mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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Enquiries: D. A. Watkins
E-mail: deidre.watkins@dme.gov.za

Reference: EC30/5/1/3/3/2/1(0458)EM
Date: 12 August 2010

South African Heritage Resources Agency
P.O. Box 758
GRAHAMSTOWN
6140

ATTENTION: MR. T. LUNGILE

CaseID: 2170

Sir

CONSULTATION IN TERMS OF SECTION 40 OF THE MPRDA OF 2002: BORROW PITS FOR IMPROVEMENT OF NATIONAL ROUTE 2 SECTION 18 BETWEEN SITEBE KOMKHULU AND VIEDGESVILLE, EASTERN CAPE

1. Attached herewith, a copy of the Environmental Management Plan received from South African National Road Agency Limited.

2. Any written comments or requirements your department may have in this regard can be forwarded to this office no later than **5 October 2010.** Failure to do so, will lead to the assumption that your department has no objection(s) or comments with regard to the said documents. Comments may be submitted at your earliest convenience in order to reduce the turnaround time for the application process.

3. Consultation in this regard has also been initiated with other relevant State Departments.

4. Please use the reference number (EC) 30/5/1/3/3/2/1(0458) EM in all future correspondence.

5. Your co-operation is appreciated.

Sincerely,

REGIONAL MANAGER

EASTERN CAPE

458mp

ENVIRONMENTAL MANAGEMENT PLAN

Improvement of National Route 2 Section 18 Between Sitebe Komkhulu and Viedgesville Eastern Cape: Associated Borrow Pits

The South African National Roads Agency Limited (SANRAL)

THE SOUTH AFRICAN NATIONAL ROADS AGENCY

Report Number: 2010-R386
August 02, 2010

Biotechnology & Environmental Specialist Consultancy cc

BESC

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Leaders in Industrial Ecology, Environmental Impact & Site Assessments
& Safety Health & Environmental Management Systems

Prepared exclusively for

The South African National Roads Agency Limited (SANRAL)

by

Biotechnology and Environmental Specialist Consultancy cc

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1 Proposal Release Notice

Proposal Status	*Date*	*Authorised*
Internal Draft	June 15, 2010	Mr. Conroy van der Riet
Client Draft	June 15, 2010	Dr. Malcolme Logie
Final Report	August 02, 2010	Dr, Malcolme Logie

This Report has been prepared by BESC the trading name of Biotechnology & Environmental Specialist Consultancy cc, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our Standard Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

BESC disclaims any responsibility to the client and others in respect of any matters outside the scope of the above.

This Report is exclusive to the client and the described project. BESC accepts no responsibility of whatsoever nature to third parties to whom this Background Information Document, or any part thereof, is made known. Any such persons or parties rely on the report at their own risk.

Dr Malcolme Logie

Digitally signed by Dr Malcolme Logie
DN: cn=Dr Malcolme Logie, c=ZA, o=BESC, email=malcolme@besc.co.za
Reason: I am approving this document
Location: East London, South Africa
Date: 2010.08.02 11:11:19 +02'00'

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2 Limitations

BESC has prepared this report for the sole use of **The South African National Roads Agency Limited (SANRAL)** in accordance with generally accepted consulting practises and for the intended purposes as stated in the agreement under which this work was completed.

This report may not be relied upon by any other party without the explicit written agreement of **The South African National Roads Agency Limited (SANRAL)** and **BESC**.

No other warranty, expressed or implied, is made as to the professional advice included in this report.

The conclusions and recommendations contained in this report are based upon information provided by others and the assumption that all relevant information has been provided by those bodies from whom it has been requested. Where field investigations have been carried out, they have been restricted to a level of detail required to achieve the stated objectives of the work.

All items listed in BESC's Standard Terms and Conditions of Business are applicable to this report.

3 Limiting Conditions

This report was compiled from information obtained from the following sources:

1. Numerous site visits and assessments
2. Public participation
3. Information on biophysical environment - BESC
4. Information on proposed Borrow Pits - Aurecon

4 Special Conditions

None

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5 Natural Science Professions Act

The Principal of BESC, Dr Malcolme Logie, is registered with the:

- South African Council for Natural Scientific Professions (SACNASP), in accordance with the Natural Sciences Professions Act (Act 27 of 2003), as a *Professional Natural Scientist - Environmental Scientist.* As such work undertaken by BESC in Environmental Management complies with the requirement of the Act, which states, "*only individuals registered may practice in a consulting capacity.*"

- The South African Institute of Ecologist & Environmental Scientist, and is registered as a *Professional Member - Environmental Scientist.*

- Certification Board of the Environmental Assessment Practitioners of South Africa (EAPSA), as a *Certified Environmental Assessment Practitioner*

- International Association of Impact Assessors - South Africa

- Senior Lead Auditor: Bureau Veritas (Safety, Health, Environment & Quality)

- Lead Auditor: TUV (Safety, Health, Environment)

- Lead Auditor: British Standard Institute (Safety, Health, Environment)

6 Legislative Specifications

Primary Environmental Legislation governing the Scope of Work undertaken for the preparation of this Report is:

- Minerals and Petroleum Resources Development Act (M&PRDA) (No. 28 of 2002)
- Minerals and Petroleum Resources Development Act (M&PRDA) (No. 28 of 2002): Minerals and Petroleum Resources Development Regulations (Government Notice No. R. 527 of 23 April 2004)

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7 DWAF - Best Practice Guidelines

The Department of Water Affairs & Forestry developed a series of Best Practice Guidelines (BPG's) for mines that was released in 2009 in line with the international Principles and Approaches towards sustainability. These guidelines have been grouped as follows:

- BPG's dealing with aspects of DWAF's water management hierarchy, namely,
  - H1: Integrated Mine Water Management
  - H2: Pollution Prevention and Minimization of Impacts
  - H3: Water Reuse and Reclamation
  - H4: Water Treatment
- BPG's dealing with General water management strategies, techniques & tolls, namely,
  - G1: Storm Water Management
  - G2: Water and Slat Balances
  - G3: Water Monitoring Systems
  - G4: Impact Prediction
  - G5: Water Management Aspects for Mine Closure
- BPG's dealing with specific mining activities or aspects, namely,
  - A1: Small-Scale Mining
  - A2: Water Management for Mine Residue Deposits
  - A3: Water Management in Hydrometallurgical Plants
  - A4: Pollution Control Dams
  - A5: Water Management for Surface Mines
  - A6: Water Management for Underground Mines

The development of the guidelines is an inclusive consultative process that incorporates the input from a wide range of experts, including specialist within the and outside the mining industry and government. The BPG's form the flowing main functions:

- Utilization by the mining sector as input for compiling water use license applications (and other legally required documents such as EIA's, EMP's, closure plans, etc) and for drafting license conditions.
- Serve as a uniform basis for negotiations through the licensing process prescribed by the National Water Act.

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- Used specifically by DWAF personnel as a basis for negotiation with the mining industry, and likewise by the mining industry as a guideline as to what the DWAFG considers as best practice in resource protection and waste management.
- Inform Interested & Affected Parties on good practice at mines.

8 Responsibilities of the Role Players

8.1 Developer

The Developer (SANRAL in this instance) remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP. The developer is responsible for ensuring that sufficient resources (time, financial, human, equipment, etc.) are available to the other role players (e.g. the ECO, ELO and contractor) to efficiently perform their tasks in terms of the EMP. SANRAL is liable for restoring the environment in the event of negligence leading to damage to the environment. The developer shall ensure that the EMP is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMP. BESC has been appointed as the independent Environmental Control Officer (ECO) to oversee all the environmental aspects relating to the development.

8.2 Consulting Engineer

The Consulting Engineer, is bound to the EMP conditions through his/her contract with the developer, and is responsible for ensuring that she/he adheres to all the conditions of the EMP. The Consulting Engineer shall thoroughly familiarise him/her-self with the EMP requirements before coming onto site and shall request clarification on any aspect of these documents, should they be unclear.

8.3 Contractor

The Contractor, as the developer's agent on site, is bound to the EMP conditions through his/her contract with the developer, and is responsible for ensuring that she/he adheres to all the conditions of the EMP. The Contractor shall thoroughly familiarise him/her-self with the EMP requirements before coming onto site and shall request clarification on any aspect of these documents, should they be unclear. The Contractor shall ensure that he/she has provided sufficient budget for complying with all EMP conditions at the tender stage. The Contractor shall comply with all orders (whether verbal or written) given by the ECO/Contract Engineer in terms of the EMP.

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The Department of Environment Affairs have reserved their rights to initiate criminal proceedings against the Consulting Engineer, contractor and/or any sub-contractors.

