mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Private Bag X6076, Port Elizabeth, 6000
Tel: (041) 396 3934
Fax: 0865768004
Cnr.Diaz and Mount Roads
Mount Croix
Port Elizabeth, 6001

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

Reference: EC30/5/1/3/3/2/1(0463)EM
Date: 27 August 2010

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

Case ID: 2184

ATTENTION: MR. T. LUNGILE

Sir

CONSULTATION IN TERMS OF SECTION 40 OF THE MPRDA OF 2002: REHABILITATION OF NR2 (N2): SECTION 20 FROM THE NGCWELENI RIVER TO BROOKES NEK

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

2. Any written comments or requirements your department may have in this regard can be forwarded to this office no later than **17 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(0463) EM in all future correspondence.

5. Your co-operation is appreciated.

Sincerely,

REGIONAL MANAGER

EASTERN CAPE

REHABILITATION OF NATIONAL ROUTE 2 (N2): SECTION 20 FROM THE NGCWELENI RIVER TO BROOKES NEK: EASTERN CAPE (30.8KM)

ENVIRONMENTAL MANAGEMENT PLAN FOR FIVE (5) BORROWPITS

Submitted to the Department of Minerals and Energy in compliance with
Section 5(4)a of the Minerals and Petroleum Resource Development Act,
Act No 28 of 2002.

July 2010

Prepared For:

SOUTH AFRICAN NATIONAL ROADS AGENCY
NRA House, Block 10
Southern Life Gardens
No. 70, 2nd Avenue
Newton park
PORT ELIZABETH
6001
Phone: (041) 3983200
Fax:(041) 3983222

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD

REGISTRATION NO. 1998/009584/06

Prepared by:

TERRECO ENVIRONMENTAL cc
P O Box 19829
TECOMA
5214
Tel: (043) 721 1502
Fax: (043) 721 1535
Email: daneelj@terreco.co.za

TERRECO
ENVIRONMENTAL CONSULTANTS

57 Jarvis Road
Berea
5241
East London

Tel (043) 721 1502
Fax: (043) 721 1535
e-mail: juppl@terreco.co.za
scottd@terreco.co.za

NOTE:

All reference to BP 98-1 in the EMP refers to the drawing Borrow Pit Plan 99-1 as provided in the appendices.

Drawing marked as Borrow Pit Plan (km 45.100) refers to BP New Cutting 40 in the EMP document.

Drawing marked as Borrow Pit Plan (km 49.400) refers to BP New Cutting 50 in the EMP document.

Should you have any queries please do not hesitate to contact Mr D Scott on (043) 721 1502 or scottd@terreco.co.za

REHABILITATION OF NATIONAL ROUTE 2 (N2): SECTION 20 FROM THE NGCWELENI RIVER TO BROOKES NEK: EASTERN CAPE (30.8KM)

ENVIRONMENTAL MANAGEMENT PLAN FOR FIVE (5) BORROWPITS

Submitted to the Department of Minerals and Energy in compliance with Section 5(4)a of the Minerals and Petroleum Resource Development Act, Act No 28 of 2002.

July 2010

	Prepared By	**Checked By**	**Approved By**
ORIGINAL	NAME **JO DANEEL**	NAME **DUNCAN SCOTT**	NAME **JO DANEEL**
DATE 30-07-2010	SIGNATURE	SIGNATURE	SIGNATURE

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South African National Roads Agency Limited	Mr M Kaiser	1	30-07-2010
Aurecon	Mr David Nel	1	30-07-2010
Iliso Consulting Engineers	Mr Roy Derbyshire	1	30-07-2010
Terreco Consulting cc	File	1	30-07-2010

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1 INTRODUCTION

1.1 Overview

The South African Roads Agency Limited (Pty) Ltd (SANRAL) proposes to upgrade the 30.8km Section 20 of the National Route 2 (N2) between Ngcweleni and Brooks Nek in the northern part of the Eastern Cape Province. SANRAL have appointed Aurecon Consulting Engineers to undertake the necessary investigations, design and construction supervision. The project is currently in the detailed design stage. It is anticipated that the contract for the upgrade will be advertised for tender in November 2010 with construction works commencing in February 2011.

The project start point is at km 39.6 at the Ngcweleni River Bridge south of Mount Ayliff and extends to km 70.4 at the Eastern Cape/KZN border at the top of Brookes Nek. The section of the N2 under consideration is in a very poor condition and high levels of routine maintenance (pothole repairs etc) are required on a continual basis. Climbing / passing lanes will be added at selected sections along the route in order to improve road safety. The intended roadwork is confined to work within the road reserve although some widening will be done to certain areas to provide additional passing opportunities. No structures (eg bridges and culverts) will be widened.

Terreco Consulting (Geotechnical, Environmental and Waste Management consultants) were appointed by Aurecon Consulting Engineers on behalf of the client to undertake the necessary investigations and applications in order to obtain authorisation from the relevant authorities for the proposed works. To this end, a Basic Environmental Assessment was undertaken for the road upgrade in terms of the requirements of Section 24 of the National Environmental Management Act, Act No 107 of 1998 (as amended).

It is proposed that road construction materials be sourced on site from a number of sources including road cuttings and borrowpits. Material sourced from road cuttings will be removed as part of the normal bulk earthworks required in order to widen and realign the road according to the design requirements. The presence of suitable material along the road cuttings has significantly reduced the volumes required from additional dedicated borrowpits with the result that it is anticipated that all borrowpits will measure less than 1.5ha. Base course materials will be sourced from a commercial quarry located outside of Kokstad.

This report presents the Environmental Management Plan (EMP) for the five (5) borrowpits which will be utilised as part of the road upgrade. The EMP is submitted in support of a mining permit application. Section 27(1) of the Minerals and Petroleum Resources Development Act, Act No 28 of 2002 (MPRDA), indicates that "*A Mining Permit may only be issued if – (a) the mineral in question can be mined optimally within a period of two years and (b) the mining area in question does not exceed 1.5ha in extent.*" Since it is anticipated that mining of the borrowpits will be completed within an 18 month to two year period and that they will all measure less than

1.5ha, an application for a mining permit was deemed to be adequate. Notwithstanding this, a detailed impact assessment has been conducted for each of the sites.

As an organ of state, the South African National Roads Agency Limited (SANRAL) – the applicant – is exempt for undertaken the full application procedure required under the MPRDA, and is simply required to submit an Environmental Management Plan as specified in Regulation 52, together with the necessary undertakings and guarantees as required by the Department of Minerals and Energy (DME) – the relevant authority in this instance.

1.2 Project Details

1.2.1 Applicant

South African National Roads Agency Limited
NRA House, Block 10
Southern Life Gardens
No. 70, 2nd Avenue
Newton park
PORT ELIZABETH
6001

Phone: (041) 3983200
Fax:(041) 3983222
Email: kaiserm@nra.co.za
Contact Person: Mr Mike Kaiser

1.2.2 Environmental Consultant

The EMP has been conducted by Terreco Consulting who is gained considerable experience in the completion of impact assessments and formulation of EMPs. Contact details are provided below:

Terreco Consulting cc
P O Box 19829
TECOMA
5214

Tel: (043) 721 1502
Fax: (043) 721 1535
Email: terreco@terreco.co.za

Contact Person: Mr D Scott

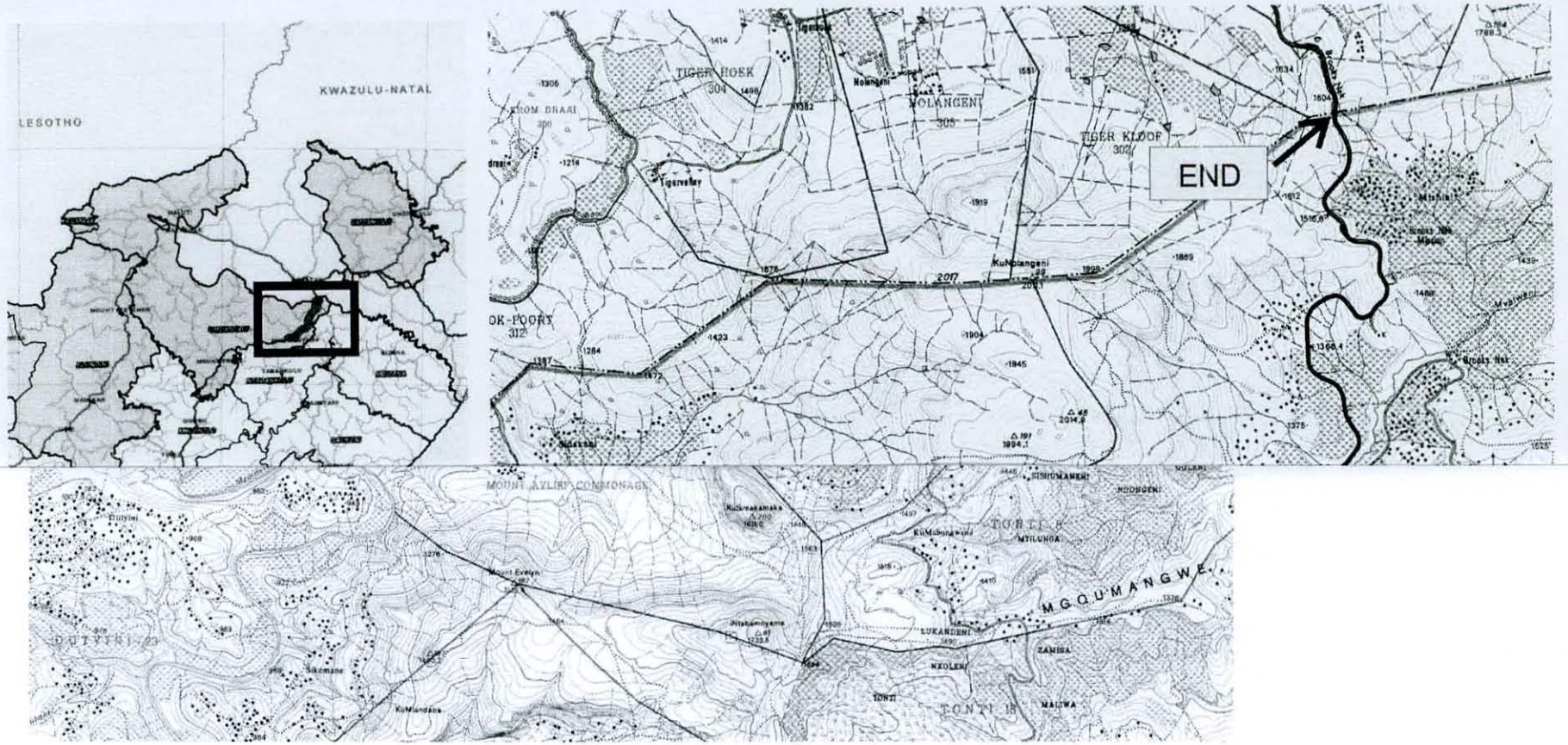


FIGURE 1.1 BORROWPIT LOCALITY	**PROJECT:** UPGRADE OF THE N2: SECTION 20 (NGCWELENI TO BROOKES NEK) EASTERN CAPE PROVINCE	TERRECO cc Geotechnical, Environmental and Waste Management	Scale: +/- 1:65 000 Date: MAY 2010

1.2.4 Landowner

The land falls within the former Transkei and is therefore State owned land held in trust for the community.

1.2.5 Regional Setting

Section 20 of the N2 falls within the Umzimvubu Local Municipality, Alfred Nzo District Municipality, in the northern extreme of the Eastern Cape Province. The nearest town is Mount Ayliff.

