mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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From: Directorate: Mineral Regulation: Northern Cape **Date:** 28 November 2011
Enquiries: Mr. N.V. Muila **E-mail:** vincent.Muila@dmr.gov.za
Ref No.: 5004BP

On Sahris
Case ID: 1050

The Director
South African Heritage Resources Agency
PO Box 4637
CAPE TOWN
8000

Attention: Mrs Nonofho Ndobochani

CONSULTATION IN TERMS OF SECTION 40 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT 2002, (ACT 28 OF 2002) FOR THE APPROVAL OF AN ENVIRONMENTAL MANAGEMENT PROGRAMME FOR MINING RIGHT IN RESPECT OF BORROW PIT ON PORTION 3 OF THE FARM HOEZAR WEST NO 776 (BP R27-8KM 32.6 RHS 6.2), PORTION 1 OF THE FARM BUFFELSKOPS FONTEIN 773 (BP R27-8 KM 45.O RHS O.2) AND PORTION 1 OF THE FARM ENKELDE WILGENBOOM 768 (BP R27-8 KM 62.6RHS 1.0), SITUATED IN THE MAGISTERIAL DISTRICT OF KURUMAN: NORTHERN CAPE REGION.

APPLICANT: SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED

Attached herewith, please find a copy of an EMP received from the above-mentioned applicant, for your comments.

It would be appreciated if you could forward any comments or requirements your Department may have to this office and to the applicant **26 January 2012** as required by the Act.

Consultation in this regard has also been initiated with other relevant State Departments. In an attempt to expedite the consultation process please contact **Vincent Muila** of this office to make arrangements for a site inspection or for any other enquiries with regard to this application.

Your co-operation will be appreciated.

.....
ACTING REGIONAL MANAGER: MINERAL REGULATION
NORTHERN CAPE REGION

D004BP

DEPARTMENT OF
MINERAL RESOURCES
PRIVATE BAG X6093
2011 -06- 27
KIMBERLEY 8300
DEPARTMENT OF
MINERAL RESOURCES

cca
ENVIRONMENTAL

[redacted]

THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD

REGISTRATION NO. 1998/009584/06

aurecon

PROPOSED BORROWPIT DEVELOPMENT FOR THE STRENGTHENING (PARTIAL RECONSTRUCTION) OF NATIONAL ROUTE 27 SECTIONS 7 & 8 BETWEEN WESTERN/NORTHERN CAPE BORDER (KM 40.0) AND CALVINIA (KM 70.0)

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THREE STRATEGIC BORROWPITS

Prepared for:
Department of Mineral Resources
Private Bag X6093
KIMBERLEY, 8300

On behalf of:
Aurecon SA (Pty) Ltd for
South African National Roads Agency SOC Limited
Private Bag X19
Bellville, 7530

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cca ENVIRONMENTAL

THE SOUTH AFRICAN NATIONAL ROADS AGENCY LTD

REGISTRATION NO. 1998/009584/06

aurecon

PROPOSED BORROWPIT DEVELOPMENT FOR THE STRENGTHENING (PARTIAL RECONSTRUCTION) OF NATIONAL ROUTE 27 SECTIONS 7 & 8 BETWEEN WESTERN/NORTHERN CAPE BORDER (KM 40.0) AND CALVINIA (KM 70.0)

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THREE STRATEGIC BORROWPITS:

Prepared for:

Department of Mineral Resources

On behalf of:

Aurecon SA (Pty) Ltd for
South African National Roads Agency SOC Limited

Prepared by:

CCA Environmental (Pty) Ltd

Approved by:
Date of Approval:

cca ENVIRONMENTAL

UNDERTAKING

I, Mr Derek Wilson, representing the applicant the South African National Roads Agency SOC Limited (SANRAL), hereby declare that the above information is true, complete and correct. I undertake to implement the measures as described herein. I understand that this undertaking is legally binding and that failure to give effect hereto will render me liable for prosecution in terms of Section 98 (b) and 99 (1)(g) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002). I am also aware that the Regional Manager may, at any time but after consultation with me, make such changes to this plan as he / she may deem necessary.

Signed on this 31 day of AUGUST 2011 at Bellville.

D Wilson

Signature of applicant

PROJECT INFORMATION

TITLE	Environmental Management Programme: Proposed borrowpit development for the strengthening (partial reconstruction) of National Route R27 Sections 10 & 11 between the Western/Northern Cape border (km 40.0) and Calvinia (km 70.0). EMP for three strategic borrowpits.
APPLICANT	South African National Roads Agency SOC Limited (SANRAL)
ENVIRONMENTAL CONSULTANTS	CCA Environmental (Pty) Ltd
REPORT REFERENCE	AUR02R27/EMPr/1
REPORT DATE	1 September 2011

REPORT COMPILED BY: Ena de Villiers

.....

Ena de Villiers
Environmental Consultant

REPORT REVIEWED BY: Jonathan Crowther

.....

Jonathan Crowther (Pr.Sci.Nat.; CEAPSA)
Managing Director

EXPERTISE OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

NAME	Jonathan Crowther
RESPONSIBILITY ON PROJECT	Project management and quality control.
DEGREE	B.Sc. Hons (Geol.), M.Sc. (Env. Sci.)
PROFESSIONAL REGISTRATION	Pr.Sci.Nat., CEAPSA
EXPERIENCE IN YEARS	22
EXPERIENCE	Jonathan Crowther has been involved in environmental consulting since 1988 and is currently the Managing Director of CCA Environmental (Pty) Ltd. He has expertise in a wide range of environmental disciplines, including Environmental Impact Assessments (EIA), Environmental Management Plans / Programmes, Environmental Planning & Review, Environmental Auditing & Monitoring, Environmental Control Officer, Public Consultation & Facilitation. He has project managed a number of offshore oil and gas EIAs for various exploration and production activities in South Africa and Namibia. He also has extensive experience in projects related to roads, property developments and waste landfill sites.

NAME	Ena de Villiers
RESPONSIBILITY ON PROJECT	Project consultant and report writing.
DEGREE	B.A. Hons (Philosophy), B.A. Hons (Demography), M.Phil (Environmental Ethics)
PROFESSIONAL REGISTRATION	-
EXPERIENCE IN YEARS	3
EXPERIENCE	Ena de Villiers has worked as an environmental assessment practitioner since 2008 and has been involved in a number of projects covering a range of environmental disciplines, including Basic Assessments (BA), Environmental Impact Assessments and Environmental Management Plans/Programmes and Environmental Control Officer. She has been exposed to a range of projects relating to mining (e.g. mineral prospecting and borrow pit development), property development and infrastructure (e.g. bridges, roads, waste water treatment works).

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PART A:

GENERAL INTRODUCTION

PART A: GENERAL INTRODUCTION

A1 INTRODUCTION

The South African National Roads Agency SOC Limited (SANRAL) is proposing to establish three strategic borrowpits to provide materials for the proposed strengthening (partial reconstruction) of the R27 Sections 7 and 8 between the Western/Northern Cape border (km 40.0) and Calvinia (km 70.0) in the Hantam Local Municipality (see Figure A1 on page A5). The borrowpits are required for additional gravels to reconstruct the road sub-base and base as required.

The proposed road upgrade would require the development of three borrow areas in the Calvinia vicinity (see Figure A2 on page A6). The proposed borrowpits are at the following locations:

1. BP R27-8 km 32.6 RHS 6.2 is situated along the R364 approximately 6 km south-west of the R27, on Portion 1 of Farm Bloedzuigerfontein North 782 ("Merino");
2. BP R27-8 km 45.0 RHS 0.2 is situated along the R27 approximately 23 km west of Calvinia, on the Remainder of Portion 1 of Farm Buffelskopfontein 773 (Doega B"); and
3. BP R27-8 km 61.6 RHS 1.0 is situated approximately 7 km south-west of Calvinia on the Remainder of Portion 1 of Farm Enkelde Wilgenboom 768 near the Calvinia Airfield.

SANRAL has appointed Aurecon SA (Pty) Ltd (Aurecon) to undertake the engineering design for the proposed project and associated borrowpits. Aurecon, in turn, appointed CCA Environmental (Pty) Ltd (CCA) to act as an independent environmental consultant to undertake a Basic Assessment process for the proposed project and to compile an Environmental Management Programme (EMP) for the proposed strategic borrowpits for submission to the Department of Mineral Resources (DMR).

A2 STRUCTURE OF REPORT

This report consists of five parts, the contents of which are outlined below.

Part A	**General Introduction** Provides the background to the project; the structure to the report; the study approach and methodology for the EMP; a description of the proposed project; and a general description of the surrounding environment.
Part B	**Project Description** Provides an overall project description, motivation for the proposed project and general characteristics of the receiving environment.
Part C	**Borrowpits** Provides a description of the surrounding environment and impact assessment for the three borrowpits.
Part D	**Environmental Management Programme** Presents the EMP for all three proposed borrowpits.
Part E	**Appendices to the Report**
Appendix 1	Public Participation Information
Appendix 2	Convention for Assigning Significance Ratings to Impacts
Appendix 3	Specialist report: Freshwater ecology assessment
Appendix 4	Specialist report: Botanical assessment
Appendix 5	Specialist report: Archaeology/heritage assessment
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A3 APPROACH AND METHODOLOGY

This section provides a description of the legislative framework within which this EMP was conducted and outlines the methodology and public participation process followed in the study.

A3.1 LEGISLATIVE FRAMEWORK

This section presents the main legislative requirements of direct relevance to the project.

A3.1.1 Mineral and Petroleum Resources Development Act (No. 28 of 2002)

The Mineral and Petroleum Resources Development Act (28 of 2002) (MPRDA) provides for the control of mining activities such as the development of borrowpits and prevents any mining activity without the appropriate right and/or permit as issued by the Minister of Mineral Resources. Such right and/or permit may only be issued once there has been compliance with the regulations promulgated in terms of the MPRDA.

Government Notice (GN) R762, in terms of Section 106(1) of the MPRDA, exempts any organ of state (such as SANRAL) from applying for such rights and/or permits. However, in terms of Section 106(2), organs of state must submit an EMP for approval by the Minister in terms of Section 39(4). Section 39(3) sets out the minimum required information that must be contained in such an EMP, including baseline information regarding the affected environment, an assessment of the potential impacts of the proposed activity, as well as measures to mitigate and rehabilitate the potential impacts.

This study has been undertaken in accordance with the requirements of the regulations promulgated in terms of the MPRDA.

A3.1.2 National Environmental Management Act (No.107 of 1998)

The Environmental Impact Assessment (EIA) Regulations 2010 promulgated in terms of Sections 24(5), 24M and 44 of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, in Government Notice (GN) No. R543 provide for the control of certain activities. Activities listed in GN No. R544, R545 and R546 are prohibited until written Environmental Authorisation (EA) is obtained from the competent authority. Such EA, which may be granted subject to conditions, will only be considered once there has been compliance with the EIA Regulations, 2010. GN R543 sets out the procedures and documentation that need to be complied with in undertaking a Basic Assessment or an EIA.

A Basic Assessment was undertaken for the proposed strengthening of the R27 Sections 7 & 8 as EA is required for listed activities in terms of GN No. 544 and R546. This included the development of two borrowpits, namely BP R27-8 km 45.0 RHS 0.2 and BP R27-8 km 61.6 RHS 1.0, which are situated in an ecological support area as indicated on the Hantam Municipality's map for critical biodiversity areas. The Basic Assessment process is underway and the Draft Basic Assessment Report (BAR) was released for public review and comment in August 2011. The Final BAR will be submitted to the Department of Environmental Affairs (DEA) for consideration and decision-making.

A3.1.3 National Heritage Resources Act (No. 25 of 1999)

Section 38(1) of the National Heritage Resources Act (NHRA) (No. 25 of 1999) lists development activities that would require authorisation by the responsible heritage resources authority. The activity applicable to the proposed project is the following:

"(c) Any development or other activity which will change the character of a site: (i) exceeding 5 000 m^2 in extent."

The NHRA requires that a person who intends to undertake a listed activity notify the relevant provincial heritage authority at the very earliest stages of initiating such as development. The relevant provincial heritage authority would then, in turn, notify the person whether a Heritage Impact Assessment Report should be submitted. However, according to Section 38(8) of the NHRA, a separate report would not be necessary if an evaluation of the impact of such development on heritage resources is required in terms of any other applicable legislation. The decision-making authority should, however, ensure that the heritage evaluation fulfils the requirements of the NHRA and take into account in its decision-making any comments and recommendations made by the relevant heritage resources authority.

An archaeological study has been undertaken in compliance with the NHRA.

A3.1.4 Legislation relating to human graves

Human remains are regularly exposed through the disturbance of lost graveyards, prehistoric burials or illegal burials during construction activities, including the development of borrow pits. Such remains are protected by a set of legislation including the Human Tissues Act (Act No 65 of 1983), the Exhumation Ordinance of 1980 and the National Heritage Resources Act (Act No 25 of 1999) which applies to graves and their contents which are greater than 60 years of age.

In the event of human bones being found on site, the South African Police Services and the South African Heritage Resources Authority (SAHRA) must be informed immediately. If it is apparent that the remains are an illegal burial and foul play is suspected, the police will need to open a murder docket and the remains placed within the chain of custody. If the remains appear to be very old or are from a legal burial greater than 60 years of age, they must be removed by an archaeologist under an emergency permit at the cost of the developer.

While no graves were identified in the study area during the archaeological investigation, there is always a low possibly that unmarked illegal or historic graves could occur.

A3.2 ENVIRONMENTAL MANAGEMENT PROGRAMME METHODOLOGY

A3.2.1 Specialist studies and site visits

Specialist studies were undertaken in May 2011 to assess the impacts related to the vegetation, heritage, and freshwater ecology on the potential sites.

