



**WorleyParsons**  
resources & energy



**Environmental Management Plan for the use of a  
hard rock quarry and borrow pits in upgrading the  
Regional Route R61, Section 3, between Cradock  
(km 24.2) and Tarkastad (km 75.0) in the Eastern  
Cape Province**

February 2013  
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## **APPENDICES**

APPENDIX A – Mining Plans

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 for the upgrade of the Regional Route R61, Section 3, between Cradock (km 24.2) and Tarkastad (km 75.0) in the Eastern Cape Province. The road upgrade requires road building material from the surrounding area. Five borrow pits and one hard rock quarry are proposed.

Since the 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 pits 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 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: Hannover 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 Elizabeth Wahl, eThembeni, while the Palaeontological Impact Assessment, was undertaken John Almond, Natura Viva. A specialist study by a independent ecologist, Jaime Pote, was commissioned to inform the assessment of the potential impacts arising from this development project by SANRAL

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

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### **BP 1 - Dwingfontein (RE/2/165 + RE/3/153)**

24 km from the Cradock R61 turnoff

Geographical position: 32°05'01"S, 25°50'38"E

Owner: Francois Michau

048 8814808, 083 9760900

michauf@cradock.co.za

PO Box 237, Cradock 5880

### **BP 2 - Fairview (RE/1/152)**

37.3 km from the Cradock R61 turnoff

Geographical position: 32°01'04"S, 25°57'20"E

Owner: Carel du Plessis

048 8813916, 071 6775169

-

PO Box 65, Cradock 5880

### **BP 3 - Klipkral (RE/104)**

42.5 km from the Cradock R61 turnoff

Geographical position: 31°59'06"S, 25°58'55"E

Owner: Jan Georg Michau



045 8469605, 082 8091591  
janneline@nokwi.co.za  
PO Box 39, Cradock 5880

**BP 4 - Burnley Park (RE/10/118)**  
53.8 km from the Cradock R61 turnoff  
Geographical position: 31°56'01"S, 26°04'53"S  
Owner: Johan Petrus Smith  
048 8814411, 079 5645936  
goldengladem@yahoo.com  
PO Box 491, Cradock 5880

**BP 5 - Prinsfontein (RE/2/94)**  
65.0 km from the Cradock R61 turnoff  
Geographical position: 31°57'06"S, 26°11'11"E  
Owner: JP van Heerden  
045 8469451, 082 8561885  
-  
PO Box 23, Tarkastad 5370

**HRQ 1 - Raasfontein (RE/2/152)**  
39.1 km from the Cradock R61 turnoff  
Geographical position: 32°00'15"S, 25°57'46"E  
Owner: Carel du Plessis  
048 8813916, 071 6775169  
-  
PO Box 65, Cradock 5880

Letters of consent from the landowners are provided 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 the regional road R61, Section 3, between Cradock (km 24.2) and Tarkastad (km 75.0) in the Eastern Cape Province.

The entire project from km 24.2 to km 75.0 is a winding road with a narrow cross section and very limited passing opportunities. The scope of the project includes the widening of the roadway ( $\pm 5.0$  m) itself and the widening of all stormwater structures along the entire project. The existing road reserve is approximately 32 m.

There are 17 river or stream crossings along the project, falling into 9 different erven. Seven of the crossings are bridges, eight are culverts and in two the stream flows through a pipe underneath the road. Five of the bridges as well as the culvert and pipe structures will be widened only to suit the road cross section. The height of two other bridges were found to be inadequate and will need to be raised by 1.5 metres from their existing vertical alignment as well.



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 R61 up to 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 pits and a 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 R61 from five borrow pits and one hard rock quarry. Mining activities at each mine are described below. The locality and site plans of the proposed borrow pits and quarry are included in the Appendix, and more detailed design drawings of the proposed activities are also provided in the Appendix.