All of the borrowpits are accessible directly off the N2 or from secondary roads. All of the borrowpits are located within the Mzintlava River catchment area, which forms part of the Umzimvubu catchment

1.3 Borrowpit Information

An overview of the five borrowpits is provided in the borrowpit information summary table provided below. It should be noted that the numbering of the borrowpits relates to the numbers allocated in the initial materials report.

1.4 Approach

The EMP has been undertaken according to the prescribed methodology outlined in the MPRDA. Regulation 52 of the MPRDA: Regulations (Government Notice No. R. 527, 23 April 2004) defines the content of the Environmental Management Plan as follows:

(a) A description of the environment likely to be affected by the proposed mining operation;
(b) An assessment of the potential impacts of the proposed mining operation on the environment, socio-economic conditions and cultural heritage, if any;
(c) A summary of the assessment of the significance of potential impacts, and the proposed mitigation and management measures to minimise adverse impacts and benefits;
(d) Financial provision which must include:
    i. The determination of the quantum of the financial provision contemplated in regulation 54; and
    ii. Details of the method providing for the financial provision contemplated in Regulation 53;
(e) Planned monitoring and performance assessment of the environmental management plan;
(f) Closure and environmental objectives;
(g) A record of public participation undertaken and the results thereof; and
(h) An undertaking from the applicant regarding the execution of the environmental management plan.

A specialist Phase I Cultural Heritage Assessment was undertaken by eThembeni Cultural Heritage on appointment from Terreco. A copy of the report is included in APPENDIX B.

Table 1.1 Borrowpit Summary Table

INFORMATION		BORROWPITS				
		BP New 1	**BP 98-1**	**BP New Cutting 40**	**BP New Cutting 50**	**BP 443-1**
TYPE OF MATERIAL		High / Moderately Weathered Shale	High / Moderately Weathered Shale	Weathered Dolerite	High / Moderately Weathered Shale	High / Moderately Weathered Shale
QUANTITY AVAILABLE		90 000m^3	10 800m^3	42 000m^3	18 000m^3	45 000m^3
CO-ORDINATES*	**S**	30° 48.131' S	30° 47.070' S	30° 47.046'S	30° 45.730'S	43° 42.557' S
	E	29° 22.607' E	29° 21.548' E	29° 22.227'E	29° 24.325'E	29° 23.633' E
CHAINAGE**		43.500km	44.500km	45.100km	49.400km	55.000km
DISTANCE FROM THE ROAD		+/- 40m from R102	1.2km from the N2 along gravel road	+/- 50m off N2	+/- 50m off N2	+/- 20m off gravel road 6km from N2
RIVER CATCHMENT		Ngcelweni River Catchment	Ngcelweni River Catchment	Ngcelweni River Catchment	Mombeni River Catchment	Mvalweni River Catchment
DISTANCE TO HOUSES		30m to school / training college	>400m	>100m	+/- 100m	50m
PRESENCE OF SERVITUDES		There are servitudes directly affected by the borrowpit expansion	There are servitudes directly affected by the borrowpit expansion	There are servitudes directly affected by the borrowpit expansion	There are servitudes directly affected by the borrowpit expansion	There are servitudes directly affected by the borrowpit expansion

* Measured from the centre of the Borrowpit

** Distance along Section 20 of the N2

The impact assessment for each borrowpit was conducted according to the requirements of the EIA Regulations published under the National Environmental Management Act, Act No 107 of 1998 (NEMA) with reference to the various guideline documents published in support of the regulations. The detailed approach and methodology employed in the impact assessment is described in greater detail in Section 5.

1.5 Scope of the EMP

This document relates to the construction, operation and closure of the designated borrowpits. Base-course and sub-base material will be sourced from a commercial quarry, located near Kokstad. This quarry is permitted by DME:KZN. The road construction works, as well as the establishment and operation of a central construction camp with workshops, accommodation, fuel tanks etc, was covered in the Basic Assessment Report undertaken for the Department of Environmental Affairs. For this reason, impact of these activities has not been covered in the Borrowpit EMP. Notwithstanding this, the Environmental Management Plan provided in Section 6 is inclusive of all activities associated with the use of the borrowpits, including vehicle maintenance, storage of fuel, washing of machines etc.

1.6 Structure of Report

The report has been structured to reflect the contents required under Regulation 52 of the MPRDA. The structure of the report is as follows:

SECTION	***CONTENT***
1: INTRODUCTION	This section provides background to the project and an overview of the proposed works. Details of the applicant as well as the landowner are provided. The project is placed in regional context and a summary of each borrowpit is provided. The approach to the EMP is discussed.
2: DESCRIPTION OF MINING OPERATIONS	This section provides a detailed description of the proposed mining operations to take place at the various borrowpits. The chapter is divided into pre-construction, construction, operation and closure phases. This section should be reviewed in conjunction with the Borrowpit development plans which are included in APPENDIX C.
3: AFFECTED ENVIRONMENT	The pre-mining environment is described in this section. Details of the biophysical, social and cultural conditions on site are provided. A borrowpit summary sheet for each of the sites is provided.
4: PUBLIC PARTICIPATION	The public participation process undertaken for the road upgrade and for the borrowpit usage is described. A list of interested and affected parties is provided. Correspondence with all interested and affected parties (IAPs) is included in APPENDIX D.
5: IMPACT ASSESSMENT	The methodology employed in undertaking the impact assessment is described. Detailed impact matrices and tables are provided and the primary impacts summarised.

6:	ENVIRONMENTAL MANAGEMENT PLAN	A detailed environmental management plan for the construction, operation and closure phases of the project is provided in this section.
7:	MONITORING PROGRAMME	Details of the monitoring programme, including monthly site visits and quarterly performance assessments are outlined.
8:	CLOSURE AND ENVIRONMENTAL OBJECTIVES	Objectives for environmental management and for final closure of the borrowpits are discussed.
9:	FINANCIAL PROVISION	The methodology for calculating the financial provision as well as the amount set aside for the financial provision is included in this section.
10:	CONCLUSIONS	Concluding remarks.

APPENDIX A:	Record of Decision issued by DEDEA [Pending]
APPENDIX B:	Cultural Heritage Assessment Report
APPENDIX C:	Borrowpit Development Plans
APPENDIX D:	Forms from Community Consultations
APPENDIX E:	Impact Assessment Tables
APPENDIX F:	Rehabilitation Cost Schedule
APPENDIX G:	Letter of Financial Guarantee
APPENDIX H:	Letter of Undertaking
APPENDIX I:	Letter confirm DRT Project
APPENDIX K:	Examples of "Toolbox Talks"
APPENDIX L:	Company Profile Aurecon

2 PROJECT PROPOSAL

2.1 Overview

It is proposed that five (5) borrowpits be used for the provision of material for the N2: Section 20 upgrade. All of these borrowpits have been previously mined and left in a largely un-rehabilitated condition. The borrowpits will be used exclusively for the upgrade of the N2 over a period not exceeding two years and will be rehabilitated and closed on completion of the works. Provision has been made in the contract document for the rehabilitation of the borrowpits which will involve benching, shaping, topsoiling and vegetating.

Mining will be undertaken by a suitably qualified contractor who is yet to be appointed by the Applicant, although the Applicant will retain overall responsibility and accountability for the manner in which the borrowpits are developed, extended and rehabilitated. It is envisaged that mining will commence shortly after the appointment of contractor, which is expected to be towards the end of 2010.

This section provides a detailed description of the mining methods likely to be employed in the exploitation of these sources. Alternative sources and mining methods are discussed in Section 2.12.

2.2 Motivation for the use of Borrowpits

The borrowpits will provide material for the re-construction of the pavement layers during the upgrading of Section 20 of the N2. The identification of these borrowpits follows a detailed materials investigation undertaken by Roy Derbyshire of Iliso Consulting Engineers during which a number of alternative sources were identified and investigated. Trail holes were dug at all of the prospective sites and samples were sent to a laboratory of analysis. Only those sources which have sufficient quantity of material of a suitable quality were recommended for use in the upgrade.

The section of the N2 under consideration is in a very poor condition and high levels of routine maintenance (pothole repairs etc) are required on a continual basis. The road surface is severely cracked allowing the ingress of water into the pavement layers. The existing asphalt surfacing is of variable thickness over Section 1 and ranges from 40mm to 180mm thick while on Section 2 the average thickness is 30mm to 40mm. The pavement layers below the asphalt on Section 1 are of poor quality and do not comply with the currently required standards for such layers. These materials are not suitable for re-use as upper pavement layers.

Rehabilitation of the pavement for Section 1 will consist of the milling of the asphalt surfacing to a depth of 75mm. An additional 75mm of G5 material will be added and the existing material recycled and stabilized to a depth of 150mm as the lower subbase. A new upper subbase layer consisting of 150mm of imported G5 material which will be stabilized will then be constructed. The new base will consist of 90mm of asphalt base and the proposed surfacing will be 40mm of

continuously graded asphalt. The pavement layers of the proposed widenings will match the reworked pavement.

On Section 2 the existing asphalt surfacing and base layer will be reworked and stabilised to a depth of 150mm to form the lower subbase. A new upper subbase layer will be added consisting of stabilised imported G5 material. The base layer will consist of 90mm asphalt base and the surfacing will be 40mm of continuously graded asphalt. No road widening will be done on Section 2.

2.3 Pre-Construction Phase

The pre-construction phase will consist of obtaining the necessary permits and authorisations from the relevant authorities for the use of the borrowpits. The surveys have been completed. Since all of the borrowpits are located in grasslands, no bush clearing was required, although some aloes may need to be relocated at BP New Cutting 40. While the materials investigation has been completed it is possible that the contractor (yet to be appointed) will embark on further investigations, probably through excavating trial holes, in order to verify the extent of the material prior to commencing with the construction phase.

2.4 Construction Phase

The construction phase typically consists of the following activities:

- The relocation of any households which are directly affected by the development of the borrowpits. **No households or buildings will require relocation on this project as a result of borrowpit development.**

- The borrowpit areas will be fenced with a standard livestock-proof fence. The fence will encompass the total borrowpit area including topsoil stockpiles. A gate will be erected at the entrance to the borrowpit. It will not be necessary to construct access roads to the borrowpits as all of them are located immediately adjacent to a road or have existing access roads.

- Topsoil, where it exists, will be stripped mechanically using a bulldozer. At least 30cm of the A-horizon will be removed in this process. Topsoil will be set aside in stockpiles as indicated in the Development Plans (APPENDIX C) and conserved for use in the final rehabilitation of the borrowpit. Existing topsoil stockpiles from previous mining operations will similarly be protected.

- Overburden, should any exist, will be stripped and stored in stockpiles adjacent to mining area but separate from the topsoil stockpiles.

- Stormwater management measures will be installed before any mining commences. These measures will consist of the creation of a diversion berm upslope of the mining area to direct stormwater runoff away from the mining face, and the establishment of a

containment berm and settlement pond on the downslope side of the borrowpit, if required, as indicated in the development plans. Energy dissipaters will be installed at the outlets of the diversion berm to prevent erosion.

2.5 Operational Phase

The operational phase will consist of the actual extraction of material from the borrowpit. This will be undertaken mechanically using excavators which will load material directly onto haul trucks for removal to the road construction areas. There will be no mineral processing on site, such as crushing and screening and there will be no blasting taking place.

Mining of the material will proceed according to the approved development plans in order to achieve the final mining profile.

There will be no infrastructure erected at the borrowpits other than the fence. There will be no materials stored on site and all servicing and maintenance will take place at a central construction camp.