Three specialists carried out an initial borrowpit investigation of seven potential borrowpit sites during May 2011 to familiarise themselves with the sites and to identify potential impacts associated with the proposed borrowpits. Ms Antonia Belcher, an aquatic scientist, investigated the environmental significance of the sites from the freshwater ecological perspective; Dr David McDonald of Bergwind Botanical Surveys & Tours CC. investigated the botanical significance of the sites; Mr Timothy Hart of ACO Associates CC investigated the archaeological and heritage significance of the sites.

Potential impacts identified during site visits were then assessed according to pre-defined rating scales (see Appendix 2). Specialists also recommended appropriate mitigatory or control measures to minimise potential impacts or enhance potential benefits.

A3.2.2 Public participation process

The public participation process undertaken during the preparation of this EMP formed part of the process undertaken for the Basic Assessment of the proposed road strengthening and upgrading project.

To date 36 Interested and Affected Parties (I&APs) have been registered on the project database. The I&AP list was compiled of landowners, authorities, councillors, community organisations such as farmers associations and other key stakeholders. The list of I&APs and other public participation information are provided in Appendix 1.

Steps taken to ensure adequate public consultation include the following:

- An advertisement (in Afrikaans) announcing the proposed project and NEMA Basic Assessment and the MPRDA EMP processes and inviting the public and/or organisations to register as an I&APs was placed in the local newspaper, the "Noordwester en Oewernuus" of 10 June 2011. The advertisement included the three proposed borrowpits (see Appendix 1).
- Site notices (in Afrikaans) were erected at each of the three borrowpit sites on 9 and 10 June 2011. See Appendix 1 for copies of the site notices and photographs of the notices *in-situ*.
- Landowners or their representatives and occupiers of property on which proposed borrowpits are situated were contacted individually by telephone to inform them of the proposed project and to obtain their contact particulars. Notification letters were sent to owners of the properties, informing them of the proposed borrowpit development (see Appendix 1). Landowners were asked to complete an acknowledgment form to indicate that they had been made aware of the location and extent of the borrowpits and that access would be required across their respective properties, as well as to raise any issues of concern. Their responses have been included in each individual borrowpit report in Part C (see Appendices C1.2; C2.2 and C3.2).
- Notification letters were sent to landowners or their representatives of properties on which proposed borrowpits are situated to inform them of the availability of the EMP for review and to request them to provide their written response within 30 days (see Appendix 1).
- An I&AP notification letter (in English and/or Afrikaans) was sent to I&APs on the project database to inform them of the availability of the EMP for review and of the opportunity to provide written comments (see Appendix 1).

A3.2.3 Way forward

This EMP Report will be submitted to the Northern Cape DMR for consideration. The Minister's delegated authority, the Regional Manager, is required to decide as to whether the EMP Report is or is not approved within 120 days. When considering the EMP Report, the Minister must consult with any State department, which administers any law relating to matters affecting the environment. These departments are given 60 days from date of request to submit comments. The Minister may request additional information and that the EMP Report be adjusted accordingly before approval.

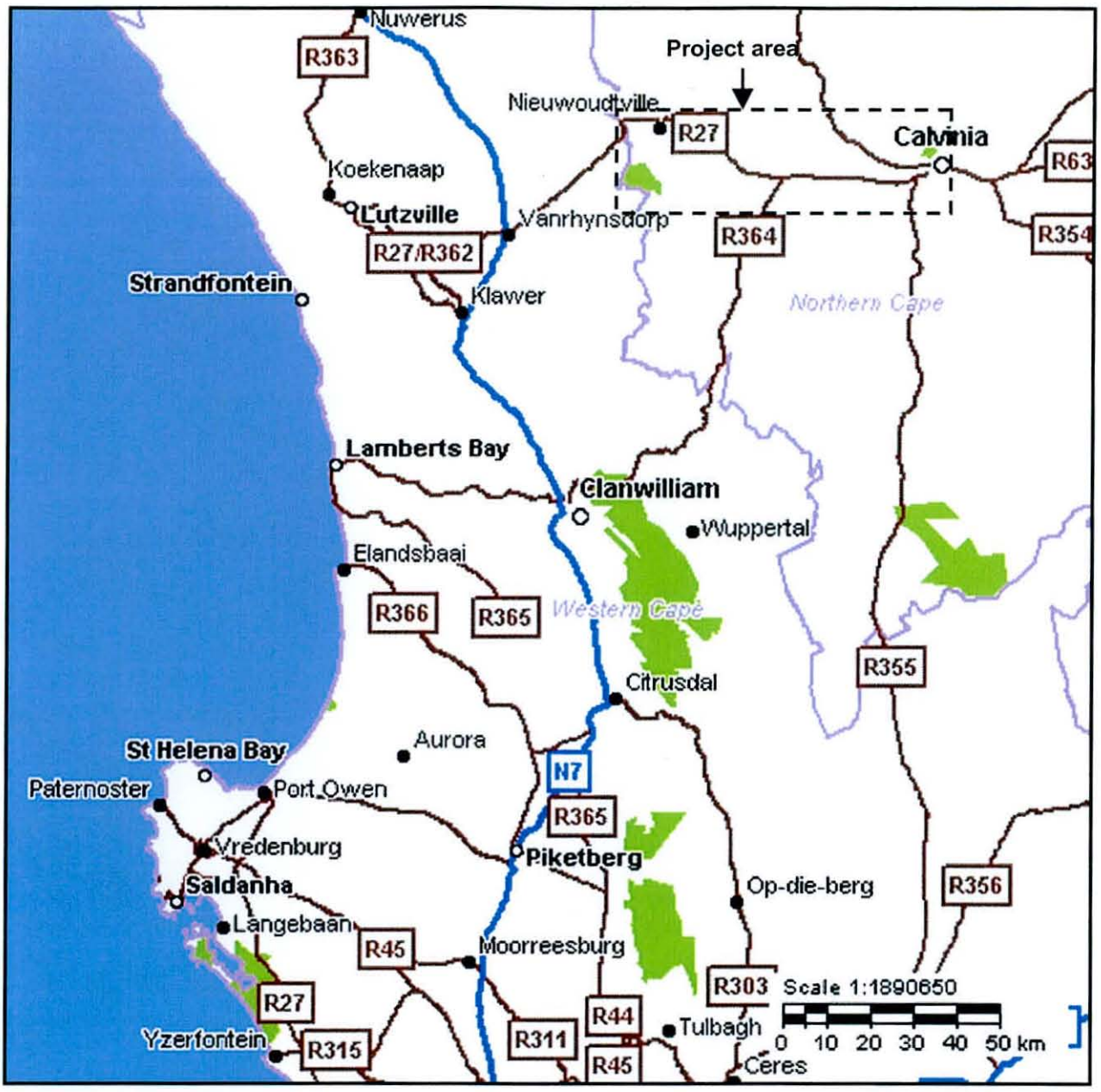


Figure A1: Locality map showing the project area between the Western/Northern Cape border (border shown in purple) and Calvinia along the R27.

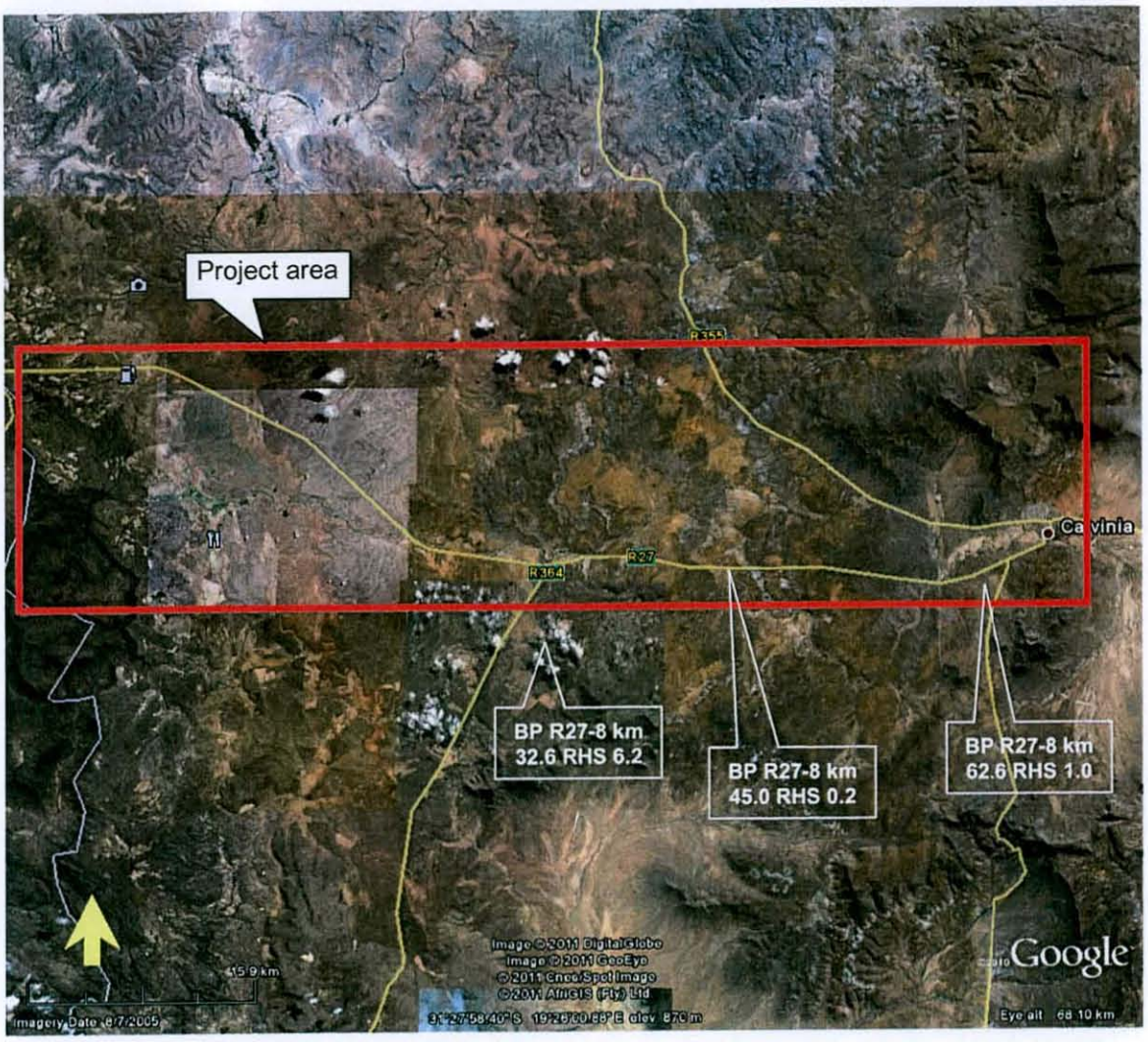


Figure A2: Google Earth air photo of the project area, showing the location of the three proposed borrowpits

PART B:

PROJECT DESCRIPTION

PART B PROJECT DESCRIPTION

B1 MOTIVATION FOR AND BENEFIT OF THE PROPOSED PROJECT

The main motivation for the use of the proposed borrowpits is the supply of material for the proposed strengthening (partial reconstruction) of the R27 between the Western/Northern Cape border and Calvinia.

Large volumes of road building base material would be required to supplement the thin (100 mm) existing base layer and to replace the unsuitable shoulder material of the road section. The extension of existing borrowpits for the sourcing of material has been proposed to supplement commercial materials sources in an economical way.

The strengthening of the R27 and the widening of the four bridges would improve the safety levels and road condition of this section of the R27.

B2 BORROWPIT ALTERNATIVES

B2.1 BORROWPITS

Different site alternatives where considered in the case of the proposed borrowpit development. Eight potential borrowpit and three potential quarry sites were identified during an initial investigation undertaken by the design engineers in November 2010. A further more detailed investigation was undertaken into only seven of the eight potential borrow areas, during which each borrowpit was assessed according to various criteria (e.g. quantity and type of material, botanical, heritage and freshwater ecology sensitivity). Two of the seven borrow areas initially investigated were rejected on the basis of the botanical sensitivity as a result of the specialist assessment (see 1 and 2 in Table B1). A further two potential borrowpits were rejected on the basis of sub-standard material quality obtained from soil sample test results (see 4 and 6 in road construction material for the proposed project (see 3, 5 and 7, shaded in Table B1). None of the potential quarry sites were investigated further.

Table B1: Potential borrowpit sites investigated as part of this study

No.	Borrowpit Name	Location		Finding
		Latitude	Longitude	
1	BP R27-7 km 51.0 LHS 6.9	S 31° 20' 01.3"	E 19° 07' 06.1"	Unsuitable due to botanical sensitivity: • Located within the mapped Critical Biodiversity Areas for the Hantam Local Municipality; • Highly sensitive vegetation, namely Nieuwoudtville-Roggeveld Dolerite Renosterveld, which harbours a very high concentration of endemic geophytic (bulb) species, and is thus an extremely important repository for plant biodiversity.
2	BP R27-8 km 9.5 LHS 0.2	S 31° 23' 57.7"	E 19° 12' 40.3"	Unsuitable due to sub-standard material quality. Unsuitable due to botanical sensitivity: • Located within the mapped Critical Biodiversity Areas for the Hantam Local Municipality; • Future excavation would impact undisturbed natural succulent-dominated shrubland.