8.4 Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) is appointed by the developer as an independent monitor of the implementation of the EMP. He/she shall form part of the project team and shall be involved in all aspects of project planning that can influence environmental conditions on the site. The ECO shall attend relevant project meetings, conduct inspections to assess compliance with the EMP and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for:

- Liaison with relevant authorities;
- Liaison with contractors regarding environmental management; and
- Undertaking routine monitoring and appointing a competent person/institution to be responsible for specialist monitoring, if necessary
- The ECO has the right to enter the site and undertake monitoring, auditing and assessment at any time, with the agreement of the Contractor, which agreement shall not be unreasonably withheld.

The ECO shall be responsible for liaising with the DME. The ECO shall submit quarterly environmental audit reports to the authorities. These audit reports shall contain information on the contractor and developer's levels of compliance with the EMP. The audit report shall also include a description of the general state of the site, with specific reference to sensitive areas and any matters of non-compliance. The ECO is to suggest corrective action measures to eliminate the occurrence of the non-compliance incidents. In order to keep a record of any non-compliance, an Environmental Incident Record (Appendix B) shall be kept.

8.5 Environmental Liaison Officer (ELO)

The contractor shall appoint an Environmental Liaison Officer (ELO) to assist with day-to-day monitoring of the construction activities. Any issues raised by the ECO shall be routed to the ELO for the contractors' attention. The ELO shall be *permanently* on site during the construction phase to ensure daily environmental compliance with the EMP and shall be ideally be a senior member of the contractor's management team. The ECO shall be responsible for ensuring that all staff members are adequately trained and aware of the EMP. The ECO shall be responsible for undertaking monthly environmental inspections (according to the criteria specified in the EMP), and

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accompany the ELO during site visits, audits or assessments. The ECO shall be notified of this appointment and furnished with the contact details of the ELO.

9 Introduction & Overview

BESC were appointed by **Aurecon** on behalf of **The South African National Roads Agency Limited (SANRAL)** as Independent Environmental Consultants for the preparation of a **Environmental Management Plan** compiled in accordance with Section 39(1) and Regulation 52 of the Minerals and Petroleum Resources Development Act (M&PRDA) (No. 28 of 2002) for the proposed Borrow Pits associated with the Improvement of National Road 2: Section 18 between Sitebe Komkhulu and Viedgesville, Eastern Cape.

It is proposed that road construction materials be sourced from a number of sources including borrow pits and road cuttings. The permitting of the materials sources required for the project will be undertaken in accordance with the Minerals and Petroleum Resources Development Act (M&PRDA) (No. 28 of 2002). Specifically, since the proponent for the proposed project is the South African National Roads Authority, the exemption provisions in terms of Section 106(1) of the Act will apply, and thus exploration of any materials sources would be subject to the preparation, submission and approval of an Environmental Management Plan compiled in accordance with Section 39(1) and Regulation 52 of the M&PRDA.

It is proposed that material sources required for the project will be sourced from eight (8) borrow pits located throughout the area (**Figure 1**).

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Table 1: Summary Table of Borrow Pits.

Information	Borrow Pits							
	BP 01 (N2-18/41.3) 0.3/R	BP 02 (N2 - 18/53.6) 0.2/L	BP 03 (N2 - 18/62.18) 0.3R	BP 04 N2 - 18/59.24) 0.7L	BP 05 N2 - 18/45.92) 2.25L	BP 06 N2 - 18/56.3) 0.7R	BP 07 N2 - 18/53.6/1.6R	BP 08 N2 - 18/65.05) 1.6R
Ownership of Land	Communal	Communal	Communal	Communal	Communal	Communal	Communal	Communal
Type of Material	Weathered Dolerite	Weathered Dolerite & Sandstone	Weathered Dolerite	Weathered Dolerite	Weathered Mudstone & Sandstone	Mudstone & Sandstone	Weathered Sandstone	Weathered Dolerite
Proposed volume to be mined	Approximately 180 000m^3	Approximately 36 000m^3	Approximately 67 000m^3	Approximately 60 000m^3	Approximately 42 000m^3	Approximately 49 000m^3	Approximately 18 000m^3	Approximately 336 000m^3
New/Existing	Existing	Existing	Existing	Existing	Existing	Existing	New	Existing
Co-ordinates (Latitude)	31° 50' 54.45"	31° 47' 29.92"	31° 44' 19.91"	31° 45' 29.58"	31° 49' 32.10"	31° 47' 58.26"	31° 48' 21.32"	31° 43' 46.25"
Co-ordinates (Longitude)	28° 31' 10.97"	28° 36' 53.37"	28° 40' 43.86"	28° 38' 50.91"	28° 33' 33.26"	28° 37' 06.57"	28° 37' 09.18"	28° 41' 24.23"
Nearest Village	Ntabeni	KwaDlomo/KuNkalane	Kotishini	Qunu/Mareko	Ngqunge	Zinyoka	Kuse Mnkalana	Jojweni
Distance to access road	230m	225m	650m	20m	10m	10m	20m	10m
Distance to nearest houses	100m	170m	300m	15m	100m	60m	50m	50m
Presence of Servitude	None	Eskom Powerline	Eskom Powerline	None	None	None	Eskom Powerline	Eskom Powerline
Proposed End Use	Closed & Rehabilitated	Closed & Rehabilitated	Closed & Rehabilitated	Closed & Rehabilitated	Closed & Rehabilitated	Closed & Rehabilitated	Closed & Rehabilitated	Closed & Rehabilitated

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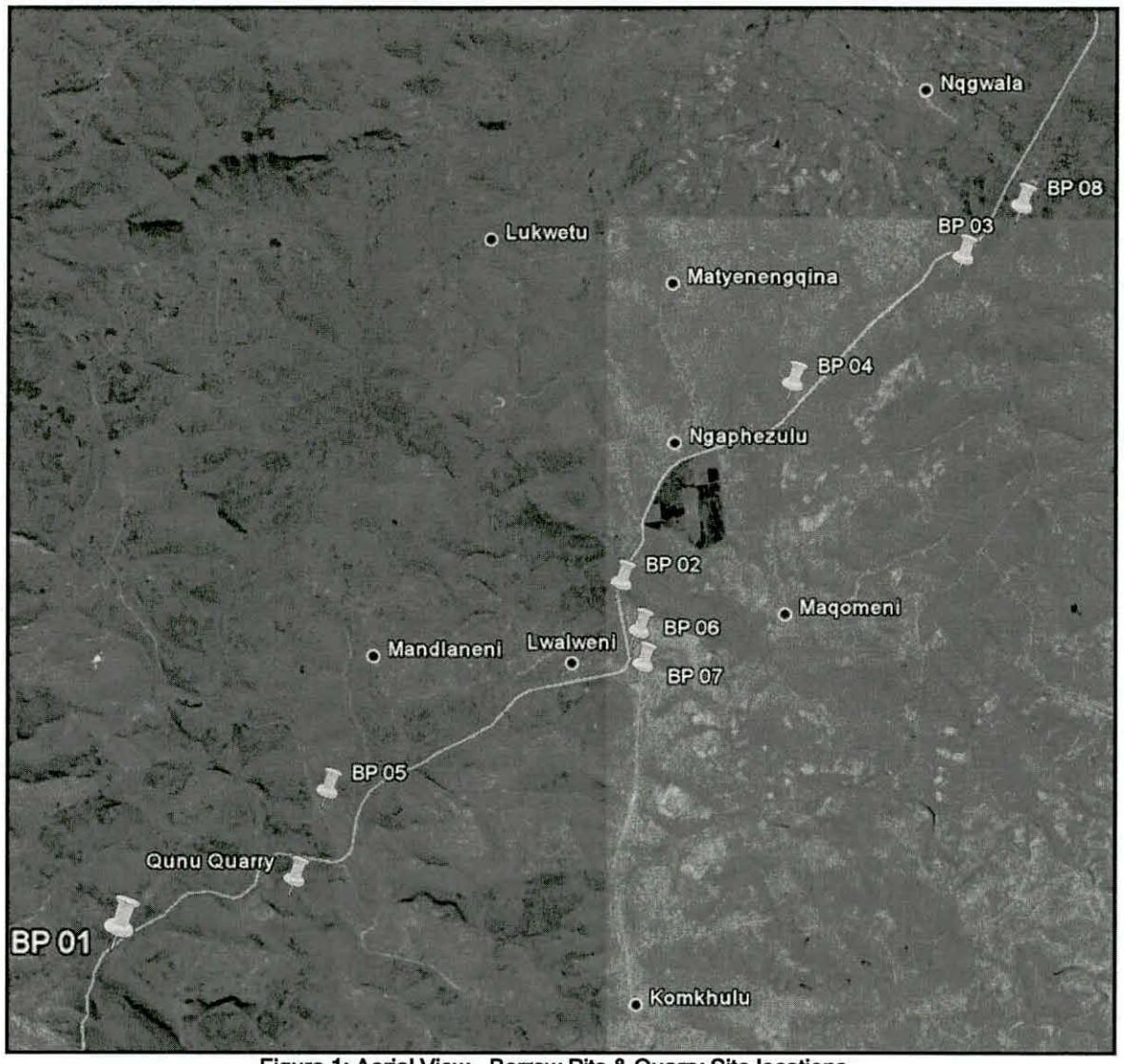

Figure 1: Aerial View - Borrow Pits & Quarry Site locations.