2.6 Closure and Rehabilitation

Borrowpit closure will be effected once all the required material has been extracted. Closure will consist of the following activities:

- Final shaping of the borrowpit slopes to resemble the approved closure plans. This will be undertaken mechanically making use of a bulldozer. Where possible, borrowpit faces will be sloped to 1:3 gradient with a fall of 1:10 across the base of the borrowpit to allow for free draining of stormwater. If the back face is vertical or too steep to flatten to a 1:3 slope, the face will be shaped with 5m wide x 3m high benches. All overburden (if any exists) will be returned to the pit and shaped against the face or bottom bench of the borrowpit. The borrowpit will be shaped in such a manner as to prevent the channelling of stormwater which might result in erosion.

- Topsoil will be spread over the surface of the borrowpit to a depth of between 20 and 30cm. This will be undertaken mechanically using a bulldozer.

- The borrowpit area will be hydroseeded using a suitable seed mix recommended by the landscape contractor. The seedmix will include fast growing annuals (such as *Eragrostis teff*) and other hardy pioneer species, such as *Digitaria eriantha*. The seed mix will be applied with a fertilizer base, such as 3:2:3.

- The fence will be retained and repaired if necessary to ensure that the borrow area is protected from grazing by livestock.

- The diversion berm will be maintained to protect the rehabilitating surfaces from the erosive effects of stormwater. Likewise the containment berm and dissipation bed

located below the borrowpit will be retained in order to prevent downstream siltation of streams and watercourses.

2.7 Post Closure Phase

- The borrowpits will be inspected after the end of the first growing season for grass regrowth and evidence of erosion. If necessary, the borrowpit, or portions thereof, will be lightly ripped, fertilized and hydroseeded at the start of the next growing season, and erosion rills or channels patched and repaired. Any alien invader plant species, such as *Lantana* will be eradicated according to standard procedures.

- Once an 80% vegetation cover has been established, a closure application for each borrowpit will be submitted to the Department of Minerals and Energy.

2.8 Surface Infrastructure

Other than the fence, there will be no other infrastructure erected at each of the borrowpits. All infrastructure pertaining to the batching of concrete, maintenance of vehicles etc, will be erected at a central construction camp. This activity is covered in the Basic Assessment Report.

2.9 Stormwater Management

Stormwater management is viewed as a critical component of the environmental management at each of the borrowpits. The general principal behind stormwater management is to divert runoff away from the borrowpit in such a manner as to prevent any erosion from resulting, and to contain and "treat" the "dirty" runoff within the borrowpit area before releasing it into the environment.

"Dirty" water runoff refers to stormwater runoff which has collected within the borrowpit and accumulated a high sediment load as a result of the exposed soils and underlying weathered rock. Other than a high sediment load, there is unlikely to be any other form of contamination of the runoff.

"Treatment" refers to the containment of water within the confines of the borrowpit in such a manner as to allow for the settlement of sediment and the controlled release of clean water, normally through a dissipation bed.

A dissipation bed may consist of an accumulation of rocks and oversized material at the outlet which serves to slow down the passage of water, allowing it to drop it's sediment load and "filter" it through the rock bed. This may be further enhanced through the use of synthetic sheeting such as bidem. The dissipation bed, through arresting the velocity of the runoff, serves furthermore to prevent any down slope erosion.

It is therefore the intention to construct a diversion berm/drain upslope of the borrowpits to divert stormwater away from the BP's. The diversion berm/drain will be located along a contour with a fall no steeper than 1:50.

A containment berm will be installed at the base of the borrowpit within the fenced area. This will serve to divert "dirty" water runoff towards a dissipation bed, described above.

The position of the berms or drains is indicated on the borrowpit development plans included in APPENDIX C.

The berms will remaining in place after borrowpit closure in order to allow for the recovery of the rehabilitated slopes and to protected the downstream environment from sedimentation and erosion which may arise during the rehabilitation period prior to the establishment of adequate grass cover.

2.10 Solid and Hazardous Waste Management Facilities

There will be no solid or hazardous waste generated at the borrowpits during normal operation. All servicing of trucks will take place at the designated workshop. It might be necessary to refuel heavy machinery, such as excavators, on site using a mobile fuel bowser, and emergency field repairs might be required in the event of a breakdown.

The Environmental Management Plan (EMP) makes provision for the containment of hazardous substances during refuelling or repairs, which includes the use of drip trays. The field service truck will be equipped with suitable drip trays, a waste oil drum and an emergency clean-up kit consisting of super absorbent materials (such as Drizit or Hazmat), spades to remove contaminated soil and a drum to convey the soil off site.

A hazardous waste management plan will be developed by the contactor for the entire project. This will include the specifications provided in the EMP, such as secondary containment of hazardous substances. Details are provided in Section 6.

The only semi-permanent personnel located at the borrowpits is likely to be the excavator or bulldozer operator. As such, there is unlikely to be any domestic waste generated and there will be no construction waste produced. Portable chemical toilets will be provided at nearby construction sites where there are more staff located.

A solid waste management plan will be developed by the contractor based on the specifications provided in the EMP.

2.11 Health and Safety

In terms of the Occupational Health and Safety Act, The contractor will be required to develop a Health and Safety Plan identifying all potential health and safety hazardous and providing a detailed plan and programme for the management and monitoring of these risks. An independent Health and Safety Auditor will be appointed for the duration of the project with the responsibility of monthly site inspections. There will, furthermore, be a designated Health and Safety Officer on site.

Potential health and safety risks which are presented by the construction, operation and closure of the borrowpits include:

- Noise, caused by the operation of heavy machinery and in particular the reverse hooters of trucks;
- Dust;
- Injury due to operation of heavy machinery and collapse of unstable faces.

Both the workforce and the surrounding community are at risk of exposure to these hazards. These risks will be minimised, if not mitigated entirely, through the implementation of a sound EMP and in the Health and Safety Management Plan.

2.12 Alternatives

This section deals with the possible alternatives to the project proposal described in the section above. Alternative sources of road construction material as well as alternative methodologies are discussed.

2.12.1 Alternative Sources

The materials investigation, which was undertaken by Roy Derbyshire of Iliso, identified a number of possible material sources located on or near the N2. These were sampled and tested in a laboratory for suitability as road building material. Considering that the road will require widening and minor realignment in places, an attempt was made to identify suitable material within the road cuttings thereby reducing the quantity of material to be sourced from dedicated borrowpits. Towards this end, material will be sourced from cuttings located towards the crest of Brookes Nek where the road requires widening as part of the proposed upgrade.

An attempt was furthermore made to identify existing borrowpits so as to avoid the opening of new, greenfields sites. As a result, all of the borrowpits are existing sites – there are no greenfields sites. No other alternative sources within a reasonable distance of the project area (the N2) were identified. There are no commercial sources of road gravel located within an economical distance of the project area.

2.12.2 Alternative Development Methodologies

There are no alternative mining methodologies to those described in the sections above.

2.12.3 The No-Go Alternative

The "no-go" alternative will simply involve not utilizing the proposed borrowpits as sources of road building material for the upgrade of Section 20 of the N2. This will affected the viability of the project as there will be insufficient material generated from road cuttings or from the road prism itself to fulfil this need. For all intents and purposes, if the borrowpits are not developed, it is highly unlikely that the road upgrade will proceed. In terms of achieving the upgrade of the N2, the "no-go" alternative cannot be considered.

3 AFFECTED ENVIRONMENT

This section provides a description of the existing biophysical and social environment in the vicinity of the project study area and at each of the borrowpits. The information presented below is a synthesis of knowledge gained from literature reviews, discussions with various roleplayers and from site investigations.

The specific environmental conditions prevalent at each of the borrowpits are presented in Tables 3.3. to 3.7.

3.1 Geology and Soils

The geology comprises of rocks of the Karoo Supergroup and post Karoo intrusives. The Karoo Supergroup is represented in the area by the Molteno Formation, Stormberg Group, and the Tarkastad Subgroup and Adelaide Subgroup belonging to the Beaufort Group.

The Tarkastad Subgroup comprises medium- to fine-grained yellow and grey sandstone and red, purple and blue-green mudstone.

Intrusive dolerite sills and dykes occur in relative abundance throughout the area. The resistance of the dolerite to weathering relative to the surrounding argillaceous formations has resulted in the formation of prominent hills and ridges. These are frequently littered with spheroidal boulders and show a distinct weathering profile of an upper, dark silty clay, overlying a pink to reddish clayey silt, which grades down to a yellow-buff, completely weathered rock, overlying an olive-khaki coloured granular, weathered rock. This is normally located above a fairly distinct contact with the slightly to unweathered, hard rock dolerite, below.

In terms of a study conducted by the Agricultural Research Council (ARC), the soils within the ULM are a mixture of red-yellow apedal freely-drained soils and plinthic catena upland duplex and megalithic soil[1]. The duplex and dispersive soils found widely in this area are subject to severe erosion. The shales and mudstones have thin topsoil of very poor quality and with very little nutritive value for the production of crops. The dolerite intrusions, characterised by their dark-red soils, provide the best cropping lands due to their high levels of iron and other minerals.

3.2 Topography and Drainage

The topography of the Umzimvubu Local Municipality is characterised by deeply incised topography and comprises a plateau which falls within the Umzimvubu River basin, which ranges from 800m to 1400m above mean sea level, and a high plateau leading to the Drakensberg Mountains which ranges between 1500, and 2200m above sea level.

[1] Umzimvubu Local Municipality: Draft Integrated Development Plan Review (2009/2010)

The topography of the study area is best described as rolling, rising sharply in the north as the route ascends to Brookes Nek pass, which is effectively the end of Section 20 and the provincial border with KwaZulu Natal. The lowest point is the Mzintlava River (also referred to as the Ngcweleni River), at 900 meters above sea level, with the highest point at roughly 1600m at the top of Brookes Nek.

The entire study area falls within the Mzintlava River catchment, which is a tributary of the Umzimvubu River. Three main rivers are crossed, the Mzintlava at the extreme south of the section under consideration, the Mombeni, near Guwini Village and the Mvalweni at the base of the Brookes Nek pass. Numerous smaller west-flowing tributaries are encountered along the route.

3.3 Climate

Summer months are warm with winter months being cold with snow in high lying areas. The average minimum temperature ranges from 7 to 10 degrees centigrade in winter to 18 to 25 degrees centigrade in summer. The annual average rainfall of the district is 671 mm, with most of the rain falling in the summer months in the form of thundershowers. Winds are typical of the Eastern Cape, with strong south-westerly and easterly winds prevailing. Violent storms, tornado and floods, as well as heavy snow falls on the high-lying areas (including the top of the Brookes Nek pass) are experienced from time to time.

The average rainfall figures and temperatures for nearby Kokstad are presented in the tables below.

Table 3.1 Mean Monthly and Annual Rainfall (Kokstad)

MONTH	Mean Monthly Rainfall (mm)
January	131.0
February	90.2
March	104.7
April	45.5
May	23.8
June	18.6
July	13.6
August	17.5
September	36.7
October	64.4
November	85.2
December	103.8
TOTAL	735.0

Table 3.2 Mean Monthly Maximum and Minimum Temperatures (Kokstad)

MONTH	Average Maximum Temp (°C)	Average Minimum Temp (°C)
January	25.8	13.3
February	25.5	13.0
March	24.8	11.9
April	21.9	7.5
May	19.7	3.2
June	17.7	-0.5
July	18.1	-0.6
August	19.7	1.9
September	21.7	6.1
October	22.8	8.6
November	23.6	10.4
December	25.2	12.3
Average	22.2	7.3

3.4 Vegetation

From a general perspective, the study area lies within the Grassland Biome which incorporates much of the Eastern Cape and extends northwards covering much of eastern South Africa inland of the coast and savannah biomes. The major vegetation type associated with this biome and found within the study area comprises the East Griqualand Grassland (Gs12)[2]. This vegetation types is associated with the Sub-Escarpment Grassland group, one of four groups identified within the Grassland Biome.