3	BP R27-8 km 32.6 RHS 6.2	S 31° 32' 15.4"	E 19° 24' 11.9"	Suitable material. Application to be made in terms of MPRDA.
4	BP R27-8 km 39.6 LHS 0.1	S 31° 29' 26.4"	E 19° 29' 28.3"	Unsuitable due to sub-standard material quality.
5	BP R27-8 km 45.0 RHS 0.2	S 31° 29' 43.7"	E 19° 32' 44.7"	Suitable material. Application to be made in terms of MPRDA and NEMA.
6	BP R27-8 km 50.4 LHS 0.1	S 31° 29' 43.0"	E 19° 36' 08.2"	Unsuitable due to sub-standard material quality.
7	BP R27-8 km 61.6 RHS 1.0	S 31° 30' 35.3"	E 19° 43' 00.0"	Suitable material. Application to be made in terms of MPRDA and NEMA.

B2.2 MINING METHODS

The borrowpit sites and associated activities and infrastructure shall be carefully planned, to ensure that the footprint is kept to a minimum.

Mechanical excavation methods would be used to obtain the required material by excavator or bulldozer. Crushing would be required to break down harder dolerite boulders.

B3 GENERAL DESCRIPTION OF THE SURROUNDING ENVIRONMENT

This chapter provides a general description of the key biophysical, cultural/heritage and socio-economic characteristics of the area. The three proposed borrowpits fall within the Hantam Local Municipality, which is part of the Namakwa District Municipality in the Northern Cape Province.

The study area for the road strengthening project encompasses the area surrounding the R27 from the Western/Northern Cape border in the Vanrhyns Pass at the south-western end to Calvinia in the east. The area lies on the Onder-Bokkeveld Plateau along the wide Oorlogskloof River Valley and consists largely of natural and open areas with some livestock farming. The town of Niewoudtville lies approximately 10 km eastwards of the edge of the escarpment and the town of Calvinia inland on the Bokkeveld Plateau at the foot of the Hantam Mountains, approximately 70 km east of Nieuwoudtville. The three proposed borrowpit sites are located along the eastern half of Section 8 of the R27, from the R364 intersection at km 32.6 towards Calvinia (refer to Figure A2).

B3.1 BIOPHYSICAL ENVIRONMENT

B3.1.1 Climate

The Niewoudtville-Calvinia area experiences a typical continental climate. Daytime summer (December to February) temperatures are an average 30^{0}C, dropping overnight to around 13^{0}C. Daytime winter (June to August) temperatures average 18^{0}C and drop to a low 4^{0}C in the evenings. Extreme temperatures can go up to 37^{0}C in summer and drop below freezing between the months of May and September.

The Hantam region is subject mainly to winter rainfall but also benefits from occasional rain showers and thunderstorms in the summer. Rainfall peaks between March and August and averages 228 mm per year. Rainfall does occur in summer (September to February), averaging 12 mm per month (Aurecon, 2011: 2).

B3.1.2 Topography

The study area is largely located on the Niewoudtville/Onder Bokkeveld Plateau between Calvinia and Niewoudtville at an elevation of approximately 800 m. The area lies within the Olifants-Doring River catchment, with the Oorlogskloof River and its tributaries flowing parallel to the R27 road. The surround topography is relatively flat within the wide river valley of the Oorlogskloof, with the Hantam Mountains in the east and the escarpment on the Bokkeveld Mountains in the west (Belcher, 2011: 7)

B3.1.3 Geology and soils

The study area is characterised by various geological formations. To the west of Niewoudtville the R27 is underlain by thick bedded sandstone of the Nardouw Formation (Table Mountain Group). The area between Nieuwoudtville and the midpoint of Section 8 of the R27, approximately 35 km to the east, is underlain by Tillite of the Dwyka Group. A combination of shale, siltstone and sandstone of the Prince Albert and Tierberg Formations underlay the area from this point eastwards to Calvinia. Karoo dolerite intrusions occur in the area. The dominant form of weathering is disintegration (Aurecon, 2011: 5). These relatively flat lying beds overlie more ancient, folded and metamorphosed rocks of the Gariep and Nama Groups, which formed between 600 and 500 million years ago as a result of sedimentation and continental collision (Belcher, 2011: 8).

Clay-rich red soils of the Arcadia Form, derived from weathered dolerite, are found on level land surfaces. On steeper slopes shallow soils of the Glenrosa and Hutton Form developed since weathering is more limited. The dolerite-derived soils are base-saturated with a neutral pH as a result of the low rainfall in the Hantam (MacDonald, 2011: 16).

More detailed information on the soils of each site is included in Part C.

B3.1.4 Vegetation

Biogeographically the study area falls mainly within the Succulent Karoo Biome and partly within the Fynbos Biome in the west, with Hamtam Karoo vegetation ("Least threatened" status) the dominant natural vegetation type of the study area (Belcher, 2011: 10; MacDonald, 2011: 18).

A sequence of vegetation types occurs from west to east, namely from the Bokkeveld Escarpment, i.e. from the Vanrhyns Pass at the Western / Northern Cape border inland to Calvinia, as described in broad terms in the national classification of the vegetation of South Africa. The vegetation of the Bokkeveld Escarpment, which occurs on sandstone-derived soils and receives higher rainfall than further inland to the east, is classified as Bokkeveld Sandstone Fynbos. Nieuwoudtville Shale Renosterveld occurs on the clay-rich soils derived from Dwyka sediments. Next in the sequence is Nieuwoudtville-Roggeveld Dolerite Renosterveld, in a narrow north-south band which is widest in the north and tapers southwards to terminate south of the Oorlogskloof River. Hantam Karoo vegetation occurs to the east on the clay-rich soils towards Calvinia and beyond (see Figure B1 on page B6) (MacDonald, 2011: 18-20). According to the Critical Biodiversity Areas (CBA) map of the Hantam Municipality, the R27 route in the vicinity of Niewoudtville traverses CBA 1 (irreplaceable sites earmarked as the most important areas for biodiversity conservation) and CBA 2 (other important areas of high biodiversity value), which would coincide with Nieuwoudtville Shale Renosterveld and Nieuwoudtville-Roggeveld Dolerite Renosterveld, respectively. In addition, Section 8 of the R27 largely falls in a designated Ecological Support Area (see Figure B2 on page B7).

B3.1.5 Aquatic features

The main freshwater feature in the study area is the Oorlogskloof River, which originates in the Roggeveld Mountains and flows westwards past Calvinia and Niewoudtville. South of Niewoudtville it enters the Koebee Mountains, flowing through a deep riverine gorge where is its known as the Koebee River. It flows southwards to its confluence with the Doring River, a major tributary of the Olifants River which enters the Atlantic Ocean on the west coast (Belcher, 2011: 10).

The Oorlogskloof River has a bedrock and sand/silt substrate. As it drains Karoo and mountain fynbos vegetation, the river is frequently turbid and is seasonal in nature. Vegetation within the Oorlogskloof River is of a wetland nature, dominated by phragmites reeds, with some Juncus sp., weedy shrubs and grasses. This vegetation would be sustained for much of the year by subsurface and groundwater contributions rather than surface water flows. The Oorlogskloof River downstream of Calvinia is in a moderately modified state, with the major impacts being some flow modification, farming within the riparian zone and a low density of invasive alien vegetation growth (*Prosopis* sp.) (Belcher, 2011: 13; 15; 22-23).

B3.2 CULTURAL / HERITAGE ENVIRONMENT

The landscape of the study area along the R27 between Calvinia and Nieuwoudtville in the Northern Cape forms part of the high Karoo plateaux above the great escarpment. It is characterised by open plains punctuated by hills and mountains The landscape qualities of the study area are dominantly rural and natural with no important sites or places of heritage significance close to any of the proposed borrowpits (Hart, 2011: 8; 10).

Nieuwoudtville is one of the more recent "Kerkdorpies" (church towns) in the area founded in 1897. It has a characteristic home grown architecture based on the use of local sandstone. Calvinia is also a "Kerkdorpie", founded in the mid-19th century. It contains some good examples of 19th century buildings. Many of the small church towns of the Cape evolved from "Nagmaal" outspans, which were central places where farming families would congregate on a monthly basis to attend a religious service, exchange and purchase goods and socialise (Hart, 2011: 8).

In terms of heritage, the area has not been well studied. The vernacular architecture of Niewoudtville and surrounds has attracted some interest. The Vernacular Society of South Africa has implemented an in-house programme to record and photograph ruins and old farm houses at the Soutpan settlement that are under threat (Hart, 2011: 8).

B3.2.1 Archaeology

The Hantam Mountains to the north of Calvinia has not been subjected to any systematic archaeological research programmes or surveys in the past and therefore virtually nothing is known of this area. There are numerous reports on the rock art of the Oorlogskloof Nature Reserve, which is located 70 km south-west from Calvinia, but very few published reports. During a contract survey for the upgrading of railway infrastructure north of Loeriesfontein, a specialist discovered a small shelter with a Middle Stone Age scatter on the Krom River. Other consultants conducting two small surveys in the Calvinia district reported no finds of significant archaeological material (Hart, 2011: 8).

An archaeological investigation of the proposed borrowpits in the Calvinia area did not find any artefacts of cultural significance. Archaeology occurred in only one instance at a frequency of 1 artefact per 10 m^2.

More detailed information on the archaeology of each site is included in Section C.

B3.3 REGIONAL SOCIO-ECONOMIC ENVIRONMENT

The study area is situated in the Northern Cape Province, the largest but most sparsely populated of South Africa's nine provinces. Even though it covers almost 30% of the total South African land mass, the Northern Cape Province houses only about 2.2 % of the country's total population at a population density of less than 2.5 people per km² and has the smallest economy of the nine provinces. The arid climate and semi-desert landscape that characterise much of the Province cannot support large-scale economic activities that would provide livelihoods to large populations. Nevertheless, the Gross Geographic Product (GGP) per capita for the Province is higher than the national average, which indicates that it provides reasonable levels of economic activity to sustain its population. Mining and agriculture dominates the provincial economy, with the mining sector contributing most to the provincial GGP, while the agricultural sector provides the most employment opportunities. Limited processing of primary commodity output in mining and agriculture takes place in the Northern Cape.

The study area falls under the jurisdiction of the Hantam Local Municipality, which, in turn, forms part of the Namakwa District Municipality. The Namakwa District Municipality is located in the north-western corner of South Africa, bordering the Atlantic Ocean to the west and Namibia to the north. It is the largest district municipality in the country, covering an area of 126 747 km² area which stretches over 1 000 km from Fraserburg in the south-east to Alexander Bay in the north-west of the Northern Cape Province. The Namakwa District Municipality, with its headquarters in Springbok, accommodates a total population in the order of 110 000 people in the seven local municipalities across the area (Namakwa Municipality, 2005: 4-6).

The Hantam area is characterised by a sparse population, open plains punctuated by hills and mountains. The main commercial activity is farming, mainly sheep, wool, lucerne and rooibos tea. The region experiences a seasonal economic boost with the annual influx of tourists during the spring flower season.

The Hantam Local Municipality is responsible for the main towns of Brandvlei, Calvinia, Loeriesfontein, Middelpos and Niewoudtville in an area covering approximately 30 000 km². The total population was estimated at 21 241 in 2007. Literacy levels are generally low, with only 13% of the workforce having completed high school and less than 2% post-matric qualifications. Unemployment has been identified as the main problem in all the towns, with the official unemployment rate approximately 26%. The general lack of economic opportunities is associated with very low personal and household incomes among the young, economically active population. The majority of the economically active population is reported to earn less than R 1 000 per month (Hantam Municipality, 2011: 7-9).

