction site, but measures will be put in place by the contractor to keep this disturbance to a minimum.

## **4 PUBLIC PARTICIPATION PROCESS**

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### **4.1 Consultation with the public and the authorities**

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A public participation process was carried out as part of the Environmental Basic Assessment. A newspaper advertisement was placed and site notices were put up. A Background Information Document informing comprehensively about the proposed activities was distributed to potentially Interested & Affected Parties (I&APs). A meeting with adjacent landowners was held.

Although several people listed their names as I&APs, no specific comments were received regarding the proposed mining of the borrow pit or the hard rock quarry.

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### **4.2 Landowner consultation**

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The details of the owners of the farms on which the mines are situated are provided in section 1.6. Landowner consultation was done by the project engineers (WorleyParsons), who also obtained consent from them. Landowners were also included in the list of registered Interested & Affected Parties for the Basic Assessment process.

## **5 ASSESSMENT OF ENVIRONMENT IMPACTS**

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### **5.1 Potential impacts**

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Potential impacts of the mining operations were assessed as part of the Environmental Basic Assessment. The following impacts were identified:



During mining neighbours and road users potentially will be affected by noise, dust, traffic congestion and other construction related nuisances. These negative impacts will be mostly site specific and temporary, and will have a low magnitude. With mitigation in place the environmental significance is low or very low. This prediction is made with high confidence. Specific impacts during construction are rated in the table below, assuming effective mitigation is implemented.

**Summary rating table of potential impacts identified for the construction phase**

Impact	Extent	Duration	Intensity	Probability	Significance	Status
Ecology	Local	Temporary	Low	Probable	Medium-low	Negative
Erosion, storm water	Site	Temporary	Low	Highly probable	Low	Negative
Socio-economic	Regional	Temporary	Low	Probable	Low	Positive
Noise	Local	Temporary	Low	Highly probable	Low/very low	Negative
Air quality	Local	Temporary	Low	Highly probable	Low	Negative
Waste	Local	Temporary	Low	Improbable	Insignificant	Negative
Traffic	Regional	Temporary	Low	Highly probable	Very low	Negative
Existing services	Local	Temporary	Medium	Improbable	Low	Negative
Archaeological resources	Local	Temporary	Low	Probable	Low	Negative
Cultural heritage resources	Local	Temporary	Low	Improbable	Insignificant	Negative
Palaeontological resources	Local	Temporary	Low	Improbable	Insignificant	Negative

## **6 ENVIRONMENTAL MANAGEMENT PLAN**

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The Environmental Management Plan (EMP) set out in this part of the document is legally binding in terms of the Mineral and Petroleum Resources Development Act 28 of 1992 and its Regulations.

As the EMP is a working document, changes may be made with regards the enforcement of stricter specifications, or future extension of the mine area (life of mine), as well as the consideration of Best Available Technology Not Entailing Extensive Cost (BATNEEC). Any changes to the EMP will be submitted to the Department of Mineral Resources for approval before any related work is implemented.

Over and above the environmental management procedures listed in this report, it is imperative that staff be educated through an environmental awareness programme. Implementation of the programme is the responsibility of management, who are advised to seek the assistance of a professional environmental educator/facilitator.

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### **6.1 Responsibilities and duties**

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#### **6.1.1 Proponent**

The South African National Roads Agency Limited (SANRAL) will be the mining right holder and will be the overall responsible entity.



The responsibilities of the proponent will include the following:

- Establish and maintain regular and proactive communications with the PM and ECO.
- Review and comment on environmental reports produced by the ECO.
- Ensure that the EMPr is reviewed and updated as necessary.

### **6.1.2 Project manager**

SANRAL has appointed WorleyParson RSA as the Project Manager (PM), delegating a part of its overall duties to the PM. Hence, 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 EMPr is included in the contract documentation issued to prospective contractors.

The PM's responsibilities will include:

- Be familiar with the contents of the EMPr.
- Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports.
- Request for, review and approve the Method Statements prepared by the Contractor in consultation with the ECO.
- Review and approve drawings produced by the Contractor or professional team in connection with, for example, the construction site layout, access/haul roads and so on.
- Issue site instructions giving effect to the ECO requirements where applicable.
- Review complaints received and make instructions as necessary.
- Maintain a record of complaints from the public and communicate these to the Contractor and the ECO.
- Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, and other possible enforcement measures when necessary.
- Issue penalties as and when necessary.
- Implement Temporary Work Stoppages as advised by the ECO, where serious environmental infringements and non-compliances have occurred.
- Facilitate proactive communication between all role-players in the interests of effective environmental management.