**BP 1 (Dwingfontein)** is situated at the start of the road upgrade project adjacent to the road. It is an extension of an existing borrow pit into a small hill. No written documentation has been traced regarding the previous mining activities at this site. Access is via the entrance road in the north leading to the Michau farmstead. While the borrow pit is active, the use of the road will be shared. When completed the borrow pit will have an oval shape of approximately 170 x 90 metres and it is to be mined for weathered dolerite to a depth of 3 - 7 metres. The extent of the area to be mined is 1.7 ha. A total quantity of 51 940 m<sup>3</sup> is needed for G7 selected and fill material from this pit 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 although the available quantities are very low. The inclined sections of the side walls, the batter, will have a slope of 1:3 when finished. Drainage of the borrow pit across the farm access road and into the unnamed non-perennial river will be managed by a headwall and pipe arrangement. The material will be mined by mechanical means with a frontend loader. No blasting will take place on site. The entire mine will be fenced. Access will be controlled with a gate, next to which there will be an office container, a weigh bridge and a stock pile area.

**BP 2 (Fairview)** is situated directly adjacent to the R61 on nearly flat ground. There is some evidence that the area has been mined previously, although details are not available. The completed borrow pit has a rectangular shape of 280 x 230 m. It is to be mined for weathered dolerite to a depth of 2 - 6 metres. The extent of the area to be mined is 6.2 ha. A total quantity of 176 420 m<sup>3</sup> is needed for G7 selected and fill material from this pit 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 eastern 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 when finished. The material will be mined by mechanical means with a frontend loader. No blasting will take place on site. The entire mine will be fenced. Access will be controlled with a gate, next to which there will be an office container, a weigh bridge and a stock pile area.



**BP 3 (Klipkral)** is a new borrow pit. Previously, mining for road material has taken place directly opposite on the other side of the road, which has left a poorly vegetated scar of some 140 x 90 m in the veld. The new completed borrow pit has a rectangular shape of 260 x 170 m. It is to be mined for weathered dolerite to a depth of 2 - 4 metres. The extent of the area to be mined is 4.3 ha. A total quantity of 134 017 m<sup>3</sup> is needed for G7 selected and fill material from this pit 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 eastern 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 when finished. The material will be mined by mechanical means with a frontend loader. No blasting will take place on site. The entire mine will be fenced. Access will be controlled with a gate, next to which there will be an office container, a weigh bridge and a stock pile area.

**BP4 (Burnley Park)** is a southward extension of a previously used borrow pit situated next to the R61. Signs of successful natural revegetation are beginning to show at the old pit, except for some bare steep edges still remaining. This will be attended to through partial filling with overburden from the new one. Caution should be exercised that the rehabilitation efforts do not annihilate the natural revegetation processes currently underway. The new completed borrow pit has a near-rectangular shape of 190 x 140 m. It is to be mined for weathered dolerite to a depth of 4 metres. The extent of the area to be mined is 2.5 ha. A total quantity of 73 093 m<sup>3</sup> is planned to be mined that will be used for G7 selected and fill material. The profile has been designed in such a way that the borrow pit will be self-draining towards the eastern 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 when finished. The material will be mined by mechanical means with a frontend loader. No blasting will take place on site. The entire mine will be fenced. Access will be controlled with a gate, next to which there will be an office container, a weigh bridge and a stock pile area.

**BP5 (Prinsfontein)** is an extension of a previously used borrow pit situated next to the R61. The new completed borrow pit has a trapezoid shape of 210 x 140 m. It is to be mined for weathered dolerite up to a depth of 6 metres in places. The extent of the area to be mined is 2.8 ha. A total quantity of 88 625 m<sup>3</sup> road building material is planned to be mined, which will be used for G7 selected and fill material. The topography does not allow for the extended borrow pit to be self-draining. Rainwater will flow towards the northern point of the worked pit where it may be pumped out into the surrounding veld, or left in place as a seasonal waterhole. 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 when finished. The material will be mined by mechanical means with a frontend loader. No blasting will take place on site. The entire mine will be fenced. Access will be controlled with a gate, next to which there will be an office container, a weigh bridge and a stock pile area.