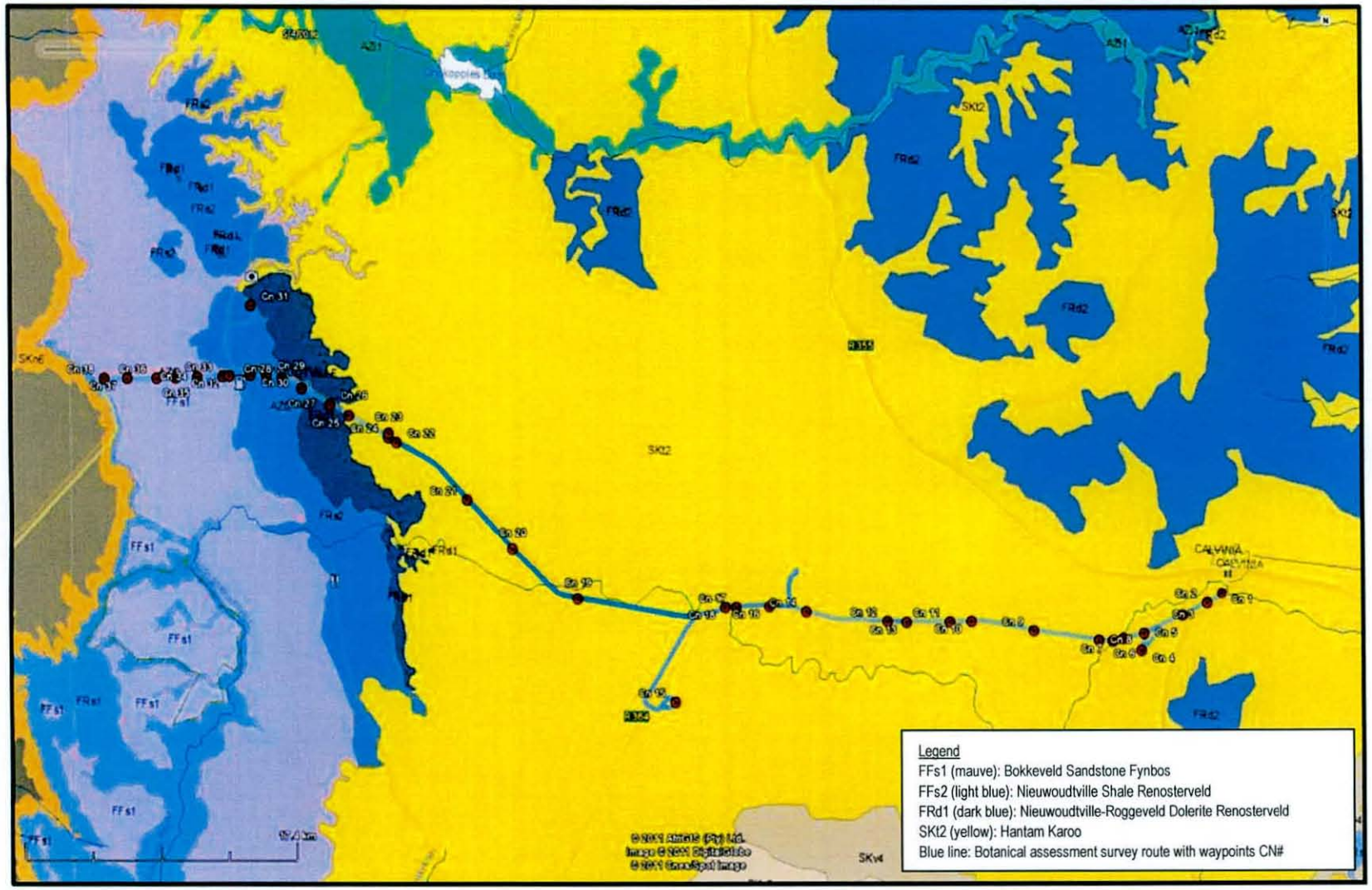
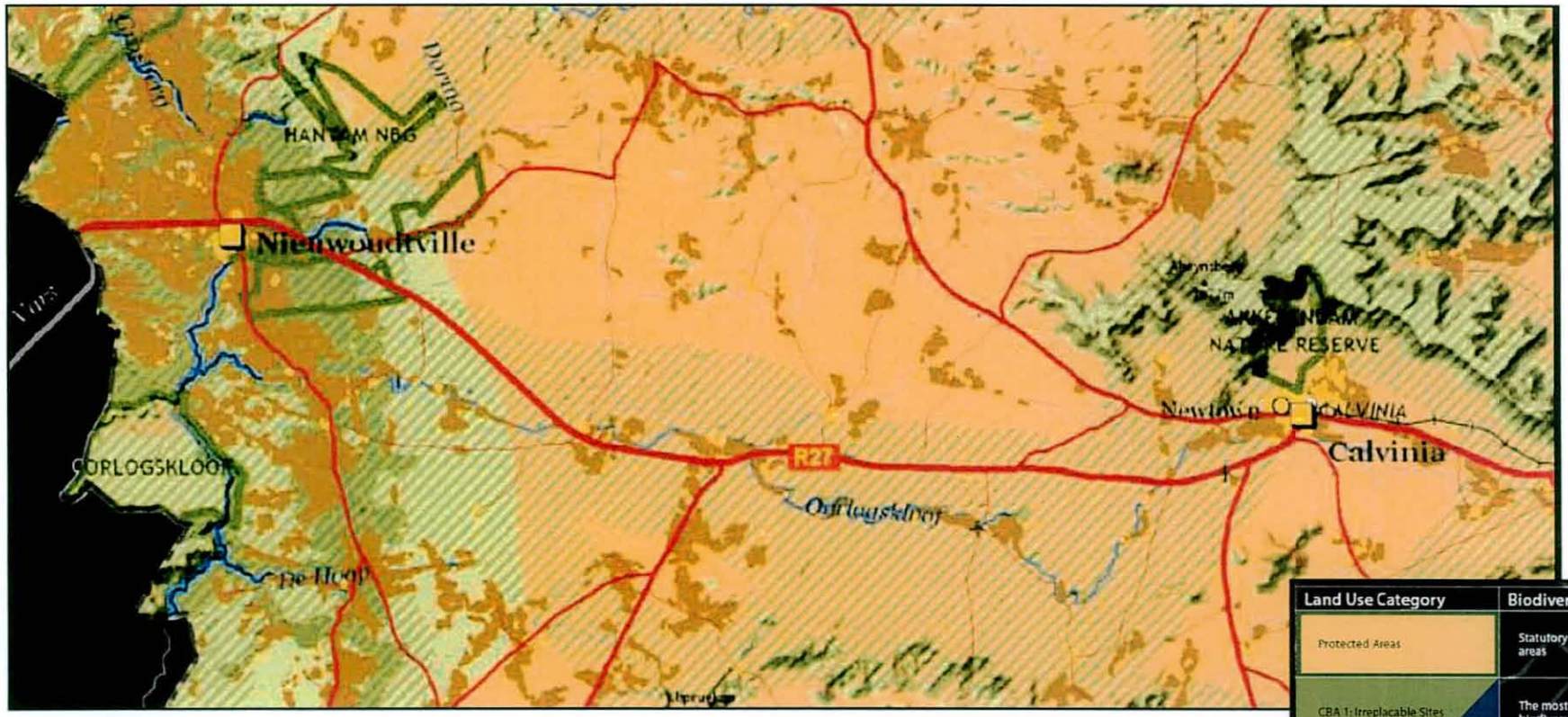


Figure B1: Portion of Vegetation Map of South Africa, Lesotho & Swaziland (Mucina et al, 2005), showing the vegetation types along the R27 Sections 7 & 8 (image supplied by MacDonald, 2011: 20)



Land Use Category	Biodiversity Criteria
Protected Areas	Statutory protected and conservation areas
CBA 1: Irreplacable Sites	The most important areas for biodiversity conservation
CBA 2: Important Areas	Other areas known to be of high biodiversity value
Ecological Support Areas	Areas that support key biodiversity resources (e.g. water) or ecological processes (e.g. movement corridors) in the landscape
Other Natural Areas	Areas of natural vegetation where the land has not been ploughed, mined or built on
Agricultural transformation	Croplands with limited or no natural remaining
Infrastructural transformation	Urban areas and roads with no natural remaining
Mining and Quarrying	Limited or no natural remaining

Figure B2: Extract of the Hantam Municipality Critical Biodiversity Areas map showing the position of the R27 Section 7 & 8 in relation to sensitive areas

PART C1:

INDIVIDUAL BORROWPITS:

BORROWPIT BP 27-8 KM 32.6 RHS 6.2

PART C: INDIVIDUAL BORROWPITS

C1 BORROWPIT BP R27-8 KM 32.6 RHS 6.2

C1.1 PART 1: BRIEF PROJECT DESCRIPTION

C1.1.1 Mine owner and mine manager / Responsible person

A contractor is still to be appointed by SANRAL to undertake the excavation of BP R27-8 km 32.6 RHS 6.2. This borrowpit is planned as a strategic borrowpit for the supply of material for the proposed strengthening (partial reconstruction) of the R27 Sections 7 and 8 between the Western/Northern Cape border (km 40.0) and Calvinia (km 70.0).

C1.1.2 Name and address of the applicant for prospecting permit or mining authorisation

Applicant:	South African National Roads Agency Limited
Contact person:	Mr D Wilson
Address:	Private Bag X19, Bellville, 7530
Telephone:	(021) 957 4600

C1.1.3 Name and address of the owner of the land and the title deed description

Farm name:	Portion 1 of the Farm Bloedzuigerfontein Noord 782, Northern Cape Province
Landowner:	Mr Johannes Louw Strauss
Contact person:	Dr FJ Strauss
Address:	PO Box 309, Clanwilliam, 8135
Telephone:	027 482 1629 / 083 230 4767
Title deed information:	Title Deed No of Property: T53016/1993
Size of the property:	1420.8053 ha

No mineral rights are indicated on the Deed of Transfer.

C1.1.4 Regional setting

Portion 1 of the Farm Bloedzuigerfontein Noord 782, known as Merino, is situated along the R364 approximately 6 km south-west of the R27. It is located in the Hantam Local Municipality, which forms part of the Namakwa District Municipality in the Northern Cape Province. The proposed borrowpit is at the site of an abandoned Iceland Spar (a variety of calcite) mine, situated approximately 1.8 km from the R364 at the foot of a hill (see Figure A2 on page A6 and Figures C1.1 to C1.6 on pages C1-8 to C1-11). Co-ordinates of the proposed borrowpit area, including the access road, are presented in Table C1.1 below.

Table C1.1: Borrowpit co-ordinates (System WGS 84 Lo 19°)

Point	"-Y"	"+X"
A	37,164.05	3,489,277.78
B	38,590.12	3,490,783.99
C	38,522.61	3,490,847.91
D	38,408.75	3,490,800.00

E	38,358.70	3,490,653.73
F	38,404.12	3,490,611.08
G	37,154.79	3,489,291.55

C1.2 PART 2: DESCRIPTION OF THE PRE-MINING ENVIRONMENT SPECIFIC TO BP R27-8 KM 32.6 RHS 6.2

C1.2.1 Climate

A general description of the climate is presented in Section B3.1.1.

C1.2.2 Topography

A general description of the topography is presented in Section B3.1.2. The contours of the area are presented in the borrowpit layout plan in Figure C1.2. The area of the abandoned mine site is located at the foot of a hill that has been excavated to expose high vertical rock faces (see Figure C1.4).

C1.2.3 Geology and soil

A general description of the geology is presented in Section B3.1.3.

A considerable amount of weathered dolerite rock was excavated in the past while mining for Iceland Spar (a variety of calcite). This dolerite remains on site in abandoned tailings-heaps consisting of variable quality materials, which would be selectively recovered for suitable quality material to be used as road building material (see Figure C1.4).

Based on the trial hole profiles (see Appendix C1.1), the material is typically comprised of brown loose to medium dense to dense weathered dolerite gravel. Although the trial hole profiles describe the upper horizon as topsoil, the material is not by definition topsoil but rather considered to be highly disturbed overburden in which very limited revegetation has taken place. This layer typically varies from 100 mm to 200 mm in thickness.

C1.2.4 Pre-mining land capability and land use

The proposed borrowpit site is highly disturbed with high exposed vertical rock faces as a result of previous mining activities. The surrounding lands have been cleared of the natural Hantam Karoo vegetation for cultivation of fodder and for grazing. It has been invaded *en masse* by the exotic invasive *Atriplex lindleyi* subsp. *inflata*. An exotic fodder plant, *Atriplex nummularia* (Old Man Saltbush) has also been planted on the cleared land (see Figures C1.4 to C1.6).

C1.2.5 Vegetation

A general description of the vegetation in the area is presented in Section B3.1.4. The natural Hantam Karoo vegetation has been cleared from the site (see Section C1.2.4).

C1.2.7 Fauna

No faunal species were seen on site.

C1.2.8 Hydrology

The proposed borrowpit is not located close to any dams or other surface water sources.

C1.2.9 Geohydrology

The borrowpit development would not impact on groundwater as it would entail the removal of existing mine heaps only and no further excavation would be undertaken on the site.

C1.2.10 Air quality

The air quality in the study area is relatively good. No local residents live in close proximity to the borrowpit site. Dust from the borrowpit operation could affect traffic along the R364, which is not tarred. The only homestead located along the R364 between the proposed borrowpit access point and the R27, approximately 700 m south of the R27, is situated approximately 400 m from the R364.

C1.2.11 Noise

The site is not currently exposed to direct noise from traffic on any major roads. No local residents live in close proximity to the borrowpit site

C1.2.12 Archaeology and heritage

A general description of the heritage environment and archaeology of the area is presented in Section B3.2. No archaeological material was found on site. No known human graves are located in the area (see Appendix 5).

C1.2.13 Sensitive landscape

No sensitive landscapes were identified that could be affected by the proposed borrowpit.

C1.2.14 Visual aspects

The proposed borrowpit site is an abandoned mine site with excavated exposed high vertical rock faces along a hill, which is visible from the R364. No rehabilitation has been undertaken in the past. The proposed borrowpit activities would not entail any further excavation but only removal of existing tailings-heaps.

C1.2.15 Regional socio-economic environment

See information provided in Section B3.3.

C1.2.16 Interested and Affected Parties

The public participation process undertaken as part of the EMP is presented in detail in Section A3.2.2. It should be noted that a notification letter was sent to Dr FJ Strauss, as representative of the landowner, Mr JL Strauss, informing him of the proposed project and that a borrowpit had been identified on the property. Dr Strauss was asked to complete an acknowledgement form (which is included in Appendix C1.2) to indicate that he was notified of the location and extent of the area and that access to the area may be required across the property, as well as to raise any issues of concern. Dr Strauss had the following comments.

Table C1.2:I&AP Comments and Responses

I&AP	Comment	Response
Dr FJ Strauss (on behalf of the landowner)	The owner would like an opportunity to remove the remaining Iceland Spar before the contract commences as well during the operation of the pit.	The design engineer has confirmed that this request could be accommodated through allowing the owner's hired labour access to the site to pick out the Iceland Spar whilst the material is being crushed.
	The owner's representative has granted permission for removal of mine heaps only and not for further excavation or mining.	The design engineer has noted this prerequisite and it is reflected as such in the borrowpit mine plan.
	The contractor must contact the owner's representative before fencing and acquiring fencing material.	The design engineer has noted this request.
	No permanent people would be allowed to stay and / or overnight on the property.	The Contractor's staff shall not be allowed to stay on the property. Site demarcation and access control to borrowpits would be implemented as specified in this EMP.
	No scrap metal or any other items may be removed from the farm or BP site.	The Contractor's staff shall not be allowed to remove any movable property from the borrowpit site. Access control would be implemented as specified in this EMP.
	The owner's representative must be informed of any entry to the property before the start of the contract.	The project team has noted this request. Access control would be implemented as specified in this EMP.

C1.3 PART 3: MOTIVATION FOR THE PROPOSED PROJECT

C1.3.1 Benefits of the project

The motivation for and potential benefits arising as a result of the project are presented in Section B1.

C1.3.2 Consideration of alternatives

The assessment of alternatives is presented in detail in Section B2. Borrowpit BP R27-8 km 32.6 RHS 6.2 has been identified as a preferred borrowpit.