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10 Description of the Borrow Pits

It is proposed to use eight (8) borrow pits for the provision of material for the upgrade of National Route 2: Section 18. Seven of the eight borrow pits have been previously mined, thus only one (BP 07 N2 - 18/53.6/1.5R) is a "greenfields" site. The borrow pits will be used exclusively for the upgrade of the N2: Section 18 over a period not exceeding three years and will be rehabilitated and closed on completion of the works.

A number of alternative borrow pits were investigated. A selection process was undertaken whereby the borrow pits having fatal flaws or limited resources were eliminated during the planning process using indicators such as materials present, volume of available material, distances to water courses, land capability, vegetation sensitivity, surrounding erosion, visibility, slopes, etc.

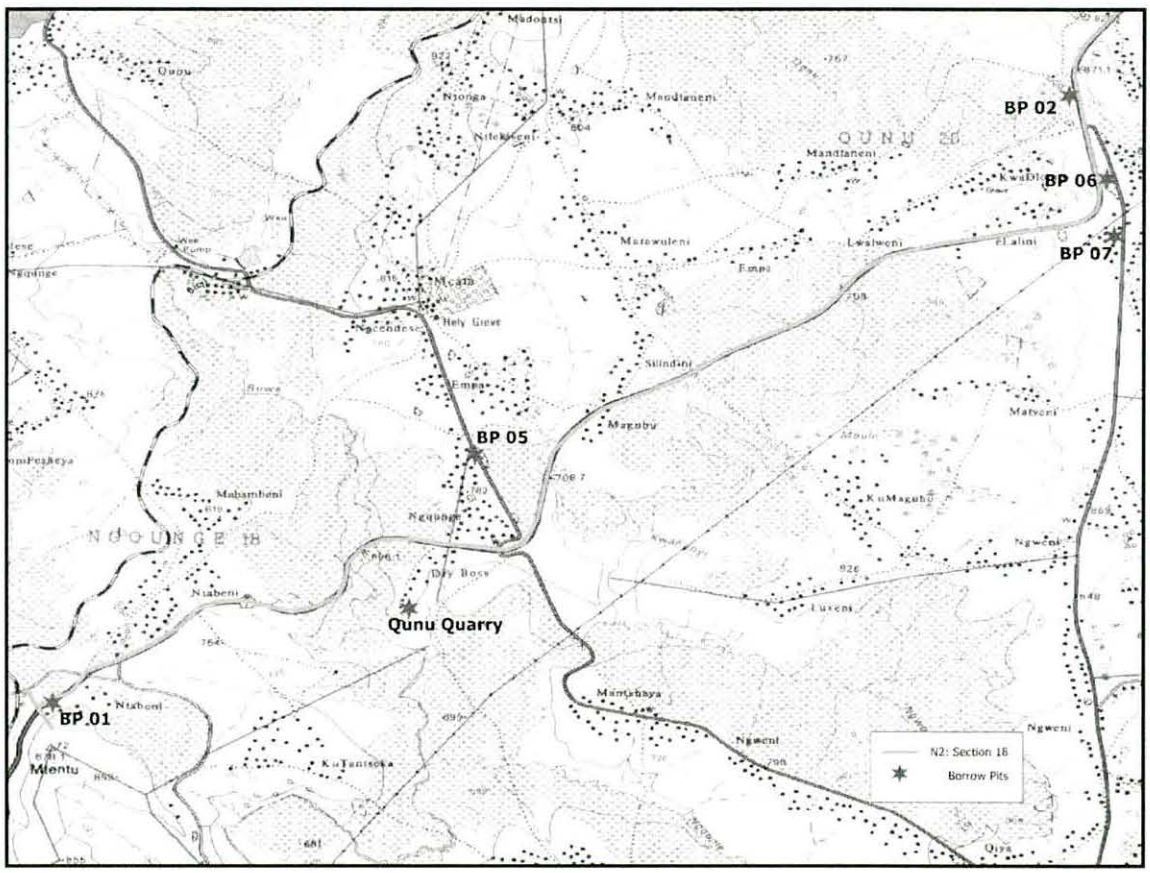

Figure 2: Topographical location of borrow pits - Part 1.

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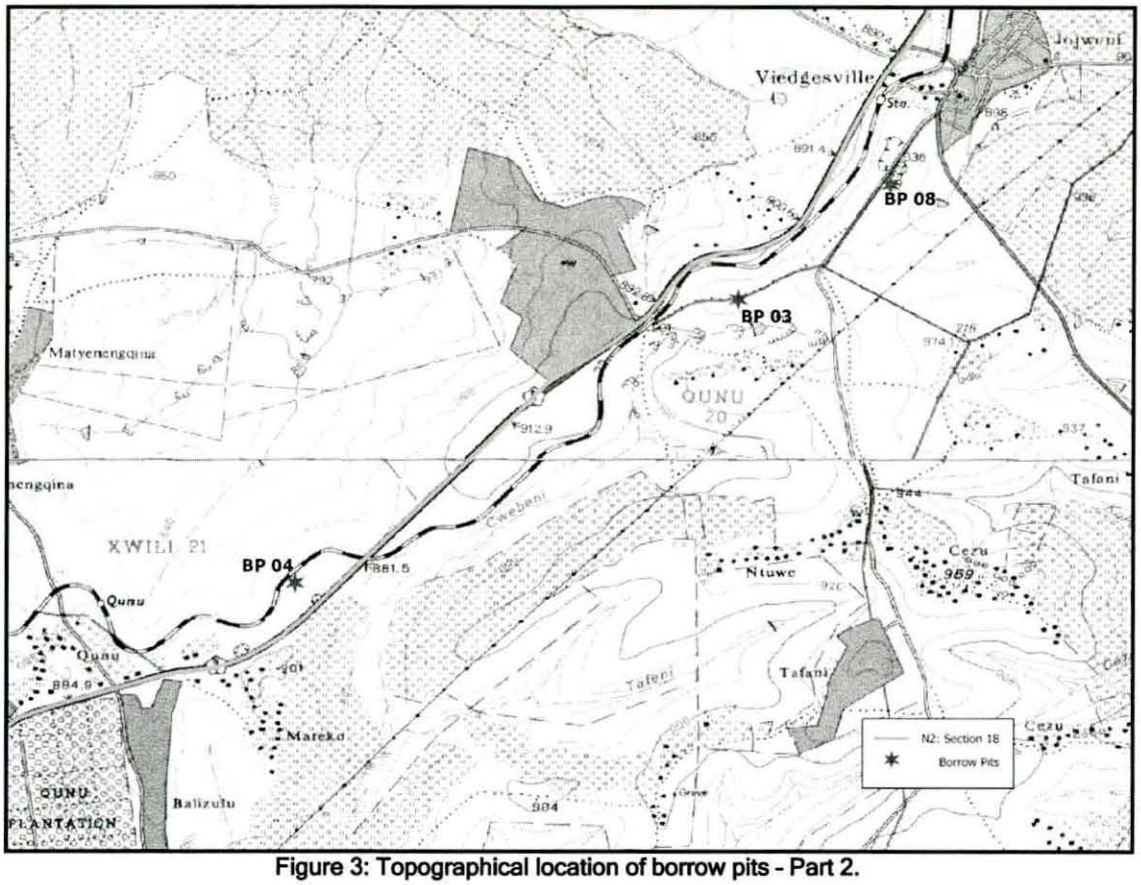

Figure 3: Topographical location of borrow pits - Part 2.