**HRQ1 (Raasfontein)** is a new hard rock quarry at km 39.1 slightly offset to the north from the R61 by +/- 100 m. The quarry has a square shape of approximately 140 x 140 m. It is to be mined for dolerite up to a depth of 20 metres in places. The extent of the area to be mined is 1.57 ha. A total quantity of ≈200 000 m<sup>3</sup> is planned to be mined. The quarry will be carved into the hill side, with a quarry floor slightly sloped towards the entrance/exit. It is unclear at this time whether the quarry will be self-draining when mined out. Top soil and overburden will be used for the rehabilitation. It will be stored separately until use. The material will be mined by mechanical means with a frontend loader after the rock has been broken by blasting. The entire mine will be fenced. Access will be controlled with a gate, next to which there will be an office





container, a weigh bridge, a crusher plant and a stock pile area. Berms placed at strategic locations will hold and redirect storm water so that the dry water course at the foot of the hill is not polluted with silt.

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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 small slivers (a few 1000 m<sup>2</sup>) of private land will have to be acquired by SANRAL. This is in progress. 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.

During planning for the road upgrade the project engineers evaluated likely sources of material for the construction of the road. To be acceptable, the material sources had to meet the following criteria:

- Suitability of the stone and rock from a geotechnical perspective
- Availability of sufficient quantities to meet the demand
- Feasibility of extracting the material by means of opencast mining
- Short hauling distance from the borrow pit or hard rock quarry to the construction site
- No or only minimal disturbance by mining activities for local residents
- No or only minimal disturbance of the traffic flow by hauling trucks
- Absence of constraints in terms of ownership of the land or title deed restrictions
- A landowner willing to accept a borrow pit or hard rock quarry in exchange for fair compensation, and
- Low environmental impact.

The reconnaissance resulted in the identification of six mining sites (5 borrow pits and 1 hard rock quarry) along the R61 as sources for material for the construction of the road. These six mining sites fulfil all the needs.

No other alternative materials sources have been identified that meet the requirements in terms of proximity to the road works and the desired quality of the road construction material. The investigation of all the proposed sites has confirmed that there is sufficient material available for use during the project. There are no feasible alternatives to the proposed method of open cast mining.

## 3 BASELINE INFORMATION

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### 3.1 Geology and soils

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The rocks earmarked for mining at the borrow pits and the hard rock quarry are dark grey and reddish dolerite with a medium grain underlain by the Tarkastad Formation. They are the result of volcanic intrusions into the surrounding sedimentary layers of the Beaufort Group which is part of the Karoo Supergroup. The dolerite originally was forced between the layers of the Beaufort Group as dykes and sills when it was hot



and soft, forming a continuous solid layer as it cooled and solidified. On exposure to the elements the dolerite is broken up into rounded rocks by the weathering action associated with erosion.

Soils are generally shallow and weakly developed. Crop and horticultural production at the mining sites is severely limited (even with irrigation) due to the dominant soil types.

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### **3.2 Topography**

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From its start at Dwingfontein (altitude 1080 m) Section 3 of the R61 traverses a gently undulating flat until reaching the Vlekpoortrivier at Klipkraal where it passes through a gap between two mountains of 1200 m in height. Thereafter, in long straight sections, the road climbs slightly, passing the Maermansberg (1674 m) on the right side, until it reaches the crossing of the Elandsrivier at the 401 turnoff to Hofmeyr (height 1250 m). On its way to Tarkastad the R61 stays at the valley bottom between the Elandskop peak (1749 m) and the spectacular buttress of the Middelkraal mountains (2031 m). The road then climbs steadily until it reaches the town limit of Tarkastad at a height of 1320 m.