C1.4 PART 4: DETAILED DESCRIPTION OF THE PROPOSED PROJECT

C1.4.1 Surface infrastructure

There would be no permanent surface infrastructure for the proposed borrow area. Establishment of a crusher would, however, be required for the duration of the construction period to break down harder dolerite boulders. A temporary access road would be constructed to link the borrowpit area via the

existing R27 and R364 to the road construction areas. The access road and boundaries of the proposed borrowpit would be fenced and a gate installed at the entrance point along the R364 to control access.

C1.4.2 Waste management

Material that is not suitable for the road rehabilitation project would be stockpiled and used to reshape only the recently disturbed areas during rehabilitation. Any domestic waste would be collected in a waste bin and disposed of at a municipal waste site.

C1.4.3 Water management

The water requirements for the proposed borrowpit operations are expected to be minimal (e.g. dust suppression on access roads and borrowpit area). Four existing boreholes on privately owned farms have been identified to supply the total monthly water use requirements for the road upgrade project. This aspect would not require a water use permit.

Drainage should not be a problem at this proposed borrowpit as there would not be a large excavated area where water could collect. The site would be free draining.

C1.4.4 Transport

This would consist of haul vehicles transporting the road building material from the borrowpit to the area of the road under construction. A temporary access road is to be constructed between the borrowpit area and the R364 (see Figure C1.3), from where existing access roads would be used.

C1.4.5 Borrowpit layout and development

The proposed site layout plan is presented in Figure C1.2.

The total area to be temporarily expropriated, including the access road, is 5.831 ha, while the proposed mined borrow area would be approximately 0.8159 ha in extent. As the operation would entail excavating the existing tailing-heaps, it would not add to the depth of existing excavations. Two zones have been identified within the borrow area, the first of which is expected to yield 15 500 m^3 of material and the second 4 900 m^3. Crushing would be required to break down harder dolerite boulders.

Prior to commencement of the operation, invasive vegetation would be cleared from the site. Since no topsoil exists on the tailings heaps, no requirement for stripping and protection of topsoil is imposed. However, it is proposed to strip and stockpile top layer of the existing overburden in which limited rehabilitation has occurred. Should any extra topsoil become available from areas with Hantam Karoo vegetation during the course of the project, this should be reserved for use at this borrowpit site. After removal of tailings-heaps, the recently mined area would be shaped to provide gradients that are smooth to moderate in order to limit erosion and possibly encourage re-colonisation of the site by natural Hantam Karoo vegetation. In order to assist rehabilitation of the borrowpit area at the end of construction, the top overburden layer reserved for this purpose would be spread along the recently mined area. Due to the extent of the previously mined areas at this site, it will not be practical to include any additional remedial measures to these other than the removal of invasive alien vegetation. The intention will be to recover the

existing tailings heaps and thereby re-instate these localised areas of the mine back to their original contours.

The road building material would be excavated from the existing tailings-heaps and loaded with an excavator directly onto haul vehicles. Material would then be transported to the location of the road under construction.

The borrowpit details are summarized in Table C1.3 below:

Table C1.3: Borrowpit details

Total borrowpit area, including access road	5.831 ha
Borrowpit area to be mined	0.8159 ha
Maximum depth	Approximately 7.0 m
Material type	Road base and subbase material
Volume of material	20 400 m^3

C1.5 PART 5: ENVIRONMENTAL IMPACT ASSESSMENT

This section provides an assessment summary table of the impacts that would result from the development of Borrowpit BP R27-8 km 32.6 RHS 6.2. Mitigation measures are proposed that would ameliorate negative impacts or enhance potential benefits. Impacts were assessed according to pre-defined rating scales as shown in Appendix 2, which are based on criteria set out in the EIA Regulations Guideline Document (Department of Environmental Affairs and Tourism, 1998).

The impacts arising from the borrowpit development are presented in Table C1.4

C1.6 PART 6: ENVIRONMENTAL MANAGEMENT PROGRAMME

A generic EMP is presented in Section D, as it is the same for all three borrowpits.

Table C1.4:Impacts arising from the proposed development of Borrowpit BP 27-8 km 32.6 RHS 6.2

Environmental Aspect	Extent	Duration	Intensity	Probability	Confidence	Significance (before mitigation)	Proposed mitigation	Significance (after mitigation)
Geology	Local	Permanent	Low	Definite	Medium	**Low**	-	**LOW**
Topography	Local	Permanent	Low	Definite	Medium	**Low**	The removal of the previously excavated tailings-heaps would assist to level the area. The slope changes must be finished off so that flowing curves that blend with the surrounding landscapes are formed in preference to sharp angles.	**VERY LOW**
Soils	Local	Short-term	Medium	Highly probable	High	**Very Low**	Stockpile topsoil and utilise during rehabilitation.	**VERY LOW**
Land capability	Local	Short-term	Medium	Probable	High	**Very Low**	• Demarcation and fencing of borrowpit site and access road. • Identification of no-go areas. • Land disturbed shall be rehabilitated.	**VERY LOW**
Land use	Local	Short-term	Low	Definite	High	**Very Low**	Land disturbed shall be rehabilitated.	**VERY LOW**
Natural vegetation	Local	Short to Medium term	Low	Definite	High	**Very Low**	Land disturbed shall be rehabilitated.	**VERY LOW**
Animal life	Local	Short-term	Low	Probable	High	**Very Low**	Land disturbed shall be rehabilitated.	**VERY LOW**
Surface water	Local	Short-term	Medium	Improbable	High	**Very Low**	All machinery and equipment shall be properly maintained, so that leaks do not appear and so that during servicing all oil, grease, etc. is disposed of correctly.	**VERY LOW**
Groundwater	Local	Short-term	Low	Improbable	High	**Very Low**	All machinery and equipment shall be properly maintained, so that leaks do not appear and so that during servicing all oil, grease, etc. is disposed of correctly.	**VERY LOW**
Air quality	Local	Short-term	Medium to High	Highly probable	High	**Low**	• Spray water and/or other dust suppression agents to reduce dust. • Retain vegetation cover as long as possible to reduce size of areas where wind could generate dust. • Protect excavated material stockpiles against wind erosion. • Suitably cover and secure material loads during transportation. • Haul vehicles should comply with speed limits.	**VERY LOW**
Noise	Local	Short-term	Medium	Highly probable	High	**Very Low**	The contractor shall be required to be familiar with and adhere to any local by-laws and regulations regarding the generation of noise and hours of operation.	**VERY LOW**
Archaeology/heritage	Local	Short-term	Low	Improbable	Medium	**Very low**	Land disturbed shall be rehabilitated.	**VERY LOW**
Sensitive landscapes	No impact							
Visual aspects	Local	Long-term	Low	Highly probable	High	**Low**	The removal of the previously excavated tailings-heaps would improve the current appearance of the area. However, the existing cutting would remain visible. Land disturbed shall be rehabilitated.	**LOW**
Regional socio-economic: Employment	Local	Short-term	Low	Highly probable	High	***Very Low (Positive)***	Local labour should be sourced.	***VERY LOW (POSITIVE)***
Regional socio-economic: Safety	Local	Short-term	High	Highly probable	High	**Low**	• The movement of construction vehicles should be limited to daylight hours. • The risk associated with the movement of large haulage vehicles should be clearly sign-posted in both directions on the R364 leading up to the proposed borrowpit.	**LOW**

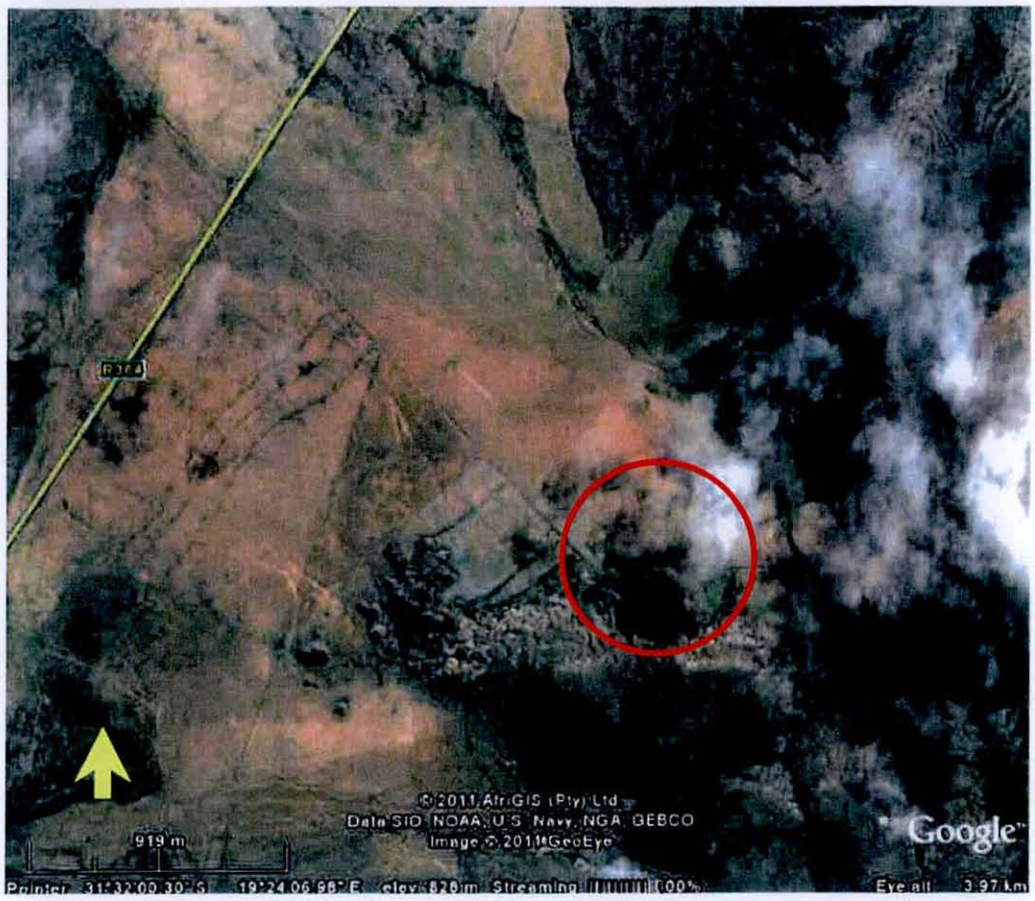


Figure C1.1: Google Earth air photo of proposed Borrowpit BP R27-8 km 32.6 RHS 6.2