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10.1 Borrow Pit 1

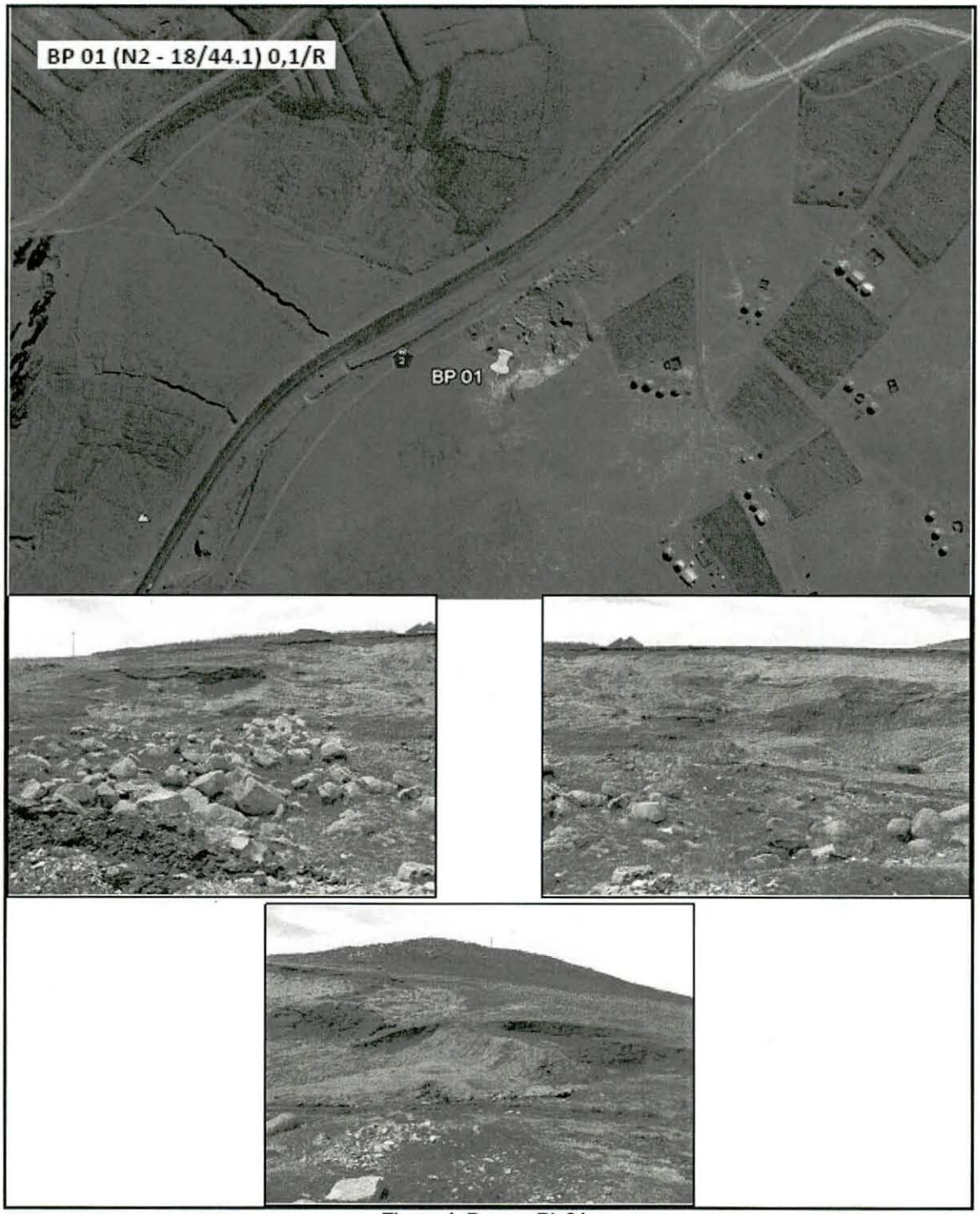

Figure 4: Borrow Pit 01.

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General Description:

Borrow Pit 1 is an existing borrow pit which has been used extensively in the past as a source for road building material (most probably for the local municipality and the provincial Department of Roads & Transport). It is located on the side of a relatively steep north-west facing slope adjacent to the N2 and is access from the Sitebe Komkhulu turnoff road. The mining plan is attached under **Appendix A**.

Site preparation will consist of stripping off topsoil and overburden into stockpiles. Existing topsoil stockpiles will be shifted out of the way to allow for mining of the material beneath. The entire mining area will be fenced and the existing access road will be upgraded to allow for trucks to access the working face. The material will be excavated and loaded directly onto haul trucks.

Material to be mined:

The material to be mined is weathered dolerite of the Mtentu sill, which occurs at this site with no limitations. The material has already been exploited and exposed due to previous excavations.

The material to be mined has been classified as silty clayey, silty sandy gravel derived by a high degree of weathering of dolerite.

Extraction Plan:

- Mining may commence by full face removal of material from the southwest face of the existing pit and extending the excavation in that direction.
- The un-mined dolerite has an overburden, including topsoil (0.5m thick) with a thickness of about 1.5m.
- The approximate volume from this pit is approximately 180 000m^3. It has been assumed for the calculations of these volumes that no large core-stone/in-situ boulders will be encountered.
- The final extent of mining should be determined by the volume of material required at any one time.
- Mining should take place by advancing from the existing face towards the proposed limit of mining.

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Proposed Rehabilitation Measures:

- Rehabilitation will consist not only of top soiling and landscaping the newly worked areas, but shall also consist of rehabilitation of the existing workings to the same standards.
- A limited amount of loosened material is to be stockpiled in the floor (at the foot of the access road) of the pit for maintenance purposes.

Additional Recommended Rehabilitation Measures:

Considering the steep slopes, storm water control is viewed as a critical component of the borrow pit development and rehabilitation. A cut-off berm should be located up slope from the borrow pit face, protecting the active mining area and topsoil and overburden stockpiles from erosion. A diversion berm with dissipation beds should be installed down slope of the mining area to filter out any sediment washed off the site during heavy rainfall.

On completion of mining, the faces should be sloped to a 1:2 - 1:3 slope, with a contour berm installed half way down the slope to minimise erosion. Topsoil (which may be required to be imported from other work areas, as may be available, as it is an existing borrow pit with limited topsoil cover) should be spread over the surface of the mining area, and the temporary access road must be ripped and re-grassed. The entire area should be fertilized and hydro-seeded with an indigenous grass mix which includes quick-growing pioneers and climax species. The storm water berms and dissipation beds must be retained on closure. Any near vertical slopes (1:1) should be stabilised by natural rock wall structures using conventional building methods or in other forms with mortar forced between the rocks. All such structures must have a 'natural' look and provide facilities for plants to grow in. All areas where the slopes are 1:3 to 1:6 should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/ cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/ cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas

Post construction site Inspections must be undertaken to ensure that erosion is minimized and to monitor the success of the revegetation. Should any damage occur the necessary repair works will be undertaken. The intention is to establish an 80% grass cover within two years of rehabilitation. Should this not be achieved, it may be necessary to lightly rip, fertilise and reseed the site. The fence will be maintained by the contractor until the end of the contract's liability period.

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10.2 Borrow Pit 2

Figure 5: Borrow Pit 02.

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General Description:

Borrow Pit 2 is an existing borrow pit which has been used extensively in the past as a source for road building material. It is located on gently sloping landscape adjacent to the N2 and consists of a series of deep excavations and near vertical slopes on the road side. The site is accessed by a side road leading off the access road toward Lalweni village. There is an Eskom power line which passed over the borrow pit, and it might be necessary to realign a section of the Eskom powerline in order to avoid damage during the construction phase. The mining plan is attached under **Appendix A.**

Site preparation will consist of stripping off topsoil and overburden into stockpiles. Existing topsoil stockpiles will be shifted out of the way to allow for mining of the material beneath. The entire mining area will be fenced and the existing access road will be upgraded to allow for trucks to access the working areas. The material will be excavated and loaded directly onto haul trucks.

Material to be mined:

The material to be mined is weathered dolerite and sandstone. The dolerite is in the form of a dyke and has already been largely exploited. A limited quantity of gravely dolerite with core stones is available. It lies largely exposed because nearly all overburden has been removed. Adjacent to the dolerite is sandstone which occurs at this site with lateral limitations.

The material to be mined has been classified as silty sandy gravel with core-stones, derived by a high degree of weathering of dolerite (G7 Quality Material), and silty sandy gravel (G8/G9 Quality Material) derived from weathered sandstone.

Extraction Plan:

- Mining may commence by removing material from the dolerite occurrence, and then the sandstone could be exploited in a series of layers, each about 5m thick.
- The dolerite has no overburden. The sandstone resource has an overburden of topsoil with a thickness of about 0.2m.
- The approximate volume from this pit is approximately 36 000m^3. It has been assumed for the calculations of these volumes that no large core-stone/in-situ boulders will be encountered.
- The extent of final mining should be determined by the volume of material required at any one time.