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### **3.3 Climate**

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Section 3 of the Regional Route R61 lies within a summer rainfall region peaking from January to March. However, rainfall is unpredictable and often falls in heavy storms. There is a west to east gradient in rainfall along section 3 of the R61 road. The mean annual precipitation ranges between  $298 \pm 82$  mm at Borrow Pit 1 to  $370 \pm 94$  mm at BP5. 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 aridity of the area will have a marked effect on the ability to rehabilitate disturbed veld.

Temperatures also vary greatly. Summer maximum reaches  $38^{\circ}\text{C}$ , but frost can be expected between May to August. Strong north-westerly winds can be expected from July to September in higher lying areas, while frequent south-westerly winds bring rain in summer.

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### **3.4 Air quality**

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Air quality is typically excellent at all the proposed mining sites and it is negligibly affected by exhaust emissions from vehicles passing by on the R61.



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### 3.5 Ground and surface water

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The Dwingfontein borrow pit lies inside the Q44B quaternary catchment and is located to the south of an un-named tributary to the Gunsteling River. The borrow pits at Fairview and Klipkraal, as well as the hard rock quarry on the farm Raasfontein, fall into the quaternary catchment Q43B. The hard rock quarry is located near the Vlekpoortrivier. The borrow pits of Burnley Park and Prinsfontein are situated inside the Q42B quaternary catchment; they far from any recognised water body. All these catchment eventually drain into the Fish River.

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### 3.6 Noise

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The five identified borrow pits and the hard rock quarry are situated in close proximity to the R61 which is a source of noise. Human noise receptors of mining activities are far removed from the borrow pits BP 2 (Fairview), BP 3 (Klipkraal), BP 4 (Burnley Park) and BP 5 (Princefontein), as well as the hard rock quarry. This is not the case at BP 1 (Fairview). Here the Michau farmstead is only 300 metres distant from the proposed borrow pit, and occupants of the farmhouse would be well within earshot of mining activities.

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### 3.7 Fauna, flora and biodiversity

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The road and its associated mines span across the Eastern Nama Karoo and the Grassveld biomes. The vegetation can be broadly categorised into a) riverine bush dominated by dense thickets of Sweet Thorn *Acacia karoo*, b) dry and arid flats covered by *Aristida congesta* grass and Karoo shrubs. The road traverses the following vegetation types, all of which are classified as Least Threatened:

- *Southern Karoo Riviere* occurs on alluvial soils and is characterised by the presence of grasses and low, mostly thorny shrubs. On site, this azonal vegetation unit is embedded into the surrounding Grassland biome.
- *Eastern Upper Karoo* is contained within the Nama Karoo biome. This vegetation unit consists of sparsely vegetated, gently sloping plains dominated by microphyllous shrubs and grasses of the genera *Aristida* and *Eragrostis*.
- *Tarkastad Montane Shrubland* is found in the Grassland biome. The vegetation is of a low height consisting of a mix of grasses and small shrubs amongst bare rock.
- *Queenstown Thornveld* consists of a complex of *Acacia* thornveld and grassland dominated by *Aristida congesta*. It is found on the near-level bottomlands of intra-mountain basins.

None of the terrestrial ecosystem occurring in the area have been assigned Critically Endangered or Endangered status. However, the entire middle part (from km 36.9 to km 65.4 = 28.5 km) of the road upgrade project lies inside a recognised biodiversity conservation corridor as determined by the Eastern Cape Biodiversity Conservation Plan of 2007.

The fauna within the area has been affected to varying extents since the advent of commercial farming. While megaherbivores have been hunted out, medium and small



mammals still occur in reasonable numbers, such as baboon, bushbuck, duiker, vervet monkey, black-backed jackal, hare, mountain reedbuck, porcupine, antbear, steenbok and dassie.

Threatened mammals that could occur in the greater study area are the Endangered White-tailed Rat *Mystromys albicaudatus* and the Mountain Zebra *Equus zebra zebra* that is regarded as Vulnerable. The proposed mining activities are unlikely to pose a threat to these two mammals.