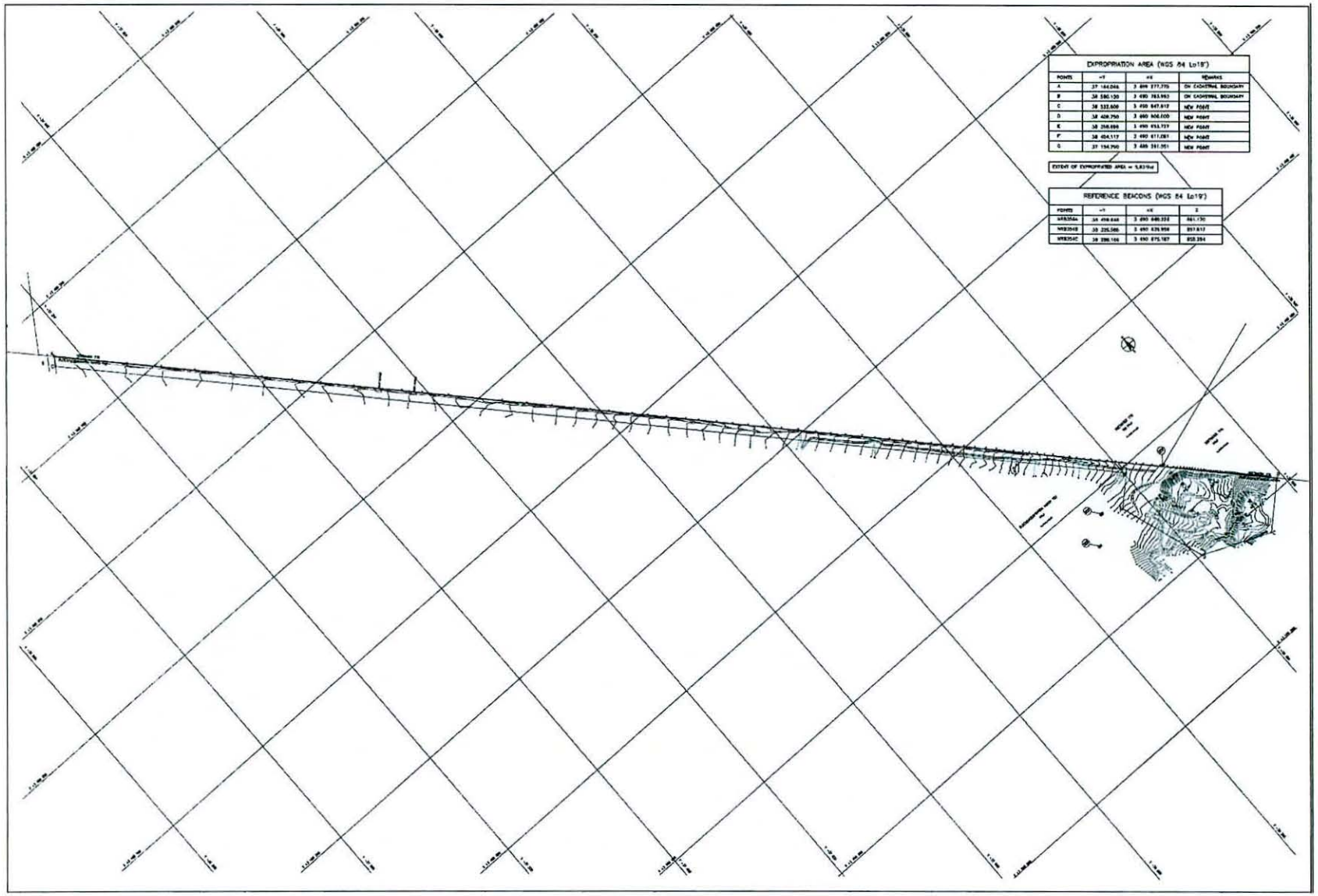


Figure C1.3: Expropriation plan for proposed Borrowpit BP R27-8 km 32.6 RHS 6.2

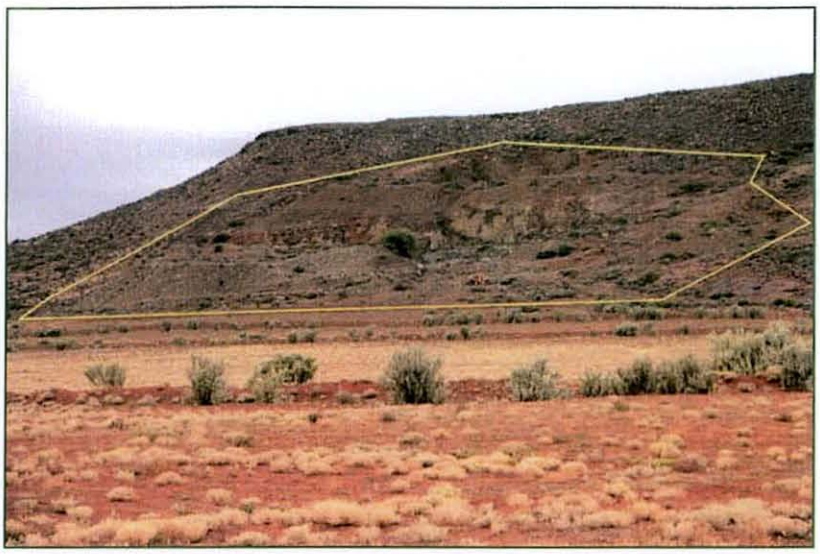


Figure C1.4: BP R27-8 KM 32.6 RHS 6.2: View of the site, with the abandoned Iceland Spar mine outlined in yellow (facing south-east)(photo provided by Dr D MacDonald)

Figure C1.5: BP R27-8 KM 32.6 RHS 6.2: View of the existing tailings heap to be excavated (facing south-west)

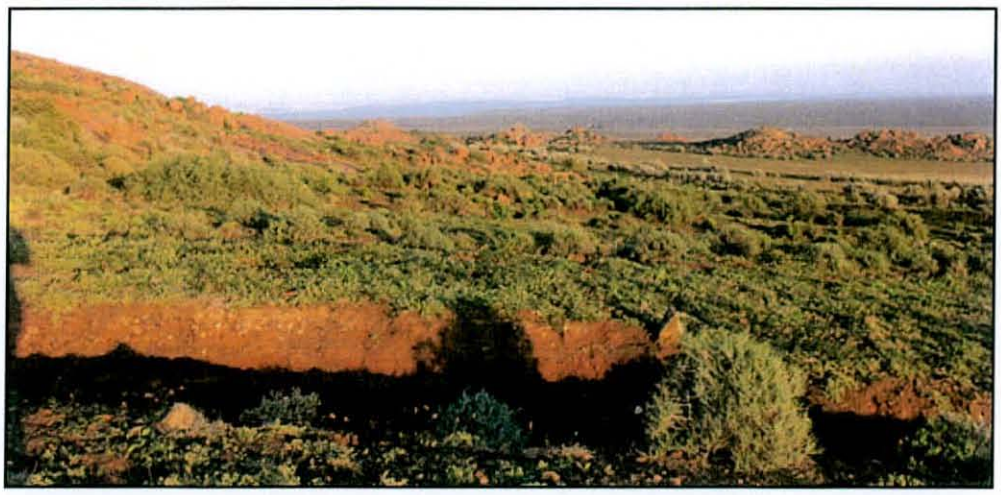


Figure C1.6: BP R27-8 KM 32.6 RHS 6.2: View of the surrounding area (facing west)

APPENDIX C1.1:

TRAIL HOLE PROFILE:

BORROWPIT BP27-8 KM 32.6 RHS 6.2

sanas T0023

GEOSTRADA engineering materials laboratory

SUMMARY OF BORROW PIT RESULTS - REP COM 8

Client:	Aurecon	**BP No:**	2		
Project Name:	R27 W/Cape Border to Calvinia	**TP No:**	1	**GPS (X):**	6509556.36
Project No:	106547	**Section:**	Section 8	**GPS (Y):**	34J 348622.74
Job No:		**Chainage:**	Km 32.6	**Date:**	
		Position:	RHS	**Test Methods:**	TMH1 A1-A5 / A7 / A8

SAMPLE DESCRIPTION		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth (mm)		0 - 500	500 - 3000	500 - 3000	3000 > Refusal		
Lab No			1/363(A)	1/363 (B)			
DESCRIPTIONS							
Layer Description	Layer 1	TOPSOIL					
	Layer 2	Br med dense weath. Dolorite gravel					
	Layer 3						
	Layer 4						
	Layer 5						
	Layer 6						
GRADING ANALYSIS							
% Passing Sieve	63.0 mm	No Sample	100				
	53.0 mm		79				
	37.5 mm		74				
	26.5 mm		67				
	19.0 mm		59	100			
	13.2 mm		54	93			
	4.75 mm		42	73			
	2.00 mm		28	52			
	0.425 mm		10	19			
	0.075 mm		3	6			
GRADING MODULUS							
GM			2.59	2.23			
ATTERBERG LIMITS							
Liquid Limit							
Plasticity Index			NP	NP			
Linear Shrinkage			0.0	0.0			
MDD / OMC & CBR ANALYSIS							
Maximum Dry Density				2322			
Optimum Moisture Content				9.0			
In-situ Moisture Content							
In-situ Density (%)							
CBR @ 90%				9.9			
CBR @ 93%				35			
CBR @ 95%				60			
CBR @ 98%				68			
CBR @ 100%				74			
% Swell (Max)				0.1			
MATERIAL CLASSIFICATION							
COLTO Classification				G5			

Remarks:

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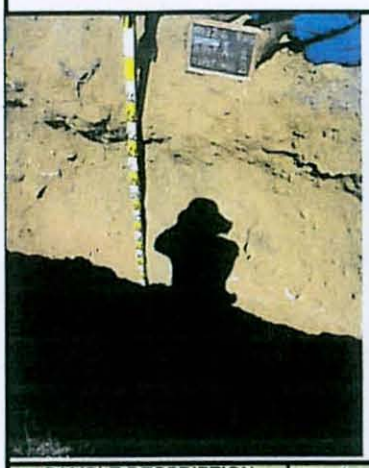
SUMMARY OF BORROW PIT RESULTS - REP COM 8

Client:	Aurecon	**BP No:**	2		
Project Name:	R27 W/Cape Border to Calvinia	**TP No:**	2	**GPS (X):**	6509579.83
Project No:	106547	**Section:**	Section 8	**GPS (Y):**	34J 348657.88
Job No:		**Chainage:**	Km 32.6	**Date:**	
		Position:	RHS	**Test Methods:**	TMH1 A1-A5 / A7 / A8



SAMPLE DESCRIPTION		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth (mm)		0 - 100	100 - 3800	3800 - 4400	4400 > Refusal		
Lab No			1/364				
DESCRIPTIONS							
Layer Description	Layer 1	TOPSOIL					
	Layer 2	Br weath. Soft to dense Dolorite gravel					
	Layer 3						
	Layer 4						
	Layer 5						
	Layer 6						
GRADING ANALYSIS							
% Passing Sieve	63.0 mm	No Sample					
	53.0 mm						
	37.5 mm						
	26.5 mm						
	19.0 mm		100				
	13.2 mm		90				
	4.75 mm		69				
	2.00 mm		48				
	0.425 mm		21				
	0.075 mm		10				
GM			2.21				
ATTERBERG LIMITS							
Liquid Limit			27				
Plasticity Index			14				
Linear Shrinkage			5.0				
MDD / OMC & CBR ANALYSIS							
Maximum Dry Density			2314				
Optimum Moisture Content			8.6				
In-situ Moisture Content							
In-situ Density (%)							
CBR @ 90%			7.0				
CBR @ 93%			10				
CBR @ 95%			13				
CBR @ 98%			20				
CBR @ 100%			25				
% Swell (Max)			0.0				
MATERIAL CLASSIFICATION							
COLTO Classification			G8				

Remarks:

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SUMMARY OF BORROW PIT RESULTS - REP COM 8

Client:	Aurecon	**BP No:**	2		
Project Name:	R27 W/Cape Border to Calvinia	**TP No:**	3	**GPS (X):**	6509649.18
Project No:	106547	**Section:**	Section 8	**GPS (Y):**	34J 348630.22
Job No:		**Chainage:**	Km 32.6	**Date:**	
		Position:	RHS	**Test Methods:**	TMH1 A1-A5 / A7 / A8

SAMPLE DESCRIPTION		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth (mm)		0 - 100	100 - 2500	2500 - 2900	100 - 2500	2500 - 2900	>2900
							Stop - Tpit caved in
Lab No			1/365 (A)		1/365 (B)		
DESCRIPTIONS							
Layer Description	Layer 1	TOPSOIL					
	Layer 2	Br weath. Loose Dolorite gravel					
	Layer 3						
	Layer 4						
	Layer 5						
	Layer 6						
GRADING ANALYSIS							
% Passing Sieve	63.0 mm	No Sample	100				
	53.0 mm		85				
	37.5 mm		85				
	26.5 mm		74				
	19.0 mm		71		100		
	13.2 mm		68		89		
	4.75 mm		59		73		
	2.00 mm		49		57		
	0.425 mm		26		28		
	0.075 mm		16		7		
GRADING MODULUS							
GM			2.09		2.08		
ATTERBERG LIMITS							
Liquid Limit			30		29		
Plasticity Index			18		17		
Linear Shrinkage			7.0		7.0		
MDD / OMC & CBR ANALYSIS							
Maximum Dry Density					2238		
Optimum Moisture Content					8.3		
In-situ Moisture Content							
In-situ Density (%)							
CBR @ 90%					7.3		
CBR @ 93%					9.5		
CBR @ 95%					12		
CBR @ 98%					15		
CBR @ 100%					18		
% Swell (Max)					0.0		
MATERIAL CLASSIFICATION							
COLTO Classification					Not Classified		

Remarks:

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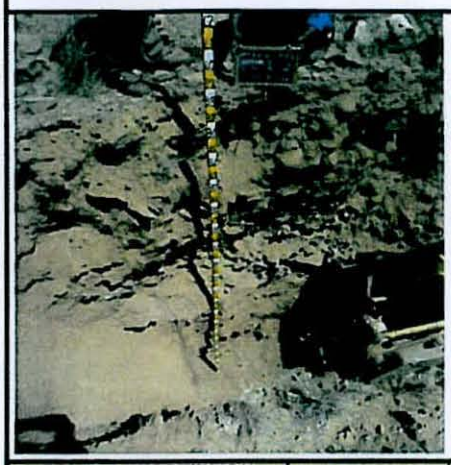
SUMMARY OF BORROW PIT RESULTS - REP COM 8

Client:	Aurecon	**BP No:**	2		
Project Name:	R27 W/Cape Border to Calvinia	**TP No:**	4	**GPS (X):**	6509624.23
Project No:	106547	**Section:**	Section 8	**GPS (Y):**	34J 348568.22
Job No:		**Chainage:**	Km 32.6	**Date:**	
		Position:	RHS	**Test Methods:**	TMH1 A1-A5 / A7 / A8



SAMPLE DESCRIPTION		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth (mm)		0 - 100	100 - 3800	100 - 3800	>3800		
					Stop - Tpit caved in		
Lab No			1/366 (A)	1/366 (B)			
DESCRIPTIONS							
Layer Description	Layer 1	TOPSOIL					
	Layer 2	Br weath. Loose Dolorite gravel					
	Layer 3						
	Layer 4						
	Layer 5						
	Layer 6						
GRADING ANALYSIS							
% Passing Sieve	63.0 mm	No Sample	Not Tested				
	53.0 mm						
	37.5 mm						
	26.5 mm			100			
	19.0 mm			99			
	13.2 mm			81			
	4.75 mm			56			
	2.00 mm			40			
	0.425 mm			16			
	0.075 mm			6			
GRADING MODULUS							
GM				2.38			
ATTERBERG LIMITS							
Liquid Limit				23			
Plasticity Index				9			
Linear Shrinkage				3.0			
MDD / OMC & CBR ANALYSIS							
Maximum Dry Density				2244			
Optimum Moisture Content				8.2			
In-situ Moisture Content							
In-situ Density (%)							
CBR @ 90%				24			
CBR @ 93%				36			
CBR @ 95%				48			
CBR @ 98%				55			
CBR @ 100%				60			
% Swell (Max)				0.3			
MATERIAL CLASSIFICATION							
COLTO Classification				G5			

Remarks:

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SUMMARY OF BORROW PIT RESULTS - REP COM 8

Client:	Aurecon	**BP No:**	2		
Project Name:	R27 W/Cape Border to Calvinia	**TP No:**	5	**GPS (X):**	6509671.68
Project No:	106547	**Section:**	Section 8	**GPS (Y):**	34J 348587.42
Job No:		**Chainage:**	Km 32.6	**Date:**	
		Position:	RHS	**Test Methods:**	TMH1 A1-A5 / A7 / A8