The East Griqualand Grassland typically occurs at altitudes of 920 – 1740 m and, within the hilly slopes, comprises 'grassland with patches of bush clumps' with *Leucosidea sericea* (only wet sites) or *Diospuros lyciodes*, *Acacia karroo* and *Ziziphus mucronata* in low-lying and very dry sites.'

Other vegetation types in the general area include the Drakensberg Foothill Moist Grassland (Gs10) and Eastern Valley Bushveld (SVs6) vegetation types which are traversed by the road at the northern and southwestern extents respectively. The Drakensberg Foothill Moist Grassland, also part of the Sub-Escapement Grassland Group of the Grassland Biome, occurs at altitudes of 880 – 1860m on moderately rolling and/or mountainous areas. The Eastern Valley Bushveld is associated with the Savanna Biome and is typically associated with deeply incised river valleys at altitudes of between 100-1000m: in this case, the Mzimtlava River which passes north-south to the west of Mount Ayliff. The Eastern Valley Bushveld comprises semi-deciduous savanna woodlands in a mosaic with thickets, often succulent and dominated by species of Euphorbia and Aloe.

[2] Mucina, L & Rutherford, M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity institute, Pretoria.

In terms of conservation status, the East Griqualand Grassland is described as Vulnerable and has generally been subject to transformation for cultivation, plantations and urban sprawl. The conservation status of the Drakensberg Foothill Moist Grassland and Eastern Valley Bushveld is described as Least Threatened. All the vegetation types are subject to pressures from cultivation, plantations and urban sprawl.

3.5 Fauna

Due to habitat transformation and degradation, as well as the presence of domestic livestock and human habitation in the study area, the indigenous fauna is likely to be restricted to those species which are largely invulnerable to human pressures, such as common bird species, small mammals and reptiles. Considering that the work will generally take place within the existing roads reserve, it is highly unlikely that any species of special concern will be negatively impacted.

3.6 Existing Land-use and Tenure

The existing land use along the route is typical of the former Transkei region on the Eastern Cape Province, consisting of rural villages and subsistence stock and crop farming. The majority of land is covered by dispersed, low-density traditional settlements, with the exception of some areas around the urban centre of Mount Ayliff

Crop farming is primarily maize while goats, sheep and cattle are grazed throughout the area. The population is mainly concentrated in a number of rural villages located along the N2 and along the connecting district and rural roads. Landuse practices have resulted in the general degradation of the natural environment – grassland composition has been transformed to largely unpalatable species through overgrazing. High population pressure, combined with vulnerable soils, has led to wide-scale sheet and gully erosion, which is a prominent feature of the area.

The majority of the study area is state land falling under the local tribal authority which is responsible for the allocation of homesteads and agricultural land to the community members.

3.7 Local Economic and Social Structure

Information provided in this section is taken largely from the Umzimvubu Local Municipality: Draft Integrated Development Plan Review (2009/2010).

According to the 2007 community survey conducted by Statistics South Africa, the total population for Eastern Cape Province is 6,527,746, of which 220,636 occur within the ULM. The average population density of the ULM is 88 people per square kilometre. The population is predominantly female, constituting 53% of the population, with African people constituting 99.8% of the population. 74% of the population is under 35 years of age, with 42.8 between the age of 0 and 14 years.

The income levels within the municipality are very low, with 72.1% of the economically active population not generating an income at all. Only 7.3% of the economically active population have an income of more than R1600.00 per month. Poverty levels within the ULM are 81.1%, which is higher than the provincial norm. High poverty levels imply a high dependency on social assistance in the form of grants. 31.3% of the municipality's population are dependant on social grants.

A number of small trading stores service the area. Commercial activities are limited to Mount Ayliff and Kokstad in the north, as well as numerous small administrative centres.

3.8 Cultural Heritage

A Heritage Impact Assessment was undertaken by eThembeni Cultural Heritage consultants in keeping with the requirements of the National Heritage Resources Act, Act No 25 of 1999. A copy of the HIA is included in Appendix B.

The survey was restricted largely to the land which lies within the current N2 road reserve as it is within this area that any disturbance will take place as a result of the upgrade. In addition, all of the potential materials sources (borrowpits) were surveyed as per the requirements of the Department of Minerals and Energy.

No historical settlements, geological sites of scientific or cultural importance, archaeological or palaeontological sites, graves or burial grounds were identified within the affected area.

The Heritage Impact Assessment has been forwarded to the South African Heritage Resources Agency for their information. No response has been received to date.

3.9 Visual Aspects

From a visual and aesthetic perspective, the study area is typical of the N2 corridor through the former Transkei region of the Eastern Cape. The broken topography with deeply incised river valleys, set against a backdrop of mountains contributes to a generally pleasing visual impression, marred somewhat by the widespread sheet and gully erosion and poor quality of the natural veldt.

Borrowpits "New Cutting 40" and "New Cutting 50" are located immediately adjacent to, and clearly visible from, the N2. These are both existing borrowpits, although "New Cutting 40" has been more fully developed than "New Cutting 50". "BP New 1" is located on the outskirts of Mount Ayliff and is highly visible from the R102. The remaining two borrowpits are located adjacent to existing rural access roads.

As a general comment, the borrowpits which have traditionally been used for road maintenance, have never undergone rehabilitation. As such they have been left with steep to vertical exposed faces, piles of topsoil or overburden and, in some cases, shallow dams forming at their base. They have, in some cases, become eroded and invaded by a variety of alien invader vegetation,

exacerbating their visual impact. These detract significantly from the scenic quality of the area and measures should be taken to close and rehabilitate all of the mining out sites, as well as to improve remaining viable sources through responsible mining and appropriate rehabilitation.

Individual borrowpit sheets, which include a description of the conditions at each site and assessment of potential "fatal flaws" are provided in Tables 3.3 to 3.7. Photographs of each of the sites are provided in Figures 3.1 – 3.5.

Table 3.3 Borrowpit Information Sheet: BP NEW 1

PROJECT: N2 – NGCWELENI RIVER TO BROOKES NEK

INITIAL ENVIRONMENTAL SURVEY

General description:

This is a large existing shale borrowpit which falls within the boundaries of the Mount Ayliff municipal area. The borrowpit has been used extensively in the past and has a high back face. It is used as a dumping ground for rubble. It is in close proximity to a school / training centre

Borrowpit number:	**Road:**	**Start:**	**Approx km:**
BP New 1	N2	39km	1.2km off the N2 at Mount Ayliff
LHS/RHS:	**Co-ordinate:**	**Material type:**	**Date:**
LHS	30° 48.131' S 29° 22.607' E	Shale	25/02/2010
Height:	**Extent:**	**Access road:**	**Photo numbers:**
+/- 10m	150m x 150m = 2.2ha	R102	P225006 – P225007

PHOTOGRAPH	**RISK ASSESSMENT / COMMENT**
	Located on the outskirts of Mount Ayliff, close to a school / training centre. This borrowpit could, however, be extended in a direction away from this facility. The high back face is currently a safety risk, especially since the borrowpit is not fenced. The BP has not been rehabilitated and is being used as a dumping ground for rubble. It currently presents an eyesore.

ENVIRONMENTAL CONSIDERATIONS :

Distance to nearest road:	**Distance to nearest river:**	**Vegetation type:**	**Topography:**
Right on the T102	>400m	Degraded grasslands	Gently sloping
Landuse:	**Distance to nearest building:**	**Percent vegetation cover:**	**Water inside:**
Grazing / municipal borrowpit and dumping ground	+/- 40m	<10% within the BP	No

FATAL FLAW:

There is no fatal flaw. This is an existing borrowpit which has not been rehabilitated. It is essential, however, to consult with the municipality regarding the use of this borrowpit. Care will need to be taken during operation to minimise the impact on the neighbouring sensitive landuses and blasting and crushing should be avoided if possible.

Table 3.4 Borrowpit Information Sheet: BP98-1

PROJECT: N2 – NGCWELENI RIVER TO BROOKES NEK

INITIAL ENVIRONMENTAL SURVEY

General description:

This is a small existing shale borrowpit located immediately adjacent to the gravel access road, roughly 1.2km from the N2. There are no houses surrounding it and it is more than 300m from the nearest drainage line. It is a relatively well established site which appears to have been mined to bedrock. Some shaping of the back face appears to have taken place although to rehabilitation has been undertaken.

Borrowpit number:	Road:	Start:	Approx km:
BP 98-1	N2	39km	44km
LHS/RHS:	**Co-ordinate:**	**Material type:**	**Date:**
RHS	30° 47.070' S 29° 21.548' E	Shale	25/02/2010
Height:	**Extent:**	**Access road:**	**Photo numbers:**
+/- 4m	80m x 1000m = 0.8ha	1.2km along gravel road	P225008 – P2250011

PHOTOGRAPH	RISK ASSESSMENT / COMMENT
	Located on the outskirts of Mount Ayliff, close to a school / training centre. This borrowpit could, however, be extended in a direction away from this facility. The high back face is currently a safety risk, especially since the borrowpit is not fenced. The BP has not been rehabilitated and is being used as a dumping ground for rubble. It currently presents an eyesore.

ENVIRONMENTAL CONSIDERATIONS :

Distance to nearest road:	Distance to nearest river:	Vegetation type:	Topography:
Right on the road	>300m	Degraded grasslands	Gently sloping
Landuse:	**Distance to nearest building:**	**Percent vegetation cover:**	**Water inside:**
Grazing / borrowpit	>400m	<10% within the BP	No

FATAL FLAW:

There is no fatal flaw. This is an existing borrowpit which has not been rehabilitated.

Table 3.5 Borrowpit Information Sheet: BP New Cutting 40

PROJECT: N2 – NGCWELENI RIVER TO BROOKES NEK

INITIAL ENVIRONMENTAL SURVEY

General description:

This is a large unsightly borrowpit located immediately adjacent to the N2 and is highly visible from the road. There are steep rocky faces, although the base of the borrowpit is vegetated. It is backed by a dolerite rocky outcrop with a profusion of aloes.

Borrowpit number:	**Road:**	**Start:**	**Approx km:**
New Cutting 40	N2	39km	45km
LHS/RHS:	**Co-ordinate:**	**Material type:**	**Date:**
LHS	30° 47.046'S 29° 22.227'E	Dolerite	25/02/2010
Height:	**Extent:**	**Access road:**	**Photo numbers:**
+/- 10m	200m x 1000m = 2ha	Right on the N2	P225012 – P2250016

PHOTOGRAPH	**RISK ASSESSMENT / COMMENT**
	This is a large, unsightly borrowpit located right on the N2. The high vertical back face presents a safety risk particularly since the borrowpit is not fenced. There are, however, no houses located in close proximity to the BP. As a dolerite outcrop, the vegetation is different to the surrounding grasslands, and there is a profusion of aloes scattered across the BP.

ENVIRONMENTAL CONSIDERATIONS :

Distance to nearest road:	**Distance to nearest river:**	**Vegetation type:**	**Topography:**
Right on the N2	+/- 100m	Grassland with aloes on rocky outcrop	Side slope of an outcrop
Landuse:	**Distance to nearest building:**	**Percent vegetation cover:**	**Water inside:**
Grazing / borrowpit	>500m	100% on the base of the BP	No

FATAL FLAW:

There is no fatal flaw. This is an existing borrowpit which has not been rehabilitated.

Table 3.6 Borrowpit Information Sheet: BP New Cutting 50

PROJECT: N2 – NGCWELENI RIVER TO BROOKES NEK

INITIAL ENVIRONMENTAL SURVEY

General description:

This is a large shallow borrowpit which covers two distinct mining areas. There is evidence of some erosion taking place within the BP. Much of the base is bare exposed rock.