### **6.1.3 Contractor**

The Contractor is the main organisation appointed by the Proponent through the Project Manager, to undertake mining activities at the borrow pit and at the hard rock quarry.

The Contractor's responsibilities include:

- Be familiar with the contents of the EMPr.
- Comply with the Environmental Specifications contained in the EMPr and subsequent revisions.
- Prepare Method Statements, programme of activities and drawings/plans for submission to the PM (and ECO).
- Review the site inspection reports and take cognisance of the information and implement recommendations contained therein.
- Notify the ECO and PM, verbally and in writing, immediately in the event of any accidental infringements of the Environmental Specifications and ensure appropriate remedial action is taken.



- Notify the ECO and PM, verbally and in writing at least 10 working days in advance of any activity he/she has reason to believe may have significant adverse environmental impacts, so that mitigatory measures may be implemented timeously.
- Ensure environmental awareness among employees, sub-contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them.
- Maintain a register of environmental training for site staff and sub-contractor's staff for the duration of the contract.
- Undertake the required works within the designated working areas.
- Rehabilitating services, utilities, private/public property and other areas adversely affected by construction activities outside of demarcated areas in accordance with the PM's instructions.
- Communicate and liaise frequently and openly with the PM and ECO to ensure effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts.

#### **6.1.4 Environmental Control Officer**

It will be the Environmental Control Officer's (ECO) duty to monitor compliance of the environmental conditions and specifications attached to the mining of road building material. Hence, the overall role of the ECO is to be the site 'custodian' for the implementation, integration and maintenance of the EMPr in accordance with the contractual requirements. The ECO will be required to liaise with the PM on the level of compliance with the EMPr achieved by the Contractor on a regular basis for the duration of the contract.

The ECO responsibilities include:

- To advise the PM on the interpretation and enforcement of the Environmental Specifications (ES), including discussions on non-compliances.
- To supply environmental information as and when required.
- To review and approve Method Statements produced by the Contractor with the PM.
- To demarcate particularly sensitive areas (including all No-Go areas) and to pass instructions through 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.
- Attend regular site meetings between engineers and contractors.
- To undertake regular monthly audits of the construction works and to generate monthly 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 construction, 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 EMPr as and when appropriate.





- Ensure that the Contractor, his employees and/or Sub-Contractors receive the appropriate environmental awareness training prior to commencing activities.

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## 6.2 Pre-mining phase

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### 6.2.1 Site preparation

This phase will consist of clearing the site of vegetation, topsoil and overburden in order to expose the underlying material to be utilised. Topsoil will be cleared by means of a bulldozer and stockpiled adjacent to the active mining area. Site clearing must be restricted to what is absolutely necessary for the efficient mining of the road building material.

Stockpiles will be no more than 2 m in height. Stockpiles will be positioned below the stormwater diversion berm, where necessary, in order to prevent erosion. Topsoil stockpiles will be positioned separately from the overburden stockpiles and will not be compacted.

### 6.2.2 Conservation of heritage resources

Should any items of historical or archaeological importance be uncovered during the development and operation of the borrow pit, all activities must cease until the South African Heritage Resources Agency (SAHRA) has been notified. Further mining will only proceed once the go-ahead has been received from SAHRA.

Middle Stone Age stone tools and blades have been located towards the south of the study within the road reserve at Hazelmere on the farm Hans Donsies Kraal and at the proposed borrow pit. The heritage resources present the proposed borrow pit will need to be destroyed. Any conditions attached to the SAHRA destruction permit must be strictly adhered to. The heritage resources present within the road reserve at Hazelmere on the farm Hans Donsies Kraal occur for approximately 600 m (from S31°30'28.4"; E26°41'17.1" to S31°30'16.9"; E26°41'29.5") along the western side of the proposed alignment. It will be conserved in situ. During road construction this section will be demarcated with danger tape and will be declared a no-go area. At the end of the construction period, a sign will be erected at the centre of the occurrence to indicate that the site is formally protected under the NHRA 1999 and that any damage thereto or impact thereon is prohibited by law. In addition the sign should indicate a reference for purposes of future identification, namely 'Site N6-4.S1'. The sign board should be approximately 60 - 80 cm x 40 - 50 cm in size which will provide for a reasonable size sign with clear legible lettering. Sign boards are usually done by professional sign writers (durability) on a metal board and fixed to a treated wooden or metal pole. Sign boards can be in a basic colour (black / white / green / blue) with any font type (lettering in black / white). It is recommended that the sign post be done in English.