SAMPLE DESCRIPTION		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth (mm)		0 - 100	100 - 4300				
			Stop - Tpit caved in				
Lab No			1/367				
DESCRIPTIONS							
Layer Description	Layer 1	TOPSOIL					
	Layer 2	Br weath. Loose Dolorite gravel					
	Layer 3						
	Layer 4						
	Layer 5						
	Layer 6						
GRADING ANALYSIS							
% Passing Sieve	63.0 mm	No Sample	69				
	53.0 mm		62				
	37.5 mm		55				
	26.5 mm		50				
	19.0 mm		47				
	13.2 mm		45				
	4.75 mm		39				
	2.00 mm		32				
	0.425 mm		15				
	0.075 mm		5				
GRADING MODULUS							
GM			2.48				
ATTERBERG LIMITS							
Liquid Limit			22				
Plasticity Index			8				
Linear Shrinkage			3,0				
MDD / OMC & CBR ANALYSIS							
Maximum Dry Density							
Optimum Moisture Content							
In-situ Moisture Content							
In-situ Density (%)							
CBR @ 90%							
CBR @ 93%							
CBR @ 95%							
CBR @ 98%							
CBR @ 100%							
% Swell (Max)							
MATERIAL CLASSIFICATION							
COLTO Classification							

Remarks:

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SUMMARY OF BORROW PIT RESULTS - REP COM 8

Client:	Aurecon	**BP No:**	2		
Project Name:	R27 W/Cape Border to Calvinia	**TP No:**	6	**GPS (X):**	6509678.63
Project No:	106547	**Section:**	Section 8	**GPS (Y):**	34J 348551.59
Job No:		**Chainage:**	Km 32.6	**Date:**	
		Position:	RHS	**Test Methods:**	TMH1 A1-A5 / A7 / A8

SAMPLE DESCRIPTION		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth (mm)		0 - 200	200 - 2300	2300 - 3300	200 - 2300	2300 - 3300	
							3300 > Too Dense
Lab No			1/368 (A)		1/368 (B)		
DESCRIPTIONS							
Layer Description	Layer 1	TOPSOIL					
	Layer 2	Br weath. Loose Dolorite gravel					
	Layer 3	L/Br weath. Med dense to dense Dolorite gravel (In Situ)					
	Layer 4						
	Layer 5						
	Layer 6						
GRADING ANALYSIS							
% Passing Sieve	63.0 mm	No Sample	100				
	53.0 mm		77				
	37.5 mm		77				
	26.5 mm		73				
	19.0 mm		69		100		
	13.2 mm		64		89		
	4.75 mm		57		69		
	2.00 mm		43		57		
	0.425 mm		23		26		
	0.075 mm		8		9		
GRADING MODULUS							
GM			2.26		2.08		
ATTERBERG LIMITS							
Liquid Limit			23				
Plasticity Index			7		NP		
Linear Shrinkage			3.5		0.0		
MDD / OMC & CBR ANALYSIS							
Maximum Dry Density					2256		
Optimum Moisture Content					7.2		
In-situ Moisture Content							
In-situ Density (%)							
CBR @ 90%					24		
CBR @ 93%					38		
CBR @ 95%					46		
CBR @ 98%					50		
CBR @ 100%					53		
% Swell (Max)					0.0		
MATERIAL CLASSIFICATION							
COLTO Classification					G5		

Remarks:

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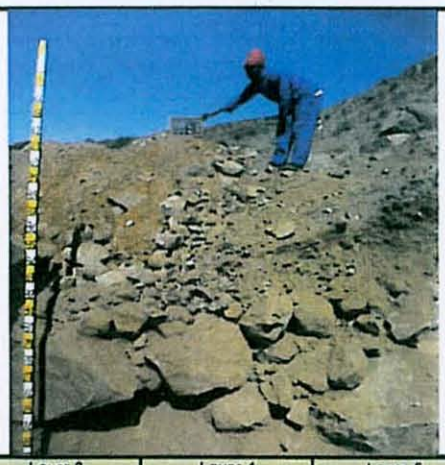
GEOSTRADA engineering materials laboratory

SUMMARY OF BORROW PIT RESULTS - REP COM 8

Client:	Aurecon	**BP No:**	2		
Project Name:	R27 W/Cape Border to Calvinia	**TP No:**	7	**GPS (X):**	6509696.02
Project No:	106547	**Section:**	Section 8	**GPS (Y):**	34J 348580.9
Job No:		**Chainage:**	Km 32.6	**Date:**	
		Position:	RHS	**Test Methods:**	TMH1 A1-A5 / A7 / A8



SAMPLE DESCRIPTION		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6
Depth (mm)		0 - 100	100 - 1500	1500 - 3000	100 - 1500	1500 - 3000	
							3000 > Refusal
Lab No			1/369 (A)		1/369 (B)		
DESCRIPTIONS							
Layer Description	Layer 1	TOPSOIL					
	Layer 2	Br weath. Loose Dolorite gravel					
	Layer 3	Br weath med dense Dolorite gravel (In Situ)					
	Layer 4						
	Layer 5						
	Layer 6						
GRADING ANALYSIS							
% Passing Sieve	63.0 mm	No Sample	100				
	53.0 mm		89				
	37.5 mm		79				
	26.5 mm		74				
	19.0 mm		68		100		
	13.2 mm		66		94		
	4.75 mm		61		80		
	2.00 mm		53		68		
	0.425 mm		26		33		
	0.075 mm		15		16		
GM			1.98		1.83		
ATTERBERG LIMITS							
Liquid Limit			27		32		
Plasticity Index			10		19		
Linear Shrinkage			5.5		7.5		
MDD / OMC & CBR ANALYSIS							
Maximum Dry Density					2216		
Optimum Moisture Content					8.7		
In-situ Moisture Content							
In-situ Density (%)							
CBR @ 90%					6.9		
CBR @ 93%					11		
CBR @ 95%					15		
CBR @ 98%					22		
CBR @ 100%					29		
% Swell (Max)					0.1		
MATERIAL CLASSIFICATION							
COLTO Classification					Not Classified		

Remarks:

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APPENDIX C1.2:

LANDOWNER / I&AP COMMENTS:

BORROWPIT BP27-8 KM 32.6 RHS 6.2

VOORGESTELDE LEENGROEWE VIR DIE VERSTERKING VAN DIE R27 GEDEELTE 7 & 8 TUSSEN DIE WES-/NOORD-KAAP GRENS (KM 40.0) EN CALVINIA (KM 70.0)

BENUTTING VAN LEENGROEWE

PROPOSED BORROWPITS FOR THE STRENGTHENING OF THE R27 SECTIONS 7 & 8 BETWEEN THE WESTERN/NORTHERN CAPE BORDER (KM 40.0) AND CALVINIA (KM 70.0)

UTILISATION OF BORROWPITS

LEENGROEF NO. / BORROWPIT NO.	**BP R27-8 km 32.6 RHS 6.2**
GEREGISTREERDE PLAASNAAM / REGISTERED FARM NAME	Portion 1 of the farm Bloedzuigerfontein Noord Nr 782 ('Merino')
GEREGISTREERDE EIENAAR / REGISTERED OWNER	J.L. Strauss (Travellers Rest Pty. Ltd)

Ek bevestig dat ek verwittig is van SANRAL se voorneme om 'n voorgestelde leengroef op my eiendom te benut, soos aangedui op die aangehegte plan, vir die versterking van Gedeeltes 7 & 8 van die R27 tussen die Wes-/Noord-Kaap grens en Calvinia; en dat ek bewus is van die ligging en omvang van die gebied en dat toegang oor my eiendom benodig mag word.

I acknowledge that I have been informed of SANRAL's intention to utilise a proposed borrowpit on my property indicated on the attached plan for the strengthening of Section 7 & 8 of the R27 between the Western/Northern Cape border and Calvinia; and that I am aware of the location and extent of the area and that access to the area may be required across my property.

HANDTEKENING VAN EIENAAR OF GEDELEGEERDE VERTEENWOORDIGER / SIGNATURE OF OWNER OR DELEGATED REPRESENTATIVE

.....

STATUS INDIEN NIE GEREGISTREEDE EIENAAR NIE/ STATUS IF NOT REGISTERED OWNER..... Representing Travellers Rest Pty Ltd.

DATUM/ DATE.....6th July 2011.....

NAAM/ NAME.....Dr F.J. Strauss.....

POSADRES/ POSTAL ADDRESS ....P.O. Box 309, Clanwilliam, 8135

.....

TELEFOONNOMMER/ TELEPHONE NUMBER....083 230 4767.....

FAKSNOMMER/ FAX NUMBER.....027 - 482 1179.....

E-POSADRES/ E-MAIL ADDRESS.....fstrauss@telkomsa.net.....

NEE / NO	JA / YES
	✓

KOMMENTAAR/ COMMENT

Fuel and Spar to be removed by owner as requested.
Contractor to contact me before fencing and removing fencing material
No permanent people to stay on the property and/or overnight on the property
No scrap metal or any other items to be removed from farm or right
Permission only granted for removal of mine heaps and not for further excavation or mining
Owner to be informed of any entry to the property before the project starts

Please forward to / Stuur asseblief aan:

CCA ENVIRONMENTAL (PTY) LTD
Unit 35, Roeland Square, Cape Town, 8001
PO Box 10145, Caledon Square, 7905
T: (021) 461 1118 F: (021) 461 1120
E-mail: ena@ccaenvironmental.co.za

aurecon

cca ENVIRONMENTAL

PART C2:

INDIVIDUAL BORROWPITS:

BORROWPIT BP 27-8 KM 45.0 RHS 0.2

PART C: INDIVIDUAL BORROWPITS

C2 BORROWPIT BP R27-8 KM 45.0 RHS 0.2

C2.1 PART 1: BRIEF PROJECT DESCRIPTION

C2.1.1 Mine owner and mine manager / Responsible person

A contractor is still to be appointed by SANRAL to undertake the excavation of BP R27-8 km 45.0 RHS 0.2. This borrowpit is planned as a strategic borrowpit for the supply of material for the proposed strengthening (partial reconstruction) of the R27 Sections 7 and 8 between the Western/Northern Cape border (km 40.0) and Calvinia (km 70.0).

C2.1.2 Name and address of the applicant for prospecting permit or mining authorisation

Applicant:	South African National Roads Agency Limited
Contact person:	Mr D Wilson
Address:	Private Bag X19, Bellville, 7530
Telephone:	(021) 957 4600

C2.1.3 Name and address of the owner of the land and the title deed description

Farm name:	Remainder of Portion 1 of the Farm Buffelskopfontein 773 ("Doega B"), Northern Cape Province
Landowner:	Mr Johannes Stefanus Muller
Contact person:	Mr JS Muller
Address:	PO Box 235, Calvinia, 8190
Telephone:	027 341 1872
Title deed information:	Title Deed No of Property: T103780/2003
Size of the property:	4386.3935 ha

No mineral rights are indicated on the Deed of Transfer.

C2.1.4 Regional setting

BP R27-8 km 45.0 RHS 0.2 is an extension of an existing borrow area located on the Reminder of Portion 1 of the Farm Buffelskopfontein 773, known as Doega B in the Hantam Local Municipality, which forms part of the Namakwa District Municipality in the Northern Cape Province. It is situated along the R27 approximately 23 km west of Calvinia (see Figure A2 on page A6 and Figures C2.1 to C2.6 on pages C2-8 to C2-11). Co-ordinates of the proposed borrowpit area are presented in Table C2.1 below.

Table C2.1: Borrowpit co-ordinates (System WGS 84 Lo 19°)

Point	"-Y"	"+X"
A	51,898.77	3,486,065.89
B	51,911.04	3,486,051.64
C	51,926.04	3,486,052.08
D	51,926.04	3,486,299.94

E	51,576.97	3,486,299.94
F	51,576.97	3,486,041.91
G	51,880.93	3,486,050.76
H	51,894.42	3,486,065.83

C2.2 PART 2: DESCRIPTION OF THE PRE-MINING ENVIRONMENT SPECIFIC TO BP R27-8 KM 45.0 RHS 0.2

C2.2.1 Climate

A general description of the climate is presented in Section B3.1.1.

C2.2.2 Topography

A general description of the topography is presented in Section B3.1.2. The natural topography of the specific borrowpit area is relatively flat (see Figures C2.4 to C2.6).

C2.2.3 Geology

A general description of the geology is presented in Section B3.1.3.

C2.2.4 Soil

Based on the trial hole profiles (see Appendix C2.1), the subsoils typically comprise weathered dolerite gravel. Harder dolerite boulders were found at shallow depth in the trial holes excavated on the western extremity, and harder dolerite rock and boulders predominate the western portion of the identified site. Machinery refusal was obtained at depths varying from 1.9 m to 4.3 m. Topsoil varies from 100 mm to 200 mm in thickness.

C2.2.4 Pre-mining land capability and land use

The proposed site is an extension of an existing borrow area adjacent to the R27. The area is extensively disturbed due to previous excavation and has been rehabilitated to a limited extent in certain parts. The surrounding land on both sides of the R27 is used for livestock grazing. No residents live near the site (see Figures C2.4 to C2.6).

C2.2.5 Vegetation

A general description of the vegetation in the area is presented in Section B3.1.4. Previous disturbance of the proposed borrowpit site has encouraged the invasion of exotic invasive species such as *Prosopis glandulosa*. The site is located in an area of Hantam Karoo 'bossieveld' (*Eriocephalus ericoides – Pteronia glomerata* Roggeveld Karoo) dominated by low succulent shrubs and composites such as *Pentzia incana*, *Eriocephalusericoides* and *Chrysocoma ciliata*. It has "Least Threatened" conservation status (see Appendix 4).

C2.2.7 Fauna

No faunal species were seen on site.

C2.2.8 Hydrology

The proposed borrowpit is not located close to any dams or other surface water sources.