Borrowpit number:	Road:	Start:	Approx km:
BP New 50	N2	39km	50km
LHS/RHS:	**Co-ordinate:**	**Material type:**	**Date:**
LHS	30° 45.730'S 29° 24.325'E	Shale and Dolerite	25/02/2010
Height:	**Extent:**	**Access road:**	**Photo numbers:**
+/- 3m	150m x 1000m = 1.5ha	Right on the N2	P225017 – P2250019

PHOTOGRAPH	RISK ASSESSMENT / COMMENT
	This is a large shallow borrowpit, with much of the base exposed rock. The greatest risk associated with this borrowpit is erosion and has already been erosion caused, or exacerbated by runoff from within the base of the BP. There are no houses located in close proximity to the BP.

ENVIRONMENTAL CONSIDERATIONS :

Distance to nearest road:	Distance to nearest river:	Vegetation type:	Topography:
Right on the N2	>100m	Degraded grasslands	Gentle slope
Landuse:	**Distance to nearest building:**	**Percent vegetation cover:**	**Water inside:**
Grazing	+/- 100m across the N2	<20%	No

FATAL FLAW:

There is no fatal flaw. This is an existing borrowpit which has not been rehabilitated.

Table 3.7 Borrowpit Information Sheet: BP443

PROJECT: N2 – NGCWELENI RIVER TO BROOKES NEK

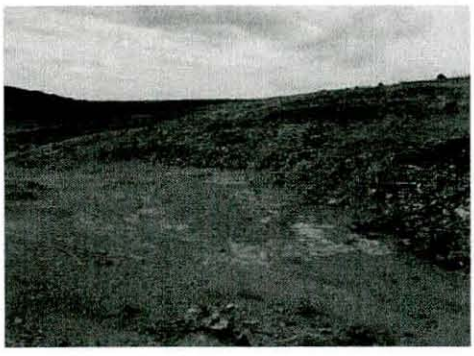
INITIAL ENVIRONMENTAL SURVEY

General description:

This is an existing borrowpit, located off the main route, accessible by gravel roads. This is a small, shallow shale borrowpit with houses located within 200m.

Borrowpit number:	Road:	Start:	Approx km:
443-1	N2 and Gravel access road	39km	55km
LHS/RHS:	**Co-ordinate:**	**Material type:**	**Date:**
RHS	43° 42.557' S 29° 23.633' E	Shale	25/02/2010
Height:	**Extent:**	**Access road:**	**Photo numbers:**
+/- 1m high	100m x 80m = 0.8ha	6km along gravel access road	P225001 – P225004

PHOTOGRAPH



RISK ASSESSMENT / COMMENT

Located relatively close to households, although may still be used. Need a buffer of at least 50m unless houses are to be relocated (unlikely).

Soil is highly erodible as seen in the erosion dongas below the site.

Care would need to be taken to avoid exacerbating these dongas through the mining of this site.

Access is through a rural area along an existing gravel road. Will be some impact of dust from vehicles.

ENVIRONMENTAL CONSIDERATIONS :

Distance to nearest road:	Distance to nearest river:	Vegetation type:	Topography:
Right on the road	>500m	Degraded grasslands	Gently sloping
Landuse:	**Distance to nearest building:**	**Percent vegetation cover:**	**Water inside:**
Grazing	+/- 100m	<10% within the BP	No

FATAL FLAW:

There is no fatal flaw. This is an existing borrowpit which has not been rehabilitated.