*MIDDLE STONE AGE  
Penhoek Pass – Upgrade of the N6-4  
Site N6-4.S1*

*THIS SITE IS FORMALLY PROTECTED BY SAHRA UNDER THE NATIONAL  
HERITAGE RESOURCES ACT, NO 25 OF 1999  
Any unauthorized impact thereon or damage thereto is prohibited by law*





### **6.2.3 Fencing**

Before any activities commence, a standard stock fence will be erected to prevent unlawful entry to the mining area as well as for safety reasons. Access to the proposed mining area must be controlled and the gate must remain locked.

### **6.2.4 Roads**

Access to the proposed mining area will be gained off the N6 onto the gravel farm road. A gravel access road will be constructed from this road to the mining area as indicated on the mining plan in the **Appendix**.

### **6.2.5 Traffic safety**

To ensure road safety heavy vehicle signs must be erected at the access point to the mining areas as per provisions of the Road Traffic Act. Traffic safety measures will be implemented at the exit point of the quarry and of the borrow pit which connects to the N6.

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## **6.3 Mining phase**

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Road construction material mined from the borrow pit and the hard rock quarry will be transported from the workface to the stock pile area where it will be collected from by trucks and transported to the point of use. Oversize rock will be crushed first to the preferred size and then stockpiled on site,

### **6.3.1 Limitation of activities**

All mining must take place in accordance with the provisions made in this EMP and with applicable mine health and safety regulations. Activities not covered by the EMP may not commence at the site until the DMR has assessed and approved the necessary documentation in this regard.

No trespassing on properties adjacent to the approved mine areas will be allowed. Poaching of wild animals, picking of wildflowers and interference with livestock is prohibited.

### **6.3.2 Solid waste management**

No burning, burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted

Insignificant amounts of general domestic waste will be generated on site at the quarry and the borrow pit. Waste generated on site should be moved to the construction camp site and disposed of at a registered/permitted waste disposal site. All vehicle maintenance will take place at a designated area in the construction camp. Scrap metal produced during machinery and vehicle maintenance will be stored in a specified area at the construction camp until removed for recycling.

Hazardous wastes, including used oil and batteries will be stored in tamper proof containers and should be disposed of at the nearest hazardous waste disposal site.



The only mine residue produced will be overburden. This will be stockpiled in a specified area and returned to the excavation on closure.

### **6.3.3 Sanitation**

Adequate washing and toilet facilities are to be provided at the construction site camp.

Portable chemical toilets at a ratio of one toilet per 15 workers shall be provided at the site camp. Portable toilets must be at least 50 meters from any water bodies.

All temporary/portable toilets shall be secured to the ground to the satisfaction of the PM to prevent them from toppling over or being blown over. The type and exact location of the toilets shall be approved by the PM prior to establishment. No septic tanks or pit latrines are to be established.

The Contractor shall ensure maintenance of all toilets in a clean sanitary condition to the satisfaction of the PM. Toilets are to be serviced twice per week and toilet paper shall be provided. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility. The toilet contractor is to provide proof that the toilet contents are disposed of at an appropriate facility.

Discharge of waste from toilets into the environment and burial of toilet waste is strictly prohibited.

### **6.3.4 Storm water management**

The entire work site must be monitored regularly for evidence of erosion.

The Contractor shall take reasonable measures to control storm water and the erosive effects thereof. Areas susceptible to erosion should be protected by installing adequate temporary and permanent drainage works as soon as possible and by taking measures to prevent the surface water from being concentrated in streams and from scouring slopes, banks or other areas. The erosion prevention measures must be implemented to the satisfaction of the PM.

The storm water diversion berms indicated in the mining plan must be established at the start of the mining operations.

Traffic movement over stabilised areas shall be restricted and controlled. Any damage to the stabilised areas shall be repaired and maintained to the satisfaction of the PM.

### **6.3.5 Water supply**

No well may be sunk or borehole drilled at the mines without prior authorisation from the Department of Water Affairs. Potable water for will be brought onto site on a daily basis by the mine operator. Water for dust suppression along the access roads and at crushing sites is to be brought in by tanker from established boreholes or wells.