The Vulnerable and endemic Plain Mountain Adder (*Bitis inornata*) may occur on the road verges and areas affected by the temporary road diversions as well as the Borrow Pits and Hard Rock Quarry. Other reptiles that may occur include the Tent Tortoise (*Psammobates tentorius*), as well as skinks and snakes basking or traversing the road and road reserve.

The bird fauna is not regarded as vulnerable to the mining activities, although any large trees requiring removal should be checked for nesting birds before removal.

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## 3.8 Heritage resources

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### 3.8.1 Paleontological resources

A Phase 1 palaeontological heritage assessment for the road project was commissioned from Dr John Almond (Natura Viva) by GIBB (Pty) Ltd in accordance with the requirements of the National Heritage Resources Act (Act 25 of 1999).

All of the borrow pit sites concerned, as well as the hard rock quarry, are underlain by Karoo dolerite intrusions and are of no palaeontological heritage significance. The dolerite in some cases is deeply weathered to yield hard rounded corestones embedded in friable *sabunga*. Adjacent sedimentary country rocks have been baked to quartzites and hornfels, compromising their fossil heritage potential. As described in the palaeontological specialist report no further palaeontological heritage studies or mitigation are recommended for this project,

Should 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 ECPHRA (the Eastern Cape Provincial Heritage Resources Authority) 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

A Phase 1 archaeological heritage assessment for the road project was commissioned from Mr Len van Schalkwyk and Ms Elizabeth Wahl (eThembeni Cultural Heritage) by GIBB (Pty) Ltd in accordance with the requirements of the National Heritage Resources Act (Act 25 of 1999).

As part of the assessment the specialists completed a site visit, despite intense searches, no heritage resources were found. The specialist study concluded that this site is of very low archaeological heritage significance. As detailed in the archaeological specialist report, no further archaeological heritage studies or mitigation are recommended for this project,



Should substantial other heritage resources be exposed during mining, e.g. human remains, the ECO should safeguard these and alert ECPHRA 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 to 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.

Several people listed their names as I&APs. One I&AP inquired about compensation to owners for mining activities on his land. It was explained that SANRAL will buy the land permanently for a Hard Rock Quarry for future road maintenance. The farmer will be compensated for the land as per provision of the Expropriation Act..

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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	Improbable	Insignificant	Negative
Paleontological 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 EMP 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 Eastern Cape Provincial Heritage Resources Agency (ECPHRA) has been notified. Further mining will only proceed once the go-ahead has been received from ECPHRA.

### 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 R61 onto the farm. 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 pits 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/permited 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 each one of the borrow pits will be rehabilitated in its entirety. If applicable, 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 borrow pit 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**

After the end of mining operations the hard rock quarry will be rehabilitated in its entirety as per plan with the objective of restoring natural processes as much as this is possible. Rehabilitation shall commence as soon as the advancing face and sufficient working area moves away from the proposed limit of mining.



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 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 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. Parts of the quarry floor are likely to become water traps in the long-term and the rehabilitation should aim to complement this by encouraging the establishment of locally occurring water-tolerant plants.

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.

#### **6.4.4 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.


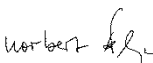
Concurrently with the rehabilitation effort exotic pest plants growing on the property must be cleared manually by pulling up the seedlings. Older growth will require chopping and slashing. Follow-up clearing of invasive species must then be done one year after the first clearing work.

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 borrow pits in upgrading the Regional Road R61, Section 3, between Cradock (km 24.2) and Tarkastad (km 75.0) in the Eastern Cape Province  
**ELECTRONIC LOCATION** : P:\J31201 (R61 and Penhoek BAR and ECO)\R61\Mining\Draft Mining EMP R61.docx

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<b>20 June 2012</b>			

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DATE	SIGNATURE	SIGNATURE	SIGNATURE

	Approved By	Reviewed By	Prepared By
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DATE	SIGNATURE	SIGNATURE	SIGNATURE

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