C2.2.9 Geohydrology

No ground water was found in the trial pit holes with depths up to 4.3 m.

C2.2.10 Air quality

The air quality in the study area is relatively good. No local residents live in close proximity to the borrowpit site. Dust from the borrowpit operation could affect traffic along the R27.

C2.2.11 Noise

The site is exposed to noise from traffic along the R27. No local residents live in close proximity to the borrowpit site.

C2.2.12 Archaeology and heritage

A general description of the heritage environment and archaeology of the area is presented in Section B3.2. No archaeological material was found on site. No known human graves are located in the area (see Appendix 5).

C2.2.13 Sensitive landscape

No sensitive landscapes were identified that could be affected by the proposed borrowpit.

C2.2.14 Visual aspects

If this proposed site were utilised, the existing borrow area would be extended south- and westwards. As it is adjacent to the R27, it would be visible to all passing traffic. The site has, however, previously been mined and has only been partially rehabilitated.

C2.2.15 Regional socio-economic environment

See information provided in Section B3.3.

C2.2.16 Interested and Affected Parties

The public participation process undertaken as part of the EMP is presented in detail in Section A3.2.2. It should be noted that a notification letter was sent to the landowner, Mr JS Muller, informing him of the proposed project and that a borrowpit had been identified on the property. Mr Muller was asked to complete an acknowledgement form (which is included in Appendix C2.2) to indicate that he was notified of the location and extent of the area and that access to the area may be required across the property, as well as to raise any issues of concern. Mr Muller had the following comments.

Table C2.2: I&AP Comments and Responses

I&AP	Comment	Response
Mr JS Muller, landowner	The BP should not be to be extended further southwards into existing grazing land. Development of the existing BP to the east and the west, i.e. all along the R27, is acceptable.	This comment has been noted. The design engineer has confirmed that the borrowpit would be extended largely to the west as indicated on the borrowpit layout plan (see Figure C2.2).
	A 50 ha fenced camp to the north of the R27, which is not utilised for grazing, is available and could potentially be used for BP development.	This comment has been referred to the design engineer, who noted the offer but indicated that additional BP sites would not be required.
	The existing borrowpit or any other excavation has to be fenced, as the surrounding area is used for grazing livestock.	The borrowpit area would be fenced off from the surrounding area (see Section C2.4.1 below).

C2.3 PART 3: MOTIVATION FOR THE PROPOSED PROJECT

C2.3.1 Benefits of the project

The motivation for and potential benefits arising as a result of the project are presented in Section B1.

C2.3.2 Consideration of alternatives

The assessment of alternatives is presented in detail in Section B2. Borrowpit BP R27-8 km 45.0 RHS 0.2 has been identified as a preferred borrowpit.

C2.4 PART 4: DETAILED DESCRIPTION OF THE PROPOSED PROJECT

C2.4.1 Surface infrastructure

There would be no permanent surface infrastructure for the proposed borrow area. Establishment of a crusher would, however, be required for the duration of the construction period to break down harder dolerite boulders. As the borrowpit borders on the R27, no temporary access road would be required. The boundaries of the proposed borrowpit would be fenced and a gate installed at the entrance point along the R27 to control access.

C2.4.2 Waste management

Material that is not suitable for the road rehabilitation project would be stockpiled and used to reshape the area during rehabilitation. Any domestic waste would be collected in a waste bin and disposed of at a municipal waste site.

C2.4.3 Water management

The borrowpit is located in a dry, low rainfall area with low risk of runoff accumulating in the proposed excavation for extended periods. The natural topography of the area is relatively flat, which renders drainage problematic. It is proposed that the floor of the borrowpit be sloped southwards, as indicated in the borrowpit layout plan (see Figure C2.2).

The water requirements for the proposed borrowpit operations are expected to be minimal (e.g. dust suppression on the borrowpit area). It is envisaged that municipal water sources supplemented by four existing boreholes on privately owned farms would be used to supply the total monthly water use requirements for the road upgrade project.

C2.4.4 Transport

This would consist of haul vehicles transporting the road building material from the borrowpit to the area of the road under construction. The borrowpit borders on the R27 and will gain direct access to the R27 through an existing gate on the road reserve fence.

C2.4.5 Borrowpit layout and development

The proposed site layout plan is presented in Figure C2.2.

The total area to be temporarily expropriated is 8.804 ha, while the proposed mined borrow area would be approximately 3.927 ha in extent, with an excavation depth not exceeding 4.0 m. Excavation side slopes of approximately 1:3 (vertical to horizontal) would be provided.

Prior to commencement of the operation, invasive vegetation would be cleared from the site. Topsoil is to be stripped to a maximum depth of 300 mm and stockpiled in the areas indicated on the layout plan to a height not exceeding 2 m (see Figure C2.2). In order to assist rehabilitation of the borrowpit area at the end of construction, topsoil would be spread along the area.

The road building material would be excavated by means of ripping and loading with an excavator onto haul vehicles. Harder dolerite boulders would be broken down by a crusher before use. Material would then be transported to the location of the road under construction.

The borrowpit details are summarized in Table C2.3 below:

Table C2.3: Borrowpit details

Total borrowpit area	8.804 ha
Borrowpit area to be mined	3.927 ha
Maximum depth	4 m
Material type	Road base and subbase material
Volume of material	92 500 m^3

C2.5 PART 5: ENVIRONMENTAL IMPACT ASSESSMENT

This section provides an assessment summary table of the impacts that would result from the development of Borrowpit BP R27-8 km 45.0 RHS 0.2. Mitigation measures are proposed that would ameliorate negative impacts or enhance potential benefits. Impacts were assessed according to pre-defined rating scales as shown in Appendix 2, which are based on criteria set out in the EIA Regulations Guideline Document (Department of Environmental Affairs and Tourism, 1998).

The impacts arising from the borrowpit development are presented in Table C2.4 on page C2-7.

C2.6 PART 6: ENVIRONMENTAL MANAGEMENT PROGRAMME

A generic EMP is presented in Section D, as it is the same for all three borrowpits.

Table C2.4: Impacts arising from the proposed development of Borrowpit BP 27-8 km 45.0 RHS 0.2

Environmental Aspect	Extent	Duration	Intensity	Probability	Confidence	Significance (before mitigation)	Proposed mitigation	Significance (after mitigation)
Geology	Local	Permanent	Low	Definite	Medium	**Low**	-	**LOW**
Topography	Local	Permanent	Low	Definite	Medium	**Low**	The borrowpit would be finished off so that the slopes are no steeper than 1:3. The slope changes must be finished off so that flowing curves that blend with the surrounding landscapes are formed in preference to sharp angles.	**VERY LOW**
Soils	Local	Short-term	Medium	Highly probable	High	**Very Low**	Stockpile topsoil and utilise during rehabilitation.	**VERY LOW**
Land capability	Local	Short-term	Medium	Probable	High	**Very Low**	• Demarcation and fencing of borrowpit site. • Identification of no-go areas. • Land disturbed shall be rehabilitated.	**VERY LOW**
Land use	Local	Short-term	Low	Definite	High	**Very Low**	Land disturbed shall be rehabilitated.	**VERY LOW**
Natural vegetation	Local	Short to Medium term	Low	Definite	High	**Very Low**	• Land disturbed shall be rehabilitated. • The area should not be grazed until it has stablised.	**VERY LOW**
Animal life	Local	Short-term	Low	Probable	High	**Very Low**	Land disturbed shall be rehabilitated.	**VERY LOW**
Surface water	Local	Short-term	Medium	Improbable	High	**Very Low**	All machinery and equipment shall be properly maintained, so that leaks do not appear and so that during servicing all oil, grease, etc. is disposed of correctly. The borrowpit shall be shaped so that water drains into the existing culvert and no ponding occurs.	**VERY LOW**
Groundwater	Local	Short-term	Low	Improbable	High	**Very Low**	All machinery and equipment shall be properly maintained, so that leaks do not appear and so that during servicing all oil, grease, etc. is disposed of correctly.	**VERY LOW**
Air quality	Local	Short-term	Medium to High	Highly probable	High	**Low**	• Spray water and/or other dust suppression agents to reduce dust. • Retain vegetation cover as long as possible to reduce size of areas where wind could generate dust. • Protect excavated material stockpiles against wind erosion. • Suitably cover and secure material loads during transportation. • Haul vehicles should comply with speed limits.	**VERY LOW**
Noise	Local	Short-term	Medium	Highly probable	High	**Very Low**	The contractor shall be required to be familiar with and adhere to any local by-laws and regulations regarding the generation of noise and hours of operation.	**VERY LOW**
Archaeology/heritage	Local	Permanent	Very low	Improbable	Medium	**Low**	Land disturbed shall be rehabilitated.	**LOW**
Sensitive landscapes	No impact							
Visual aspects	Local	Long-term	Medium	Highly probable	High	**Medium**	Land disturbed shall be rehabilitated.	**LOW**
Regional socio-economic: Employment	Local	Short-term	Low	Highly probable	High	***Very Low (Positive)***	Local labour should be sourced.	***VERY LOW (POSITIVE)***
Regional socio-economic: Safety	Local	Short-term	High	Highly probable	High	**Low**	• The movement of construction vehicles should be limited to daylight hours. • The risk associated with the movement of large haulage vehicles should be clearly sign-posted in both directions leading up to the proposed borrowpit.	**LOW**

Figure C2.1: Google Earth air photo of proposed Borrowpit BP 27-8 km 45.0 RHS 0.2

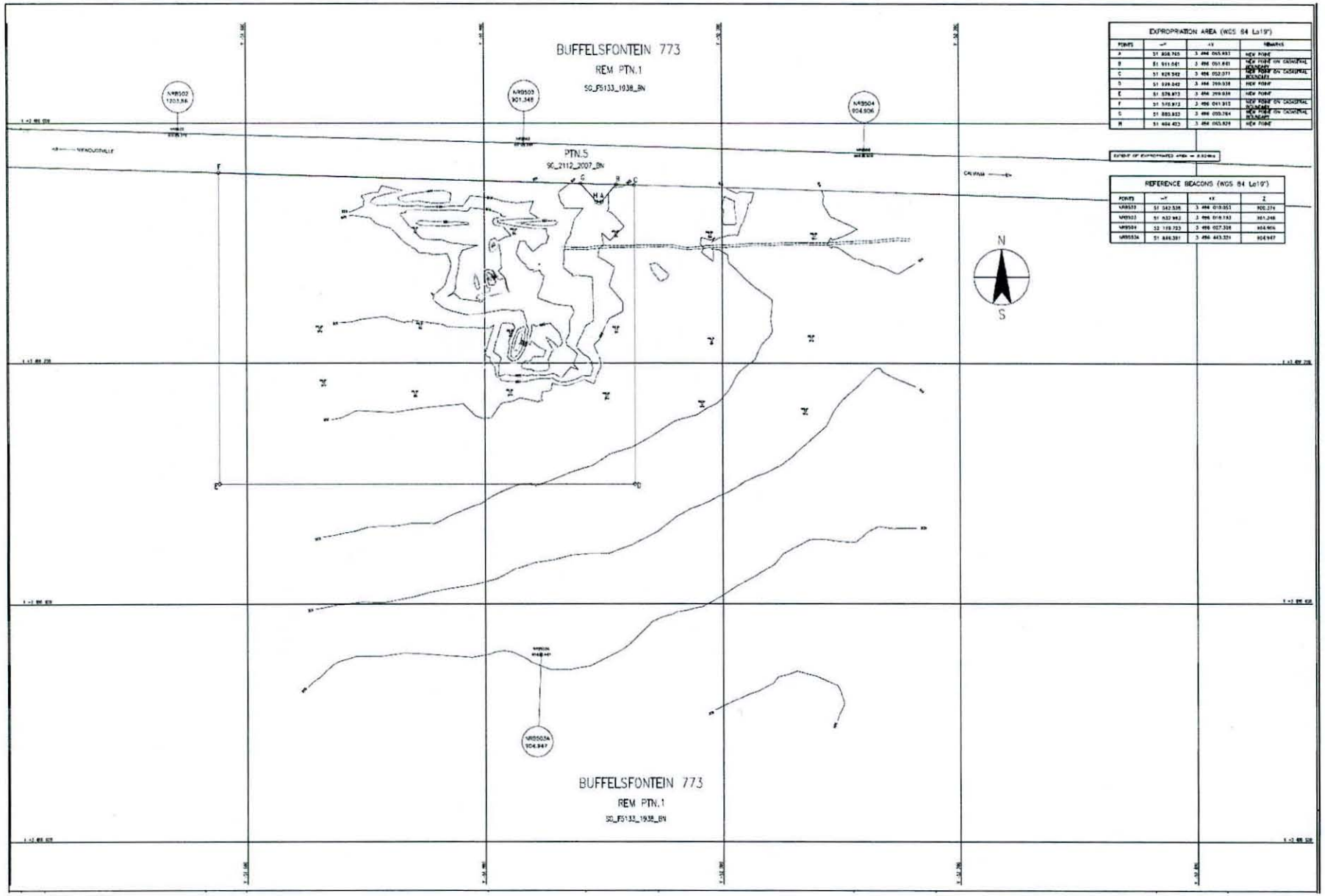

Figure C2.3: Expropriation plan for proposed Borrowpit BP 27-8 km 45.0 RHS 0.2

Figure C2.4: BP R27-8 KM 45.0 RHS 0.2: View from the R27 towards the existing excavated area (facing south-west)

Figure C2.5: BP R27-8 KM 45.0 RHS 0.2: View towards the R27 (facing north-east)

Figure C2.6: BP R27-8 KM 45.0 RHS 0.2: View of existing disturbed areas (facing north)

APPENDIX C2.1:

TRAIL HOLE PROFILE:

BORROWPIT BP 27-8 KM 45.0 RHS 0.2