### **6.3.6 Noise control**

The contractor shall keep noise level within acceptable limits. The Contractor shall comply with all relevant guidelines and regulations. The use of all plant and machinery shall be appropriate to the task required in order to reduce noise levels.



All vehicles and machinery shall be fitted with appropriate silencing technology that shall be properly maintained.

Any complaints received by the Contractor regarding noise will be recorded and communicated to the PM.

#### **6.3.7 Dust control**

The Contractor shall be responsible for the control of dust arising from his operations and activities.

Control measures shall include regular spraying of working/exposed areas with water at an application rate that will not result in soil erosion or runoff. The frequency of spraying will be agreed with the PM.

The excavation, handling and transport of erodible materials shall be avoided under high wind conditions. Top soil stockpiles shall be wetted and/or sheltered from the wind with a cover.

#### **6.3.8 Fire prevention**

The Contractor shall take all reasonable and precautionary steps to ensure that fires are not started as a consequence of his activities on site.

The Contractor shall ensure that there is basic fire-fighting equipment available on site.

Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires. Smoking shall not be permitted in those areas where there is a fire hazard. These areas shall include: fuel storage areas, any areas where vegetation or other material is such as to make likely the rapid spread of an initial flame.

The Contractor shall hold fire prevention talks with staff to create an awareness of the risks of fire.

#### **6.3.9 Pollution prevention**

Any fuel or oil spillages must be addressed immediately, removed from the mine and be disposed of at a licensed facility.

Drip trays must be placed under parked vehicles when refuelling or servicing. Leaking equipment must be repaired immediately.

#### **6.3.10 Weed and invasive plant control**

The proponent will be responsible for weed and invader control in order to conserve the natural agricultural resources on adjacent land.

#### **6.3.11 Emergency procedures**

The Contractor must comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety



Act, 1993, the NEMA, 1998, the National Water Act, 1998 and the National Veld and Forest Fire Act, 1998 as amended as well as any other relevant legislation.

The Contractor shall ensure that his employees and subcontractors on site are aware of the procedure for dealing with spills and leaks. Relevant emergency telephone contact numbers shall be displayed at the site office.

The Contractor shall also ensure that the necessary materials and equipment for dealing with the spills and leaks are available on site at all times.

The site shall have a supply of absorbent material readily available to absorb any emergency hydrocarbon spills, and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such material shall be able to deal with a minimum of 200 litres of spill.

If a spill has occurred, the affected area shall be cordoned off and secured. The Contractor shall notify the PM and relevant authorities of any spills that occur.

#### **6.3.12 Health and safety**

This EMP is not a replacement for a dedicated Health & Safety Plan. It is the Contractor's responsibility to meet the requirements of the Occupational Health & Safety Act prior to the commencement and during any physical work on site.

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### **6.4 Mine closure phase**

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#### **6.4.1 Termination of mining**

If mining is to be terminated, either temporarily or permanently, the DMR must be notified 14 days prior to the cessation of mining.

#### **6.4.2 Borrow pit rehabilitation**

After the end of mining the borrow pit will be rehabilitated in its entirety. Rehabilitation will extend to the adjacent area that was mined previously by another party (not SANRAL) and was left as is.

All equipment and temporarily erected structures, such as the site office, will be removed from the site. The site will be cleared of all litter and scrap, which may have accumulated.

Suitable earthmoving machinery will be used to profile the quarry sidewalls to the final slope as per specification in the layout plan in the Appendix, and to slope the floor of the quarry. Spoil material from the construction areas will be used to profile the borrow pit areas and assist in the rehabilitation process.

Topsoil will be returned to the site, and its vegetation cover will be monitored according to the rehabilitation plan. Temporary access roads will be scarified to facilitate revegetation.



Fences, the access gate and stormwater control structures that may have been implemented (earth berms, spill way and energy dissipaters) will only be removed once closure of the mining areas has been granted by the DMR.

### **6.4.3 Hard rock quarry rehabilitation**

Since the reserves at the hard rock quarry exceed the demands of the current project SANRAL is envisaging to make future use of this quarry for road maintenance purposes. Hence mine closure will not be pursued during the lifetime of the National Route N6 upgrade project. Instead the mine will be made safe until it is used once more as a source of stone.

The objective is then to minimise, as far as possible, the residual impacts while the quarry is not in use. These impacts relate mostly to the stability of the slopes, the control of storm water and the safety of the surrounding human communities and their life stock. Visual and waste management aspects must also be attended to at the end of National Route N6 upgrade project.