Figure 3.1

Panoramic Photo and Google Earth image of BP New 1

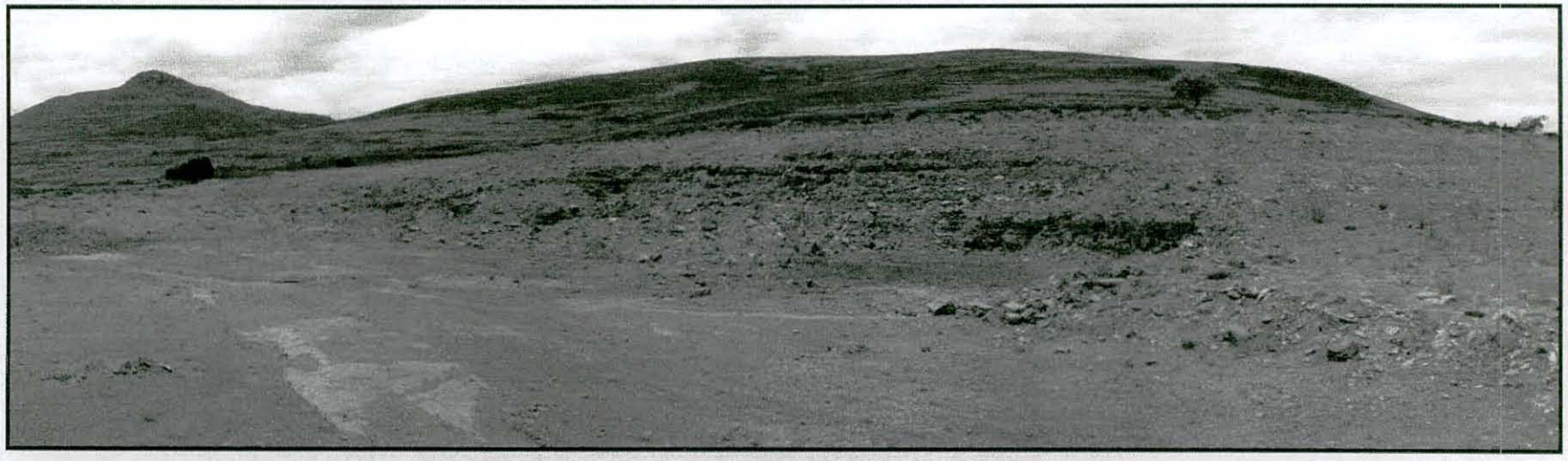


Figure 3.2

Panoramic Photo and Google Earth image of BP 98-1

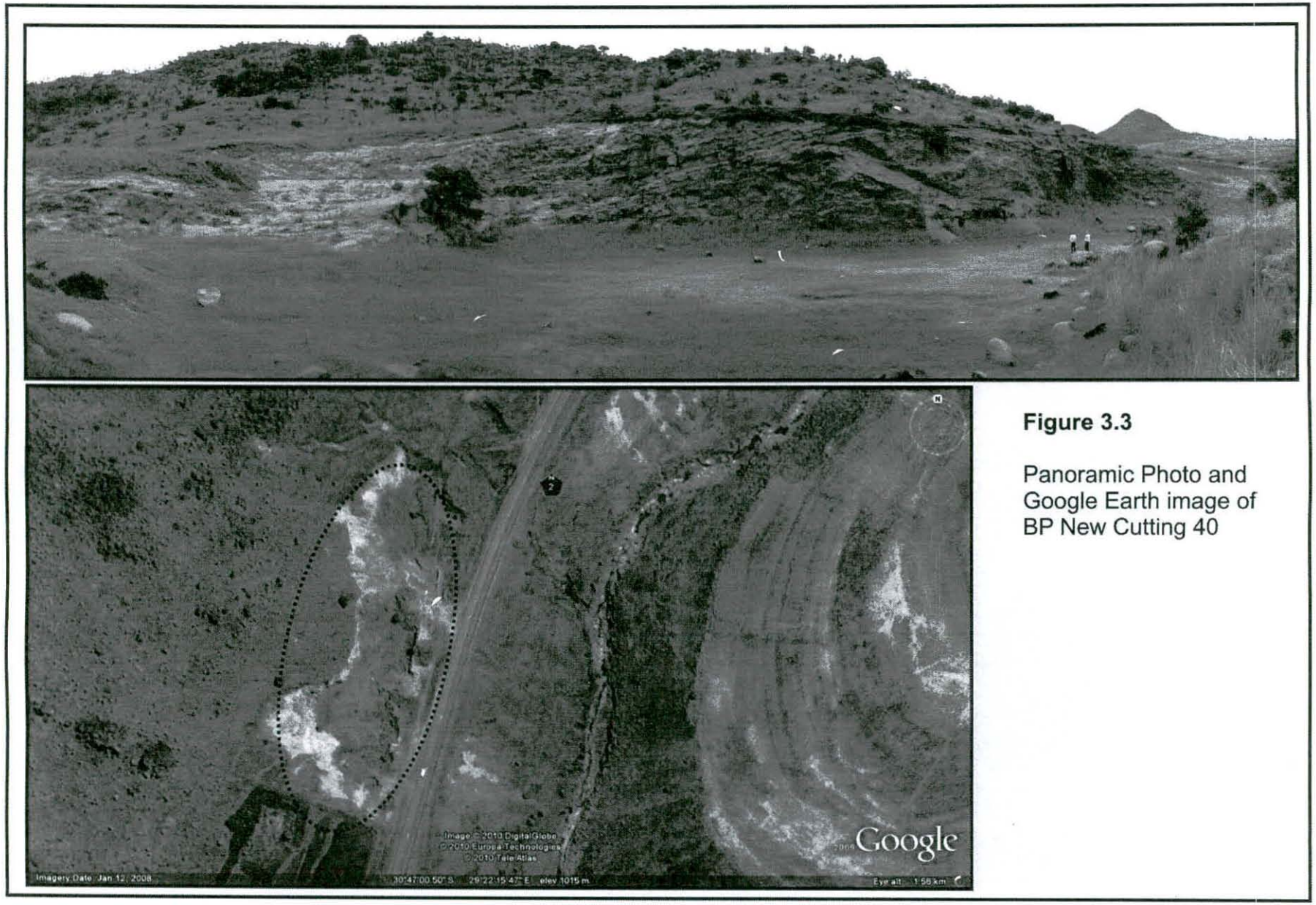


Figure 3.3

Panoramic Photo and Google Earth image of BP New Cutting 40

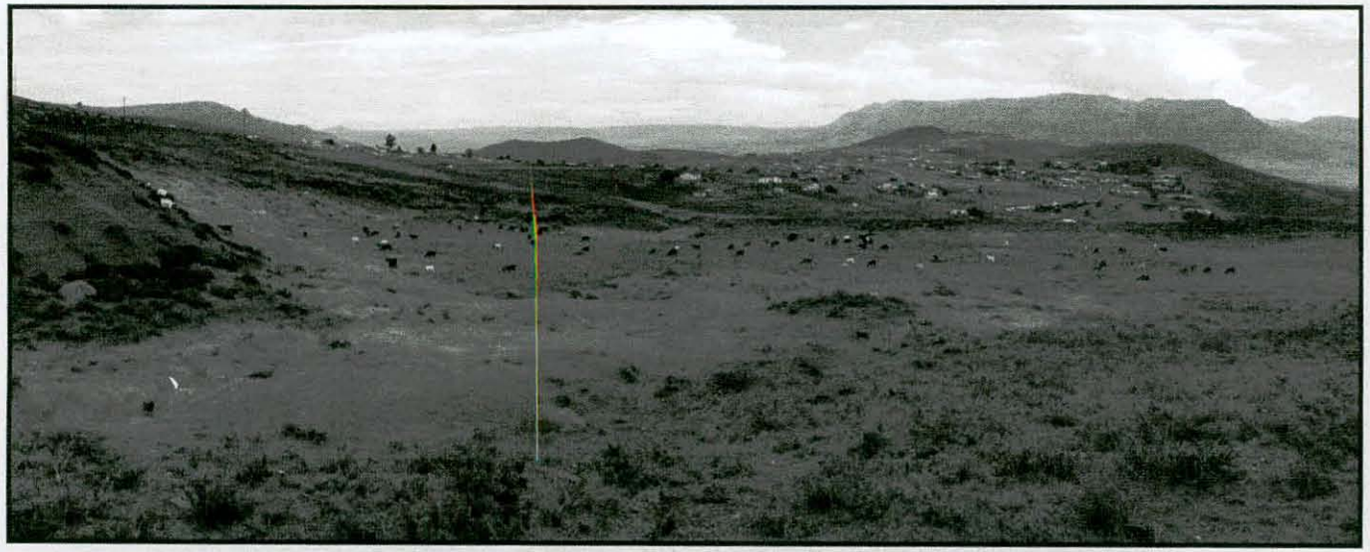


Figure 3.4

Panoramic Photo and Google Earth image of BP New Cutting 50

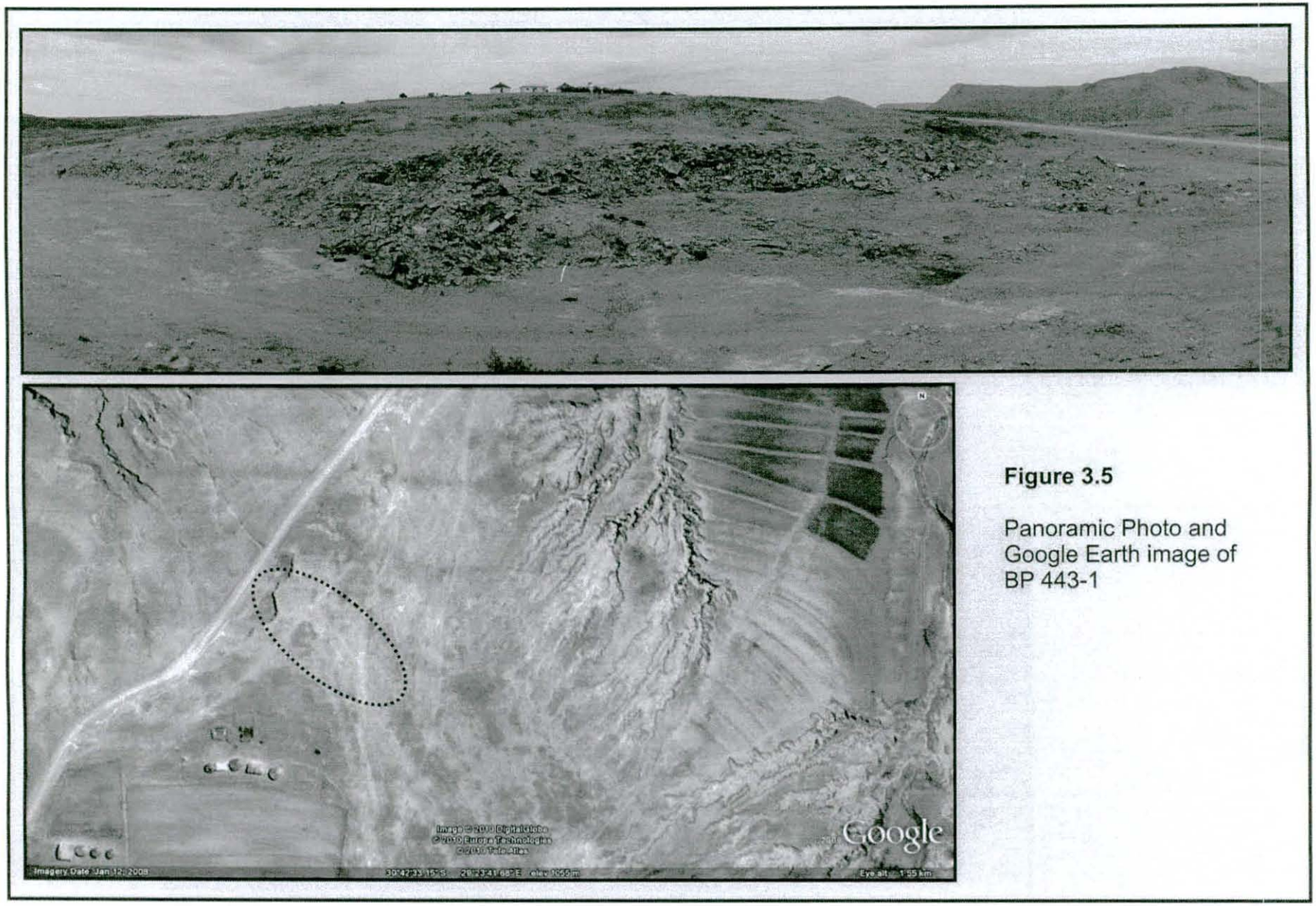


Figure 3.5

Panoramic Photo and Google Earth image of BP 443-1

4 PUBLIC PARTICIPATION

4.1 Introduction

Public Participation is an essential and integral part of the EIA process. It is furthermore a requirement of the DME's permit process for borrowpits. The objectives of Integrated Environmental Management, as defined in Section 23 (2) of the National Environmental Management Act, No 107 of 1998, are *inter alia* to "Ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment." The specific objectives of the Public Participation Process (PPP) are discussed below.

- To ensure that the public are informed of the project and provided with the opportunity to register as interested and affected parties (IAPs) in the EIA Process;
- To provide IAPs with the opportunity to raise any concerns they may have with regards to the project proposal, and to ensure that these concerns are recorded and addressed in the Scoping Study;
- To allow IAPs the opportunity to contribute to the EIA process by identifying potential impacts and means by which negative impacts may be mitigated, or the benefits of a project enhanced.

4.2 Methodology

The methodology undertaken in order to achieve the above objectives was as follows:

- Key stakeholders were identified in consultation with the project team.
- The issue of borrowpits and quarries were discussed in general at the community meetings which are reported on in the Environmental Scoping Report submitted to DEDEA.
- One-on-one consultations were held with community members living in close proximity to the borrowpits. The implications of the mining activities were discussed. Signed forms giving consent to the mining activities are included in APPENDIX D.

4.3 Key Stakeholders

Key stakeholders are identified as follows:

- South African National Roads Agency Limited (Applicant and therefore "Mine Owner")
- Department of Economic Development and Environmental Affairs
- Department of Minerals and Energy

- South African Heritage Resources Agency
- Umzimvubu Local Municipality and Ward Councillors
- Tribal Authority
- Residents of local villages including neighbouring residents.

4.4 Key Issues

Key issues which arose as a result of the public participation, in particular the interviews with the affected and surrounding households are summarised below. Only two of the Borrowpits, viz BP New 1, and BP443-1 are located in close proximity to settlements. Copies of the Scoping Questionnaire are included in Appendix D.

Table 4.1 Summary of Issues Raised by Municipality and IAPs

BP No.	Name	Comment
BP New 1	Mt Ayliff	For the purposes of development, we support this project but as the SGB-Mt Ayliff Hospital J.S.S we have concerns as this borrowpit is a strong hazard to our learners because the previous project could not maintain their rehabilitation plan and the pits were left unattended, they had dams which were deep and our learners were drowning. We reported to our District Municipality and they assisted in trying to close the dams. Our recommendation is can't you fence the pit before using it to avoid similar injuries as stated above.
	Ward 7 Cllr- Cllr Ntsengwane	As a ward Councillor of Ward 7 Umzimvubu LM have no objection to the use of Borrowpit in Mt Ayliff as it is going to benefit our community in terms of Job creation. I only appeal that dongas be filled after use for the purpose of security.
	Lulama Soweni	The Borrowpit can be used and must be rehabilitated.
	Hombakazi Mpetshwa	The Borrowpit can be used for road upgrade.
	Zathiwe Tshavata	The borrowpit must be closed as it is close to my field and there are also graves close by.
	Ntombekhaya Xazonke	Borrowpit can be used.
BP 443-1	Velaphi Mpakumpaku	No Complaints - the borrowpit can be used.
	Macoselela Mpakumpaku	No Complaints - the borrowpit can be used.
	Nontsapho Maqam	Borrowpit can be used.
	Sandile Maqam	No Complaints the borrowpit can be used as we will get employment opportunities.
	Mathile Nogula	Borrowpit can be used. We hope to get jobs in the project.
	Ward 1 Councillor- Cllr Mataka	Have no problem as there is no danger or threat for the community.

5 IMPACT ASSESSMENT

This section is completed in terms of Regulation 50 of the Minerals and Petroleum Resources Development Regulations and provides and assessment of the nature, extent, duration, probability and significance of the identified impacts and benefits.

The objective of the assessment is to identify and assess all significant impacts that may arise from the undertaking of an activity. The findings of the assessments are used to inform the competent authority in their decision as to whether the activity should be authorised, authorised subject to conditions that will mitigate the impacts to within acceptable levels or should be refused.

5.1 EIA Methodology

5.1.1 Overview

This section presents the methodology employed in the identification, prediction and analysis of impacts. The approach to the impact assessment is based the current EIA Regulations which came into effect on the 03/07/2006 in fulfilment of Chapter 5 of NEMA, the guideline documents which are published in support of both the former and the current EIA regulations and the Integrated Environmental Management Information Series publication on Impact Significance (DEAT, 2002). The logical and methodical approach described below, while seemly exhaustive and repetitive, ensures that the assessment is focused and provides the basis for making predictions and value judgements that will ultimately inform the decision of the competent authority.

5.1.2 Scope

The scope of the Impact Assessment includes all activities associated with the proposed development of borrowpits for use on the rehabilitation of the N2. Impacts which may occur during the various phases (pre-construction, construction, operation and maintenance and decommissioning – where relevant) have been identified and assessed.

5.1.3 Impact Identification

An "aspects" based approach has been utilised in the identification of potential impacts. "Environmental Aspects" are the mechanisms by which an activity interacts with the environment. Environmental aspects refer to an element of an activity, product or service which can have a beneficial or adverse impact on the environment. For example, it could involve a discharge, an emission, the consumption or re-use of a material, or noise. A number of environmental aspects have been determined for the proposed operations. These are presented in Table 5.1.