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- Mining should take place by advancing from the existing face towards the proposed limit of mining.

Proposed Rehabilitation Measures:

- Rehabilitation will consist not only of top soiling and landscaping the newly worked areas, but shall also consist of rehabilitation of the existing workings to the same standards.
- A limited amount of loosened material is to be stockpiled in the floor (at the foot of the access road) of the pit for maintenance purposes.

Additional Recommended Rehabilitation Measures:

On completion of mining, the faces should be sloped to a 1:2 - 1:3 slope, with a contour berm installed half way down the slope to minimise erosion. Topsoil (which may be required to be imported from other work areas as may be available as it is an existing borrow pit with limited topsoil cover) should be spread over the surface of the mining area, and the temporary access road must be ripped and re-grassed. The entire area should be fertilized and hydro-seeded with an indigenous grass mix which includes quick-growing pioneers and climax species. The storm water berms and dissipation beds must be retained on closure. Any near vertical slopes (1:1) should be stabilised by natural rock wall structures using conventional building methods or in other forms with mortar forced between the rocks. All such structures must have a 'natural' look and provide facilities for plants to grow in. All areas where the slopes are 1:3 to 1:6 should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/ cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/ cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas

Post construction site inspections must be undertaken to ensure that erosion is minimized and to monitor the success of the revegetation. Should any damage occur the necessary repair works will be undertaken. The intention is to establish an 80% grass cover within two years of rehabilitation. Should this not be achieved, it may be necessary to lightly rip, fertilise and reseed the site. The fence will be maintained by the contractor until the end of the contract's liability period.

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10.3 Borrow Pit 3

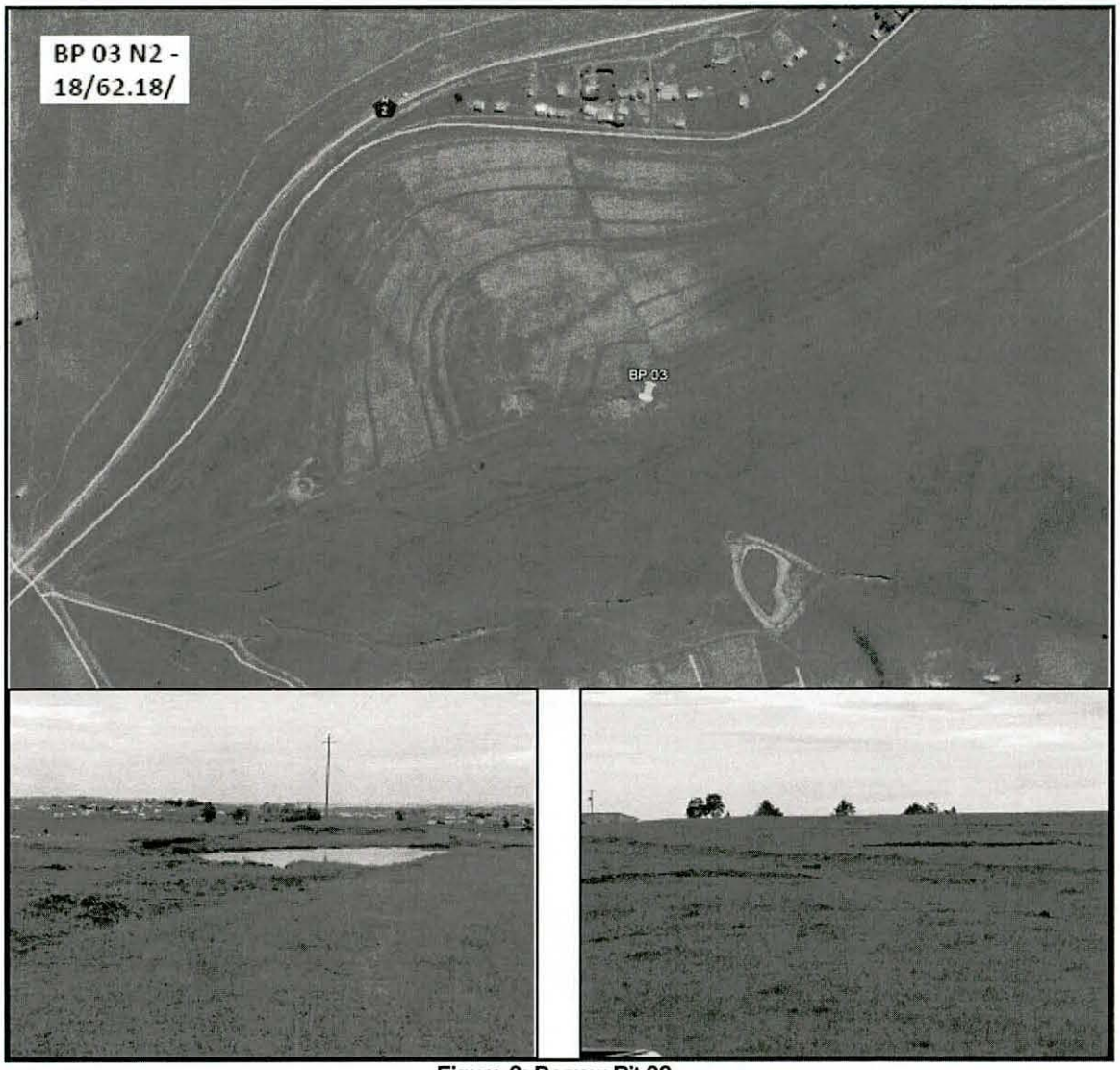

Figure 6: Borrow Pit 03.

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General Description:

Borrow Pit 3 is an existing borrow pit which has been used to small extent in the past as a source for road building material. It is located on a relatively flat landscape adjacent to a previously cultivated field. The site is accessed via the access road leading off the N2 towards the Kotishini village. There is a low capacity Eskom power line which passed over the borrow pit, and it might be necessary to realign a section of the Eskom powerline in order to avoid damage during the construction phase. The mining plan is attached under **Appendix A.**

Site preparation will consist of stripping off topsoil and overburden into stockpiles. Existing topsoil stockpiles will be shifted out of the way to allow for mining of the material beneath. The entire mining area will be fenced and the existing access road will be upgraded to allow for trucks to access the working areas. The material will be excavated and loaded directly onto haul trucks.

Material to be mined:

The material to be mined is weathered dolerite of Karoo Age, which occurs at this site in the form of a dyke with an approximate 60m width and an unknown, but limited depth with lateral limitations. The resource materials lie beneath an overburden that is about 1.5m thick, of which the upper 0.5m to 0.7m is topsoil.

The material to be mined has been classified as silty clayey, silty, sandy, fine gravel derived by a high degree of weathering of dolerite.

Extraction Plan:

- Mining may commence by removing material in full face once the overburden has been removed.
- The approximate volume from this pit is approximately 67 000m^3. It has been assumed for the calculations of these volumes that no large core-stone/in-situ boulders will be encountered.
- The final extent of mining should be determined by the volume of material required at any one time.
- Mining should take place by advancing from the existing face towards the proposed limit of mining.
- Temporary batter boards are to be erected as required as mining proceeds to indicate the sideways and downwards limit of mining.

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- Each limit of the mined area should be bound by a temporary safe slope along its edge with un-mined ground.

Proposed Rehabilitation Measures:

- Rehabilitation will consist not only of top soiling and landscaping of the newly worked areas.
- The local populace have requested, through the local headman, that the finished borrow pit be left in a state that water for livestock may collect in it. To this end the drainage channel could be modified to create a low berm that will retain a limited amount of runoff.
- A limited amount of loosened material is to be stockpiled in the floor (at the foot of the access road) of the pit for maintenance purposes.

Additional Recommended Rehabilitation Measures:

On completion of mining, the faces should be sloped to a 1:2 - 1:3 slope, with a contour berm installed half way down the slope to minimise erosion. Topsoil (which may be required to be imported from other work areas, as may be available, as it is an existing borrow pit with limited topsoil cover) should be spread over the surface of the mining area, and the temporary access road must be ripped and re-grassed. The entire area should be fertilized and hydro-seeded with an indigenous grass mix which includes quick-growing pioneers and climax species. The storm water berms and dissipation beds must be retained on closure. Any near vertical slopes (1:1) should be stabilised by natural rock wall structures using conventional building methods or in other forms with mortar forced between the rocks. All such structures must have a 'natural' look and provide facilities for plants to grow in. All structures must have a 'natural' look and facilities for plants to grow in. All areas where the slopes are 1:3 to 1:6 should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/ cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/ cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

Post construction site inspections must be undertaken to ensure that erosion is minimized and to monitor the success of the revegetation. Should any damage occur the necessary repair works will be undertaken. The intention is to establish an 80% grass cover within two years of rehabilitation. Should this not be achieved, it may be necessary to lightly rip, fertilise and reseed the site. The fence will be maintained by the contractor until the end of the contract's liability period.