All machinery and construction plant will be removed from the site. This will include any debris and waste material left by personnel.

All structures will be dismantled or demolished and removed from site. These areas should be revegetated. However, any diversion berms for the management of stormwater will be retained. These will only be removed once the DMR has issued a closure certificate. Likewise, the fencing and access gates will be removed only once the DMR have issued a closure certificate.

The stockpile areas near the exit road will be levelled and blended in with the natural landscape, scarified, covered with top soil and vegetated.

Oversized material, overburden and other residual or reject material is to be returned to the quarry and shaped against the base of the rock face during rehabilitation of those sections that are mined out.

Topsoil will not be placed directly on rock or oversized material, which must first be covered with small-grained material and subsoil.

### **6.4.4 Closure certificate**

After all operations and rehabilitation have taken place on site a closure certificate will be issued by the DMR.

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## **6.5 Rehabilitation plan**

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After mining has taken place landscape repair is to be implemented because in the absence of suitable remedial action, a disturbed landscape can undergo further degradation.

End-use goals and the degree of disturbance at a site determine the type and level of landscape repair to be implemented. Three levels of land repair are available:



1. Reclamation (a process whereby unusable land is returned to a state of usefulness).
2. Rehabilitation (where continual management encourages plant growth).
3. Restoration (return to the original natural ecological functioning of the land).

Restoration can ultimately result in complete ecological recovery. However, because the area has been quarried and there is very little topsoil available, full restoration of the site will be doubtful. Therefore, rehabilitation is the end goal. In this case.

The common feature of disturbed landscapes is the damage or destruction of the soil. As a result the management of soil always initiates rehabilitation. Therefore, stockpiled topsoil from the cleared areas shall be spread over the disturbed areas in a 10 cm thick layer and watered to enhance germination of the seeds contained therein. This should, if encouraged and managed, result in a sustainable vegetation cover that ultimately will require minimum input.

Topsoil is defined as the material that is able to sustain plant growth with the subsoil being the material beneath that. The subsoil increases the water holding capacity while topsoil increases the water infiltration rate. Topsoil provides a good rooting medium, increased infiltration, reduced runoff and encourages improved re-establishment of nutrient cycles and an increased species cover and diversity.

If sufficient growth has not been established after two months, the still barren areas must be hydroseeded with an indigenous grass mix. Red Top Grass *Melinis* and Red Grass *Themeda* are suitable species in this regard, as once established, these grasses need little attention. This should be guided and monitored by the ECO.

Fertiliser, while not essential, will improve the success of the rehabilitation effort and speed up the process towards a sustainable condition. Slow-release organic fertilisers such as bone meal (source of phosphorus) at 30 kg ha<sup>-1</sup> could be used initially to increase the number of rooted seedlings. Inorganic fertiliser ASN (ammonium sulphate nitrate) at 30 kg ha<sup>-1</sup> could be used at the first sign of germination. Super phosphate at 200 kg ha<sup>-1</sup> could be applied after one year.


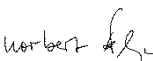
Concurrently with the rehabilitation effort exotic pest plants growing on the property must be cleared manually by pulling up the seedlings. Older growth will require chopping and slashing. Follow-up clearing of invasive species must then be done one year after the first clearing work.

The timing of the rehabilitation efforts in relation to temperature and rainfall is important. Obviously the best results will be accomplished when moderate temperatures prevail (spring to early summer) and during the rainy season. Dry frost periods are not suitable for the spreading of topsoil on the mined out areas.



## DOCUMENT CONTROL SHEET (FORM IP180/B)

**CLIENT** : WorleyParsons  
**PROJECT NAME** : R61 and Penhoek BAR **PROJECT No.** : J31201  
**TITLE OF DOCUMENT** : Environmental Management Plan for the Use of a Hard Rock Quarry and a Borrow Pit in Upgrading the National Route 6, section 4, south of and at Penhoek Pass between kilometres 52.0 and 66.2  
**ELECTRONIC LOCATION** : P:\J31201 (R61 and Penhoek BAR and ECO)\Penhoek Pass\BAR\IDBAR CD\27\_Draft Mining EMP Penhoek.docx

	Approved By	Reviewed By	Prepared By
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<b>20 June 2012</b>			

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DATE	SIGNATURE	SIGNATURE	SIGNATURE

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