Table 5.1 Environmental Aspects

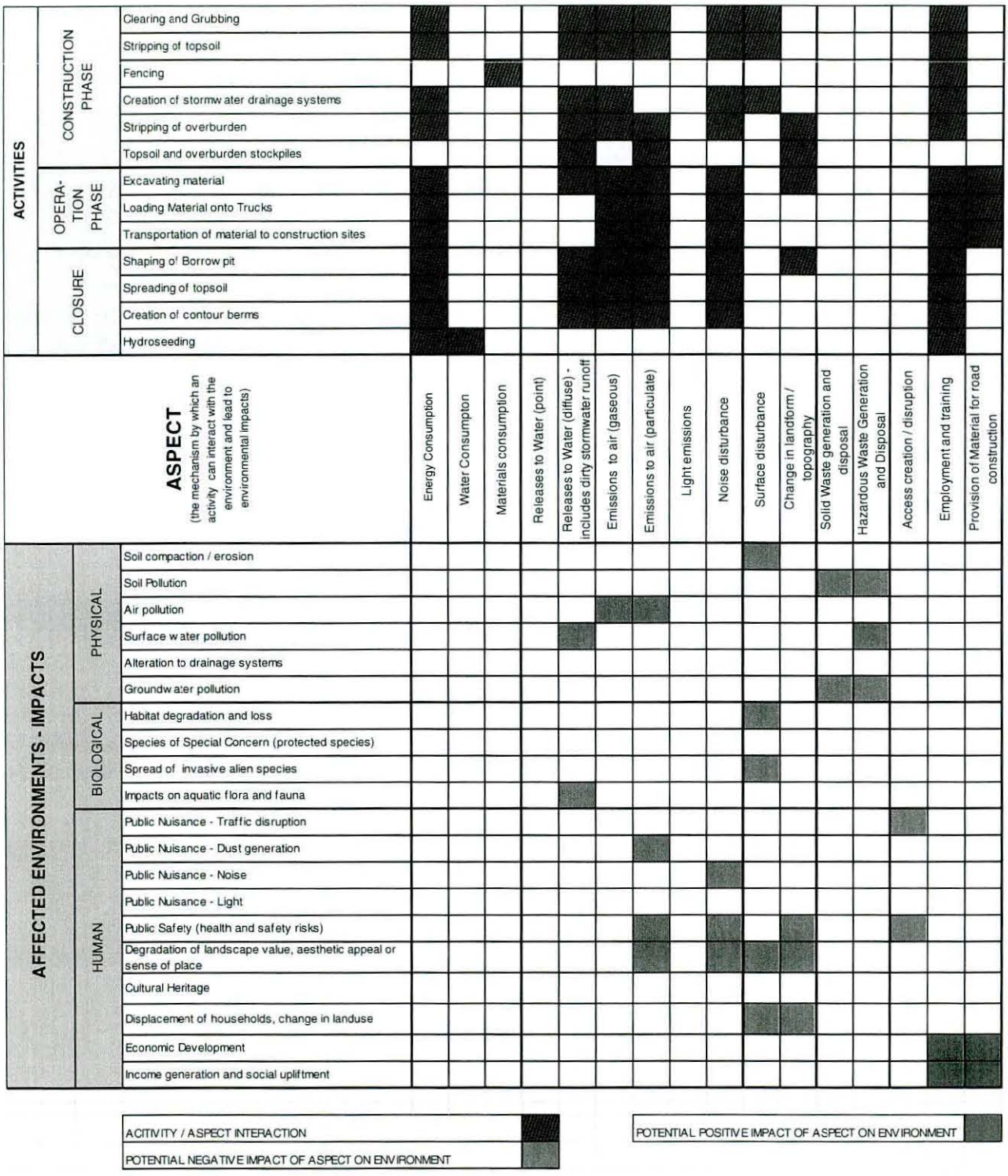
Main Category		Sub-Categories	Example
INPUTS	**Resource Consumption**	Raw Materials Manufactured Products Energy	Diesel
		Water	Water for construction works (dust suppression) Potable water for domestic purposes.
OUTPUTS	**Releases to Water**	Point sources (piped source) Diffuse sources (seepage/run-off)	Stormwater runoff
	Releases to Air	Dust Gasses and fumes	Dust generated from transport (haul roads), stripping, excavating and stockpiling. Gasses and fumes generated from exhaust emissions
	Other Releases	Noise Solid waste Spillages Light Vibrations	Construction noise (blasting, operation of machinery, crushing) Solid waste from staff, Spillages from maintenance activities Vibrations from mining, hauling etc.
Land Transformation		Surface disturbance Topographical change	Removal of vegetation Stripping of topsoil Excavation of material Shaping of borrowpit.
Social Aspects		Employment & Training	Staff Subcontractors
		Changes in Landuse / zoning	Expansion / creation of borrowpits.
		Supply of goods	Supply of road building materials to site.

Environmental "aspects" (or mechanisms) provide the link between activities and impacts. Significant impacts will only result where there is a significant "aspect".

Potential impacts associated with the proposed activities have been identified using activity/aspect/impact matrix (Figure 5.1). The matrix illustrates the interactions between the activities, aspects and the affected environment.

The impact and aspect matrix serves to highlight at a glance the likely consequences of an activity. Some of the interactions are non-significant and therefore require no further investigation in the EIA process. These include energy and water consumption which will occur during construction and operation. Where appropriate, these have been highlighted in the matrices.

Figure 5.1 Aspect and Impact Summary Matrix



5.1.4 Impact Prediction

The methodology of the Impact Prediction is presented below. The results are presented in the Impact Tables which are included in APPENDIX E.

Nature and significance

Once potential impacts have been identified, further investigation is required to predict the nature and significance of an impact. The nature of the impact is essentially the type of impact which may occur from undertaking an activity. The impacts may be positive or negative and may be categorised as being direct (primary), indirect (secondary) or cumulative impacts.

Where significant environmental aspects are present (as indicated in the matrices), significant impacts may result. The final significance of the impact is a function of probability and consequence. The consequence is determined by considering the severity, spatial extent and duration of the impact. The severity of the impact is determined by qualitative or quantitative criteria as well as by community response. Criteria for the ranking of Severity are presented in Table 5.2.

Table 5.2 Criteria for ranking *Severity*

RANK		CRITERIA
NEGATIVE	HIGH	• Substantial, Measurable deterioration, Death, illness or injury • Recommended Level always exceeded • Widespread complaints from community • Complete loss of land capability • Soil alteration resulting in a high level impact in one of the other environments • Disturbance to areas that are pristine, have conservation value or are an important resource to Humans • Destruction of rare or endangered species • Deterioration of water quality/quantity, resulting in a high negative impact on one of the other environments • Is difficult to manage • May require an alternative course of action. • May affect the viability of the project.
	MEDIUM	• Moderate, measurable deterioration and discomfort • Recommended level will occasionally be violated • Widespread complaints from community • Partial loss of land capability • Soil alteration resulting in a moderate impact on one of the other environments • Disturbance of areas that have some conservation value or are of some potential use to humans • Complete change in species variety or prevalence • Deterioration of water quality/quantity, resulting in a moderate negative impact on one of the other environments • May be managed. • Is low or medium only if managed according to a management programme. • Does not affect the viability of the project.

	LOW⁻	• Minor, deterioration, nuisance or minor irritation. Change not measurable • Recommended level will never be violated • Sporadic community complaints • Minor deterioration in land capability • Disturbance of areas that are degraded, have little value or are unimportant to humans as a resource. • Minor changes in species variety or prevalence • Deterioration of water quality/quantity, resulting in a low negative impact on one of the other environments
POSITIVE	LOW⁺	• Minor Improvement in quality • Change not measurable • Sporadic complaints
	MEDIUM⁺	• Moderate improvements • Measurable improvements • Will be within or better than recommended level • No observed reaction from public
	HIGH⁺	• Substantial improvements • Measurable improvements • Will be within or better than recommended level • Favourable publicity

Potential impacts are furthermore assessed according to spatial extent, duration and probability as follows:

Table 5.3 Criteria for ranking Spatial Extent, Duration and Probability

Criteria	Categories	Explanation
Spatial Extent	Site (S)	*Immediate area of activity*
	Local (L)	*Area within 500m of the site.*
	Regional (R)	*Entire municipality, drainage basin, landscape etc*
	National (N)	*South Africa*
Duration	Short-term (S)	*Less than the construction/ operation period*
	Medium Term (M)	*Construction / operation period*
	Long-term (L)	*Less than 2 years post construction / operation*
	Permanent (P)	*Permanent change*
Probability	Unlikely (U)	
	Possible (P)	
	Likely (L)	
	Definite (D)	

5.1.5 Mitigation Potential

The significance rating provided in the impact tables is the significance WITH mitigation and WITHOUT mitigation. Mitigation potential describes the ability to manage or mitigate an impact given the necessary resources. Some impacts, by their very nature are extremely difficult to mitigate, while others may be managed to an acceptable level with the implementation of a sound environmental management plan. Mitigation potential is described in Table 5.4.

Table 5.4 Mitigation Potential

Mitigation potential	Description	Example
HIGH:	• The impact is relatively easy and cheap to manage. Specialized expertise or equipment is generally not required. • The nature of the impact is understood and may be mitigated through the implementation of a managed plan, with regular monitoring undertaken to ensure that any negative consequences remain within acceptable limits. • The significance of the impact after mitigation is likely to be LOW to Non-Significant. • These impacts are normally mitigated by "good housekeeping".	Noise Dust Soil contamination from accidental spillages and leakages Litter
MEDIUM:	• Management of this impact requires a higher level of expertise and resources in order to maintain within acceptable levels • The significance of the impact after mitigation is likely to be LOW to MEDIUM depending on the level of management applied. • May not be possible to mitigate the impact entirely – may result in a residual impact (e.g. topographical change)	Visual Impacts Changes to landscape form and functioning Alteration of stream flow patterns Soil Erosion
LOW:	• Will not be possible to mitigate this impact entirely regardless of the expertise and resources applied. • The potential to manage the impact may be beyond the scope of the Project • Management of this impact is not likely to result in a measurable change in the level of significance.	Change of land use

It should be noted that a LOW mitigation potential does not necessarily imply that the impact is highly significant. An impact with a low significance rating may be extremely difficult to mitigate, such as noise generated by earthmoving machinery during construction, while a highly significant impact may be relatively simple to mitigate with the implementation of the correct management measures.

Concern naturally arises when an impact with a HIGH significance has a LOW Mitigation potential. In some instances this may present a fatal flaw, and motivation for rejecting the development.

The detailed impact assessment is provided in the tables included in APPENDIX E. These tables are informed by the impact matrix and provide a description of the affected environment, the aspect responsible for the impact, the characteristics of the impact (nature, severity, duration, extent and probability), the overall significance rating (with and without mitigation) and reference to the applicable mitigation measures. The mitigation measures are discussed in detail in Section 6.

A summary of the impacts which will arise during the various phases of the mining operations is provided below.

5.2 Borrowpit New 1

Borrowpit New 1 is a large existing borrowpit which has been used by the municipality over the year to source gravel for road maintenance and building purposes. It appears as if there is no valid permit for this borrowpit. It has a steep back face and a large amount of rubble has been dumped in the base. The borrowpit is located on the outskirts of Mount Ayliff in close proximity to a school. The borrowpit is not fenced.

The use of this borrowpit will involve the extension of the back face into the hillside in the direction away from the town and the school. No structures will be affected. The distance between the active mining area and the school will be > 50m. The vegetation affected is degraded grasslands.

During construction and operation of the borrowpit, the primary impacts will be noise and dust, both of which may be controlled to some extent by the implementation of the measures included in the EMP. Provided that the borrowpit is mined and rehabilitated according to the management and closure plans described in this report, the final outcome should be an improvement on the current site, which presents a safety hazard to the community as well as being unsightly.

5.3 Borrowpit 99-1

Borrowpit 99-1 is a relatively small, shallow borrowpit located roughly 1.6km off the N2, along a gravel access road. The borrowpit is located well away from any drainage lines and households. The use of this borrowpit is unlikely to impact negatively on water quality or on human settlements. The borrowpit will largely be mined within the existing foot print, with some expansion in the direction away from the road. The resulting excavation will be a shallow pit which will be shaped and topsoiled.

5.4 Borrowpit New Cutting 40

This is a large and highly visible borrowpit located immediately adjacent to the N2. It consists of a flat base with steep, near vertical backfaces, and is backed by a dolerite "koppie". As the major source of weathered dolerite, it is likely that this borrowpit will be mined extensively.

As a result of its proximity to the N2, the use of this site will result in a high visual impact during construction. It will be necessary to extend the borrowpit back into the koppie, and in doing so will lose some vegetation cover. It is recommended that the any aloes which need to be removed are replanted in the areas surrounding the borrowpit.

The borrowpit is located well away from any settlements or drainage lines and provided that the specifications included in the EMP are properly implemented and the mining activities carefully

monitored, the impact on the biophysical and social environment resulting from the construction and operation phases will be minor.

Provided that the borrowpit is mined and rehabilitated according to the management and closure plans described in this report, the final outcome should be an improvement on the current site, which presents a safety hazard to the community as well as being unsightly.

5.5 Borrowpit New Cutting 45

This is an extensive, shallow borrowpit located adjacent to, but below, the level of the N2, at roughly km45. This borrowpit was last used some years ago and left in a largely un-rehabilitated state. Erosion has occurred at the lower end of the borrowpit where water drains into the nearby donga.

It is proposed that material be mined from the upper section, leaving a shallow excavation which will be relatively easy to shape and rehabilitate. The site is located more than 80m from any houses. There will be a visual impact during operation, but this will be mitigated on closure.