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10.4 Borrow Pit 4

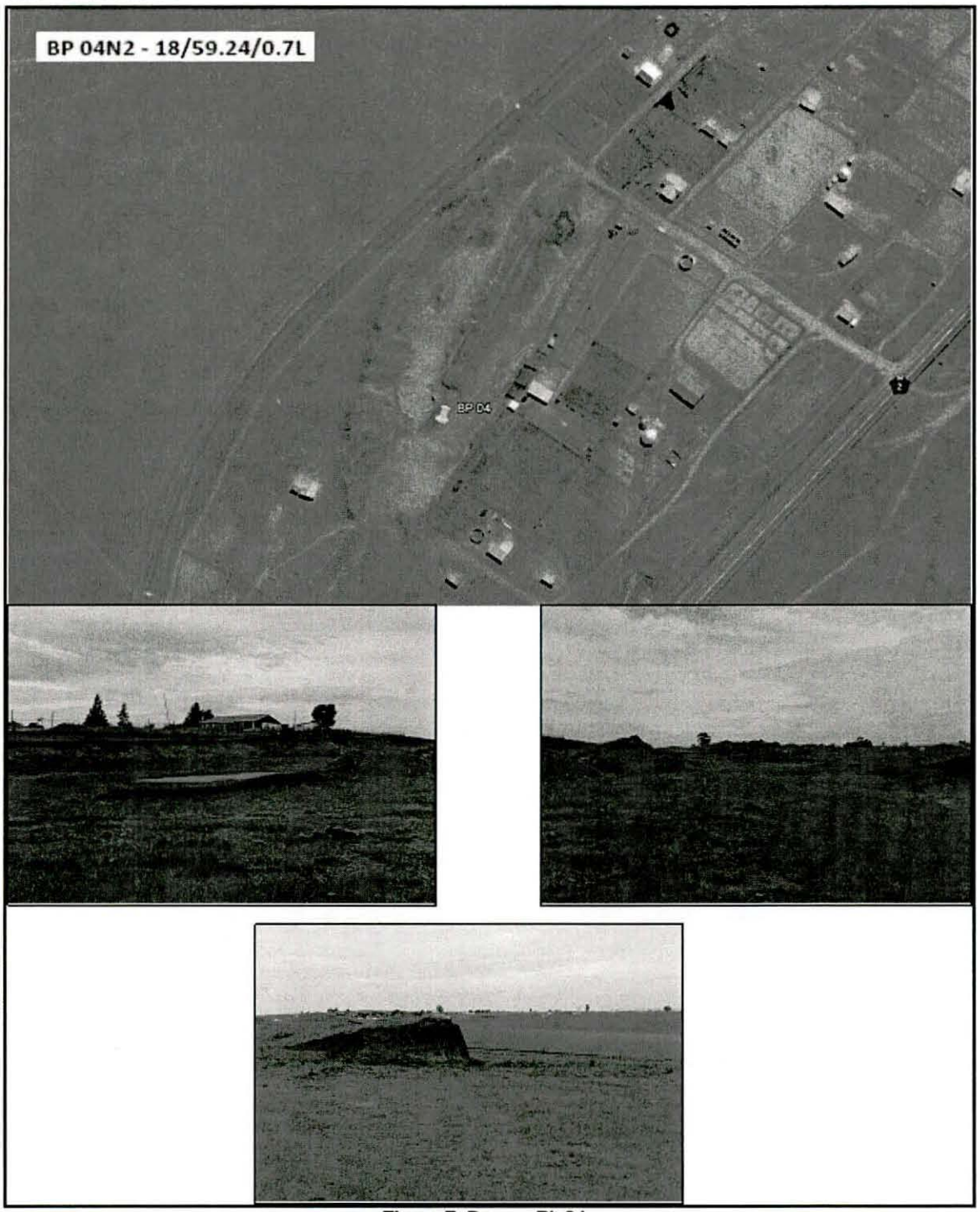

Figure 7: Borrow Pit 04.

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General Description:

Borrow Pit 4 is an existing borrow pit which has been used to extensively in the past as a source for road building material. It is located on a relatively flat landscape adjacent to existing residential houses. Although the borrow pit is located in close proximity to houses, it will not be necessary to relocate any of the households. The site is accessed via the access road leading off the N2 towards the Mareko village. The train tracks leading form Mthatha to Idutywa is located adjacent to the borrow pit area. The mining plan is attached under **Appendix A.**

Site preparation will consist of stripping off topsoil and overburden into stockpiles. Existing topsoil stockpiles will be shifted out of the way to allow for mining of the material beneath. The entire mining area will be fenced and the existing access road will be upgraded to allow for trucks to access the working areas. The material will be excavated and loaded directly onto haul trucks.

Material to be mined:

The material to be mined is highly weathered dolerite of Karoo Age. The dolerite is in the form of a sill, with lateral mining limitations, and has already been exploited. It lies largely exposed because nearly all of the overburden has been removed.

The material to be mined has been classified as silty sandy gravel derived by a high degree of weathering of dolerite (G7 Quality Material).

Extraction Plan:

- Mining may commence by removing material from the dolerite occurrence.
- The approximate volume from this pit is approximately 61 500m^3. It has been assumed for the calculations of these volumes that no large core-stone/in-situ boulders will be encountered.
- The final extent of mining should be determined by the volume of material required at any one time.
- Mining should take place by advancing from the existing face towards the proposed limit of mining.

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Proposed Rehabilitation Measures:

- Rehabilitation will consist not only of top soiling and landscaping the newly worked areas, but shall also consist of rehabilitation of the existing workings to the same standards.
- A limited amount of loosened material is to be stockpiled in the floor (at the foot of the access road) of the pit for maintenance purposes.

Additional Recommended Rehabilitation Measures:

On completion of mining, the faces should be sloped to a 1:2 - 1:3 slope, with a contour berm installed half way down the slope to minimise erosion. Topsoil (which may be required to be imported from other work areas, as may be available, as it is an existing borrow pit with limited topsoil cover) should be spread over the surface of the mining area, and the temporary access road must be ripped and re-grassed. The entire area should be fertilized and hydro-seeded with an indigenous grass mix which includes quick-growing pioneers and climax species. The storm water berms and dissipation beds must be retained on closure. Any near vertical slopes (1:1) should be stabilised by natural rock wall structures using conventional building methods or in other forms with mortar forced between the rocks. All such structures must have a 'natural' look and provide facilities for plants to grow in. All structures must have a 'natural' look and provide facilities for plants to grow in. All areas where the slopes are 1:3 to 1:6 should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/ cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/ cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

Post construction site inspections must be undertaken to ensure that erosion is minimized and to monitor the success of the revegetation. Should any damage occur the necessary repair works will be undertaken. The intention is to establish an 80% grass cover within two years of rehabilitation. Should this not be achieved, it may be necessary to lightly rip, fertilise and reseed the site. The fence will be maintained by the contractor until the end of the contract's liability period.

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10.5 Borrow Pit 5

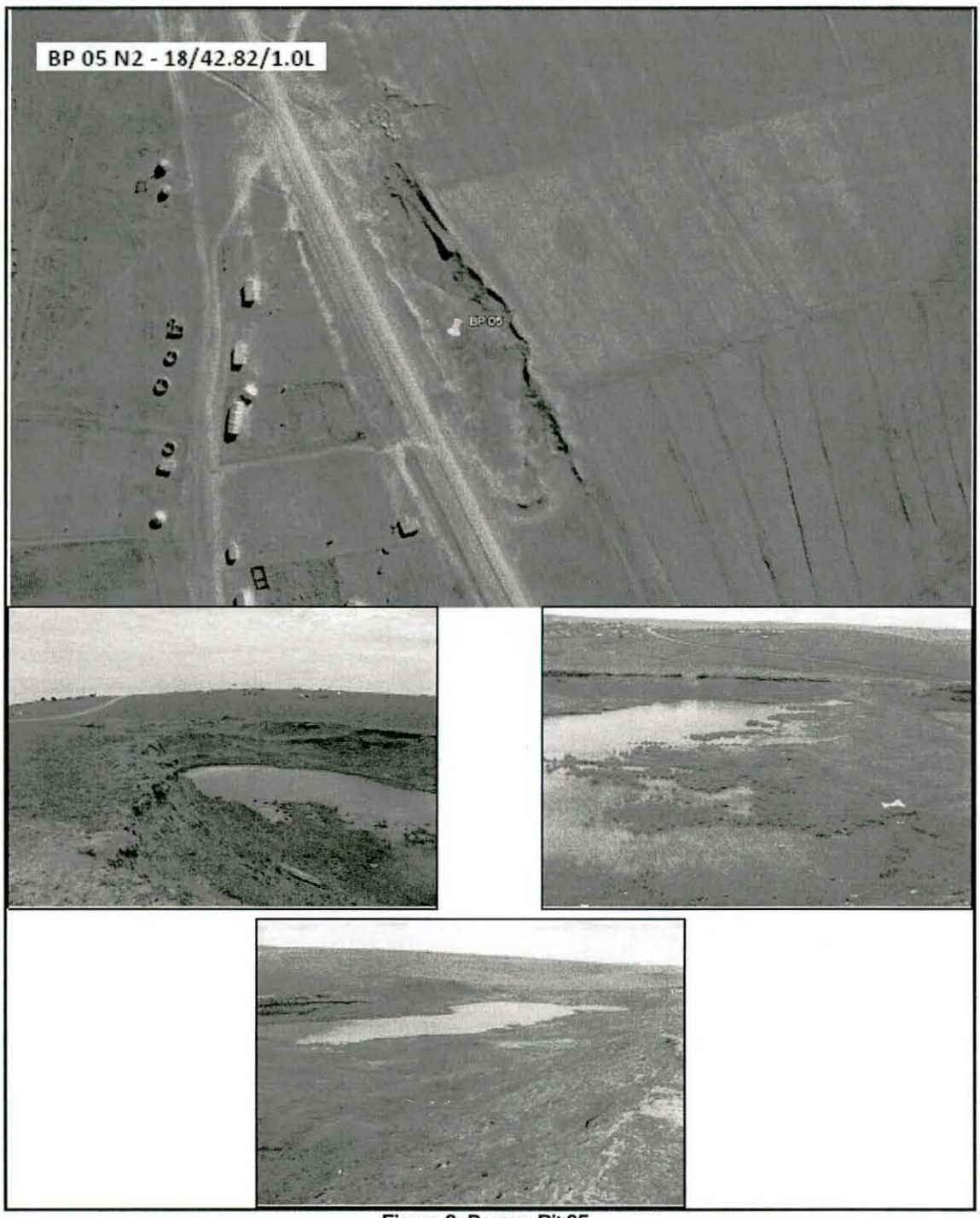

Figure 8: Borrow Pit 05.

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General Description:

Borrow Pit 5 is an existing borrow pit which has been used extensively in the past as a source for road building material (most probably for the local municipality and the provincial Department of Roads & Transport). It is located on the side of a relatively steep north-east facing slope adjacent to the N2 and in close proximity of some residential houses of the Ngqunge village. Although the borrow pit is located in close proximity to houses, it will not be necessary to relocate any of the households. Some ponding of water has developed at the base of the borrow pit which are used by the local populace for washing clothes and watering of stock. The borrow pit is accessed from the Bityi village turnoff road leading off the N2. The mining plan is attached under **Appendix A.**

Site preparation will consist of stripping off topsoil and overburden into stockpiles. Existing topsoil stockpiles will be shifted out of the way to allow for mining of the material beneath. The entire mining area will be fenced and the existing access road will be upgraded to allow for trucks to access the working face. The material will be excavated and loaded directly onto haul trucks.

Material to be mined:

The material to be mined is weathered mudstone and sandstone of the Beaufort Group, which occurs at this site with lateral limitations. It lies partially exposed because nearly all overburden has been removed. The resource materials are partly exposed by mining and partly covered by topsoil and overburden stockpiles up to about 1.5m deep. Unlearned topsoil is about 0.2m thick.

The material to be mined has been classified as silty sandy gravel derived by a high degree of weathering of mudstone and sandstone.

Extraction Plan:

- Mining may commence by removing material in a series of layers, each about 0.5m thick.
- The approximate volume from this pit is approximately 42 000m^3. It has been assumed for the calculations of these volumes that no large core-stone/in-situ boulders will be encountered.
- The final extent of mining should be determined by the volume of material required at any one time.
- Mining should take place by advancing from the existing face towards the proposed limit of mining.

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Proposed Rehabilitation Measures:

- Rehabilitation will consist not only of top soiling and landscaping the newly worked areas, but shall also consist of rehabilitation of the existing workings to the same standards.
- The local populace have requested through the local headman that the finished borrow pit be left in a state that water for livestock may collect in it. To this end the drainage channel could be modified to create a low berm that will retain a limited amount of runoff.
- A limited amount of loosened material is to be stockpiled in the floor (at the foot of the access road) of the pit for maintenance purposes.

Additional Recommended Rehabilitation Measures:

Considering the steep slopes, storm water control is viewed as a critical component of the borrow pit development. A cut-off berm will be located up slope form the borrow pit face, protecting the active mining area and topsoil and overburden stockpiles from erosion. A diversion berm with dissipation beds will be installed down slope of the mining area to filter out any sediment washed off the site during heavy rainfall.

On completion of mining, the faces should be sloped to a 1:2 - 1:3 slope, with a contour berm installed half way down the slope to minimise erosion. Topsoil (which may be required to be imported from other work areas, as my be available, as it is an existing borrow pit with limited topsoil cover) should be spread over the surface of the mining area, and the temporary access road must be ripped and re-grassed. The entire area should be fertilized and hydro-seeded with an indigenous grass mix which includes quick-growing pioneers and climax species. The storm water berms and dissipation beds must be retained on closure. Any near vertical slopes (1:1) should be stabilised by natural rock wall structures using conventional building methods or in other forms with mortar forced between the rocks. All such structures must have a 'natural' look and provide facilities for plants to grow in. All structures must have a 'natural' look and provide facilities for plants to grow in. All areas where the slopes are 1:3 to 1:6 should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/ cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/ cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

Post construction site inspections must be undertaken to ensure that erosion is minimized and to monitor the success of the revegetation. Should any damage occur the necessary repair works will be undertaken. The intention is to establish an 80% grass cover within two years of rehabilitation.

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Should this not be achieved, it may be necessary to lightly rip, fertilise and reseed the site. The fence will be maintained by the contractor until the end of the contract's liability period.

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10.6 Borrow Pit 6

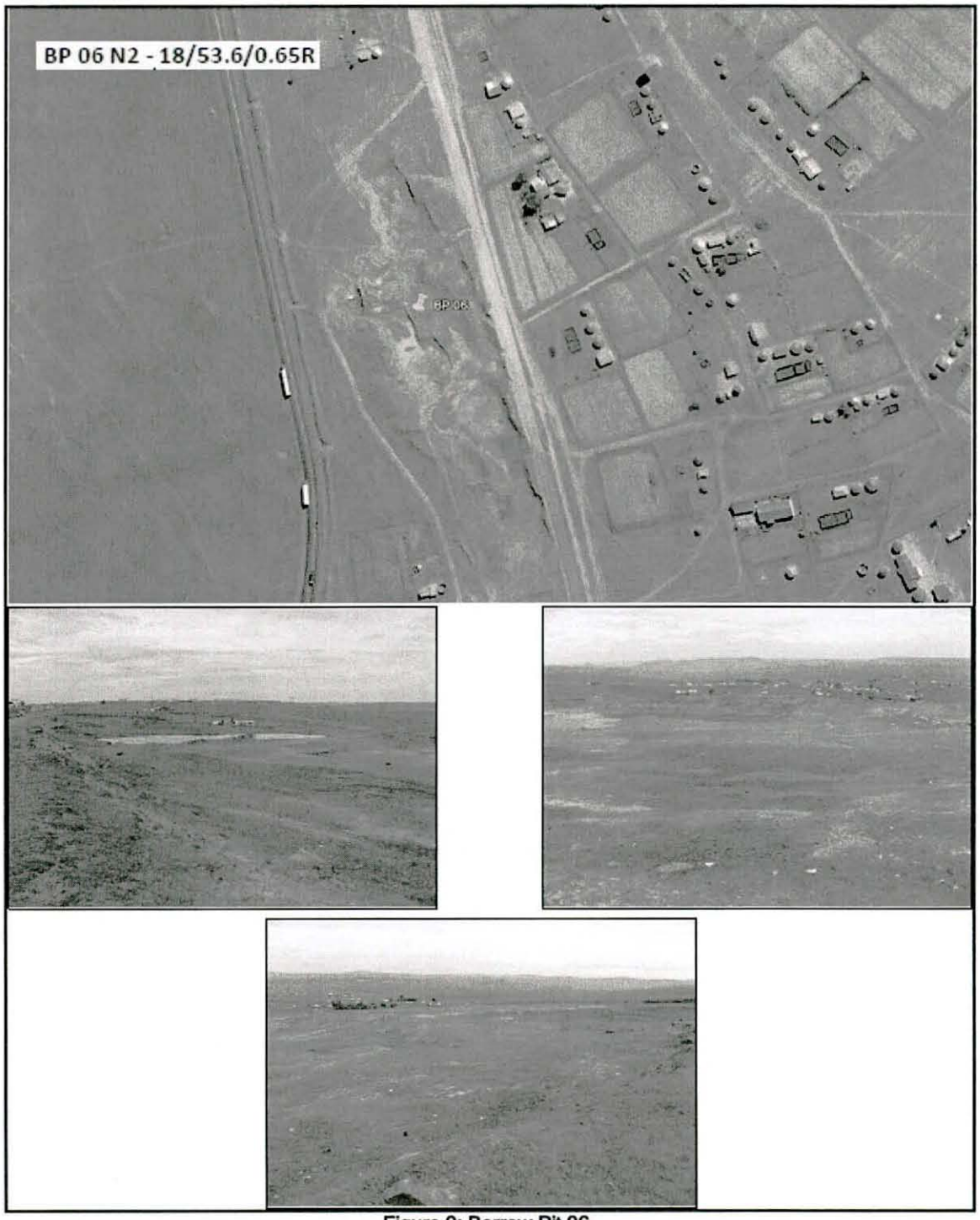

Figure 9: Borrow Pit 06.

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General Description:

Borrow Pit 6 is an existing borrow pit which has been used extensively in the past as a source for road building material. It is located on the side of a moderately sloping landscape adjacent to the N2 and in close proximity of some residential houses of the Zinyoka village. Although the borrow pit is located in close proximity to houses, it will not be necessary to relocate any of the households. One small area of ponding has developed at the southern base of the borrow pit which is used by the local residents for washing clothes and watering of stock. The borrow pit is accessed from the Bityi village turnoff road leading off the N2. The mining plan is attached under **Appendix A.**

Site preparation will consist of stripping off topsoil and overburden into stockpiles. Existing topsoil stockpiles will be shifted out of the way to allow for mining of the material beneath. The entire mining area will be fenced and the existing access road will be upgraded to allow for trucks to access the working face. The material will be excavated and loaded directly onto haul trucks.

Material to be mined:

The material to be mined is weathered mudstone and sandstone of the Beaufort Group, which occurs at this site with lateral limitations. It lies partially exposed because nearly all overburden has been removed. The resource materials are partly exposed by mining and partly covered by topsoil and overburden stockpiles up to about 1.5m deep. Unlearned topsoil is about 0.5m thick.

The material to be mined has been classified as silty sandy gravel derived by a high degree of weathering of mudstone and sandstone.

Extraction Plan:

- Mining may commence by removing material in a series of layers, each about 0.5m thick.
- The approximate volume from this pit is approximately 41 000m^3. It has been assumed for the calculations of these volumes that no large core-stone/in-situ boulders will be encountered.
- The final extent of mining should be determined by the volume of material required at any one time.
- Mining should take place by advancing from the existing face towards the proposed limit of mining.

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Proposed Rehabilitation Measures:

- Rehabilitation will consist not only of top soiling and landscaping the newly worked areas, but shall also consist of rehabilitation of the existing workings to the same standards.
- The local populace have requested, through the local headman, that the finished borrow pit be left in a state that water for livestock may collect in it. To this end the drainage channel could be modified to create a low berm that will retain a limited amount of runoff
- A limited amount of loosened material is to be stockpiled in the floor (at the foot of the access ramps) of the pit for maintenance purposes.

Additional Recommended Rehabilitation Measures:

On completion of mining, the faces should be sloped to a 1:2 - 1:3 slope, with a contour berm installed half way down the slope to minimise erosion. Topsoil (which may be required to be imported from other work areas as may be available as it is an existing borrow pit with limited topsoil cover) should be spread over the surface of the mining area, and the temporary access road must be ripped and re-grassed. The entire area should be fertilized and hydro-seeded with an indigenous grass mix which includes quick-growing pioneers and climax species. The storm water berms and dissipation beds must be retained on closure. Any near vertical slopes (1:1) should be stabilised by natural rock wall structures using conventional building methods or in other forms with mortar forced between the rocks. All such structures must have a 'natural' look and provide facilities for plants to grow in. All structures must have a 'natural' look and provide facilities for plants to grow in. All areas where the slopes are 1:3 to 1:6 should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/ cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/ cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

Post construction site inspections must be undertaken to ensure that erosion is minimized and to monitor the success of the revegetation. Should any damage occur the necessary repair works will be undertaken. The intention is to establish an 80% grass cover within two years of rehabilitation. Should this not be achieved, it may be necessary to lightly rip, fertilise and reseed the site. The fence will be maintained by the contractor until the end of the contract's liability period.

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10.7 Borrow Pit 7

Figure 10: Borrow Pit 07.

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General Description:

Borrow Pit 7 is the only new borrow pit proposed for the improvement of N2: Section 18. It is therefore a "greenfields site", however the area has been severely degraded by footpaths and tracks formed by the people and livestock, which has lead to minimal vegetation cover. The borrow pit is located on a flat landscape adjacent to some residential houses of the Kuse Mnkalana village and the school. Although the borrow pit is located in close proximity to the houses and school, it will not be necessary to relocate any of the households or the school. The borrow pit is accessed via the road leading to the KuNkalana village which is accessed off the N2 approximately 1.2km north of the site. The mining plan is attached under **Appendix A**

Site preparation will consist of stripping off topsoil and overburden into stockpiles. Existing topsoil stockpiles will be shifted out of the way to allow for mining of the material beneath. The entire mining area will be fenced and the existing access road will be upgraded to allow for trucks to access the working face. The material will be excavated and loaded directly onto haul trucks.

Material to be mined:

The material to be mined is weathered sandstone of the Beaufort Group, which occurs at this site with lateral limitations. The resource material is covered by a topsoil layer of about 0.2m thick.

The material to be mined has been classified as silty sandy gravel (G8/G9 Quality Material) derived by weathering of sandstone.

Extraction Plan:

- Mining may commence by removing material in a series of layers, each about 0.5m thick.
- The topsoil and overburden thickness is about 0.2m thick.
- The approximate volume from this pit is approximately 18 000m^3. It has been assumed for the calculations of these volumes that no large core-stone/in-situ boulders will be encountered.
- The final extent of mining should be determined by the volume of material required at any one time.
- Mining should take place by advancing from the existing face towards the proposed limit of mining.

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Proposed Rehabilitation Measures:

- Rehabilitation will consist not only of top soiling and landscaping the newly worked areas, but shall also consist of rehabilitation of the existing workings to the same standards.
- The local populace have requested through the local headman that the finished borrow pit be left in a state that water for livestock may collect in it. To this end the drainage channel could be modified to create a low berm that will retain a limited amount of runoff
- A limited amount of loosened material is to be stockpiled in the floor (at the foot of the access ramps) of the pit for maintenance purposes.

Additional Recommended Rehabilitation Measures:

On completion of mining, the faces should be sloped to a 1:2 - 1:3 slope, with a contour berm installed half way down the slope to minimise erosion. Topsoil (which may be required to be imported from other work areas as may be available as it is an existing borrow pit with limited topsoil cover) should be spread over the surface of the mining area, and the temporary access road must be ripped and re-grassed. The entire area should be fertilized and hydro-seeded with an indigenous grass mix which includes quick-growing pioneers and climax species. The storm water berms and dissipation beds must be retained on closure. Any near vertical slopes (1:1) should be stabilised by natural rock wall structures using conventional building methods or in other forms with mortar forced between the rocks. All structures must have a 'natural' look and facilities for plants to grow in. All areas where the slopes are 1:3 to 1:6 should be logged or otherwise stepped (using stabilisation cylinders or similar) in order to prevent soil erosion. Logs/ cylinders must be laid in continuous lines following the contours and spaced vertically 0.8-1.2 m apart, depending on the steepness of the slope. These logs/ cylinders must be secured by means of steel pegs and wire in rocky areas, and treated wooden pegs in other areas.

Post construction site inspections must be undertaken to ensure that erosion is minimized and to monitor the success of the revegetation. Should any damage occur the necessary repair works will be undertaken. The intention is to establish an 80% grass cover within two years of rehabilitation. Should this not be achieved, it may be necessary to lightly rip, fertilise and reseed the site. The fence will be maintained by the contractor until the end of the contract's liability period.

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