Provided that the borrowpit is mined and rehabilitated according to the management and closure plans described in this report, the final outcome should be an improvement on the current site.

5.6 Borrowpit 443

BP 443 is a small, shallow excavation located roughly 50m from a household. There is a potential to impact negatively on the neighbours as a result of noise and dust produced by the mining operations. Measures outlined in the EMP to control these aspects of the operation will must be strictly enforced.

As evidenced in the surrounding landscape, the soil is highly erodible. There are a number of deep dongas extending very close to the proposed site. Care will need to be taken to minimise the potential for soil erosion through proper stormwater control.

5.7 Benefits

The development of these borrowpits will supply road construction material for the upgrade of Section 20 of the N2 which will have obvious and far reaching benefits for the local community, in the short term from job creation, and to the road using public in general.

The use of these borrowpits will allow for the rehabilitation of the sites which currently present a significant visual impact. This applies particularly to BP new 1 and BP New Cutting 40. The concerns expressed by the community in terms of safety hazards presented by the steep faces and by "dams" will essentially be addressed by the rehabilitation of these sites.

6 ENVIRONMENTAL MANAGEMENT PLAN

The mitigation measures which will apply during the Site Establishment, Operation and Rehabilitation phases are provided in the following Sections. An "aspects based" approach has been adopted to the mitigation measures as the impacts may be more effectively controlled through the management of the aspects, eg the impact on surface water quality may be effectively mitigated through the management of surface water runoff, discharge of water from a point source and from effective hazardous waste management.

Overall objectives and specific targets for the management of the various aspects are provided. Activities which are responsible for the aspect are listed and the likely impact summarised. The responsibility for the implementation of the mitigation measures is indicated and any institutional and training requirements outlined. Finally, requirements for monitoring are provided.

The Mitigation Measures are grouped under the following aspects:

- Energy consumption
- Water consumption
- Releases to Water (point)
- Releases to Water: Diffuse (Stormwater Management)
- Emissions to Air
- Light Emissions
- Noise Disturbance
- Surface Disturbance (Soil Compaction and Loss)
- Surface Disturbance (Vegetation Degradation and Loss)
- Surface Disturbance (Cultural Heritage)
- Surface Disturbance (Land use and Productivity)
- Surface Disturbance and Changes in Landform and Topography (Aesthetics)
- Changes in Landform and Topography (Public Health and Safety)
- Solid Waste Generation and Disposal
- Access Creation and Disruption
- Procurement of Goods and Services
- Employment and Training
- Additional Measures, which include
    - Community Relations
    - Staff Safety and Education
    - Work Stoppages
    - Existing Services and Infrastructure

NOTE: Although the current report deals exclusively with the development and use of borrowpits, provision has been made in the EMP for all impacts and aspects associated with the mining operations, including the servicing of vehicles, storage of fuel, accommodation of staff etc.

6.1 Energy Consumption	
Objectives:	To utilise renewable resources SUSTAINABLY, and non-renewable resources WISELY. To ensure that the project does not impact negatively on the availability of power for other users.
Targets:	To use "clean" sources of power where possible, eg solar power. To minimise the amount of power utilised on site and to guard against the unnecessary wastage of power.
Activities:	All mining activities using either diesel.
Impact:	Greenhouses gasses produced from the production of power from fossil fuels. The depletion of non-renewable materials in the generation of power and processing of diesel.
Mitigation Measures:	Alternative energy sources (such as solar power) to be used where practical. Energy saving measures (eg the use of energy saving globes) to be implemented on site. All vehicles are to be kept in good working order to minimise fuel consumption.
Responsibility:	Site Agent Operators
Permit Requirements:	None
Institutional and Training requirements:	Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits. Conservation of energy (electricity and diesel) to form part of the environmental awareness training programme.
Monitoring:	Energy conservation will be monitored during the environmental performance assessments.

6.2 Water Consumption	
Objectives:	To utilise renewable resources SUSTAINABLY, and non-renewable resources WISELY. To ensure that the project does not impact negatively on the availability of water for other users, including the environment. To ensure that the project does not impact on the conservation status of the ecosystems and the health and welfare of surrounding water users.
Targets:	Recycle as much of the process water as possible and prevent wastage and/or loss through the proper maintenance of machinery. Ensure that all water which is discharged off site either as stormwater meets the DWA standards for water quality.
Activities:	• Dust suppression • Hydroseeding
Impact:	The depletion of potable and process water sources to the detriment of other users and the environment.
Mitigation Measure:	Recycling of water must take place where possible. Minimise the use of water on site on site. Water abstraction from dams, streams, rivers etc is not permitted without obtaining the necessary authorisation from DWA.
Responsibility:	Site Agent
Permit Requirements:	A water abstraction permit will be required from DWA. Obtaining this permit is the contractor's responsibility and should be applied for as soon as the contract is awarded.
Institutional and Training requirements:	Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits. Water conservation and recycling will form part of the environmental awareness training programme.
Monitoring:	Water consumption is to be monitored by mine staff on an ongoing basis and reported to the EEA. The implementation and efficacy of the water conservation policy and plan will be assessed as part of the biannual performance assessments.

6.3 Releases to Water (Point)	
Objectives:	To ensure that the project does not impact negatively on the ground and surface water quality and therefore the health of other users, and of the environment. To ensure that any polluted water is treated and discharged in accordance with the legislation with negligible risk to the health of other users and the environment. To prevent the loss of soil through erosion caused by point source discharge.
Targets:	All water which is discharged on or off site either as stormwater, wastewater or process water must meet the DWA standards for water quality. The discharge of water from point sources must not result in the pollution or loss of soils through erosion.
Activities:	• Office Block (ablutions, waste water from kitchens etc) • Maintenance of plant and machinery (washbays) • Batching of Cement at the construction camp
Impact:	The contamination of soils through discharge of polluted water. The pollution of surface and groundwater sources through the discharge or polluted water.
Mitigation Measure:	Potential point sources of pollution include: ablutions, waste water from kitchens etc, washbays, workshops and cement mixers (construction) Onsite ablutions at the site office are to be discharged into French drains/soakaways. Temporary work areas (eg during the construction phase) are to be equipped with chemical porta-loos, which should be emptied on a regular basis and the contents disposed of at the sewage treatment works in Mount Ayliff. All temporary / portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause. All toilets are to be maintained in a clean, sanitary condition. The Site Agent shall ensure that no spillage occurs when the toilets are cleaned, or emptied, and that the contents are properly stored and removed from Site. Discharge of waste from toilets into the environment, and burial of waste, is strictly prohibited. Refueling activities should not be conducted where runoff could carry contaminants into drainage pathways (including stormwater drains/trenches and sewers). Washing of vehicles must be kept to a minimum and must only take place in a designated washbay area on an impervious surface which drains into an oil sump. Concrete mixers to be located on an impermeable surface. A lined settlement pond to be established below the plant to contain any contaminated run-off. Cleaning out of concrete mixers and trucks must take place on a properly

	designated site with a sump that can be cleaned out. Washing, whether of the person, or of personal effects, and acts of excretion and urination, are strictly prohibited other than at the facilities provided. All water requiring discharge, including wastewater from kitchen and ablution facilities, should be led into the soakaway system. No wastewater shall be discharged into rivers or streams.
Responsibility:	Site Agent
Permit Requirements:	No permits are required for the discharge of waste water via the soakaway system as the quantities are expected to be relatively low.
Institutional and Training requirements:	The prevention of pollution through the discharge of contaminated water will form part of the **Environmental Awareness Programme**. Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	Possible pollution of soil or water bodies will be monitored by the EEA during the monthly site inspections and reported to the DME on a biannual basis as part of the environmental performance assessments.

6.4 Releases to Water: Diffuse (Stormwater Management)	
Objectives:	To ensure that the project does not impact negatively on the ground and surface water quality and therefore the health of other users, and of the environment. To ensure that all contaminated water (eg sewage) is treated and discharged in accordance with the legislation with negligible risk to the health of other users and the environment. To prevent the loss of soil through erosion caused by stormwater runoff,
Targets:	Provide for appropriate stormwater control, protecting exposed areas from stormwater runoff and directing and dissipating stormwater in such a manner as to prevent erosion.
Activities:	• Clearing and Grubbing • Stripping of topsoil • Creation of platforms • Creation of stormwater drainage systems • Excavation of Material • Stockpiling of topsoil and overburden • Rehabilitation measures.
Impact:	The overland flow of stormwater may result in the erosion and loss of soil, the transformation of the surface through gully and sheet erosion and the contamination of surface water bodies through sediment ingress and pollution with consequent impacts on the aquatic flora and fauna.

Mitigation Measure:	All excess run off water, generated during mining operations, must be captured in a sediment trap constructed below the low point of the borrowpit. These sediment traps must be monitored to ensure that they remain effective. Once the trap becomes 50% full, then it must be emptied and the captured material must be stored within the stockpile area. A diversion berm must be installed above the mining area to divert clean stormwater runoff away from the mining area. This must constructed on a fall of less than 1:50 to prevent erosion. The stormwater management system must be designed for the worst case, i.e., heavy rainfall and runoff events. No rock, silt, cement, grout, petroleum product, timber, vegetation, domestic waste, or any deleterious substance shall be placed or allowed to disperse into the stormwater system or directly into the drainage lines. Halt construction activity on exposed soil during events of high rainfall intensity and runoff. Minimise vegetation cover removal on all the cleared areas - ie only clear those areas where mining and stockpiling is currently taking place. Water that has been contaminated with suspended solids, like soils and silt, may be released into natural watercourses or stormwater channels. However, all suspended solids shall be removed from water before it is discharged by settling out these solids in settling ponds. Soil erosion shall not be tolerated on the Site. Uncontrolled erosion will cause siltation and pollution of drainage lines and other downstream areas and result in loss of valuable topsoil. The Site Agent should take all reasonable measures to prevent soil erosion and protect areas susceptible to erosion. Erosion prevention measures must be implemented to the satisfaction of the EEA and DME. Areas particularly susceptible to erosion include: • areas stripped of topsoil, and • soil stockpiles. Where erosion does occur, the Site Agent shall reinstate such areas to the satisfaction of the DME and the EEA through the construction of contour berms, cut-off drains, or planting of grass sods / ground cover, as may be necessary. Topsoil that has been washed away shall be replaced.
Responsibility:	Site Agent
Permit Requirements:	There are no permit requirements for the control of erosion and stormwater discharge.
Institutional and Training requirements:	There are no specific institutional or training requirements for the control of stormwater. Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	Areas affected by mining related activities must be monitored regularly for evidence of erosion.

	Results will be reported in the Environmental Performance Assessment Reports submitted to DME.

6.5 Emissions to Air	
Objectives:	To reduce dust emissions to levels that are acceptable in terms of the following aspects: nuisance, road hazards, aesthetics and health hazards. To minimise the risk to human health through the minimisation of emissions and the provision of protective equipment.
Targets:	Identify all potential sources of dust. To ensure that dust emissions do not exceed the legal standards and where these standards are exceeded, to take the necessary precautionary measures to protect the health of the exposed persons.
Activities:	• Construction and upgrade or access and haul roads • Clearing and Grubbing • Stripping of topsoil • Stripping of overburden • Creation of stormwater drainage systems • Stockpiling of topsoil and overburden • Excavation and loading of material • Transportation of material off site • Rehabilitation measures.
Impact:	Excessive exposure to dust may impact on human health. Lower levels are primarily of a nuisance value. Dust is regarded as a nuisance when it reduces visibility, soils private property, reduces the palatability of grazing grasses and may retard plant growth. It is also aesthetically displeasing.
Mitigation Measure:	Minimise areas of exposed soil by only clearing those areas where mining or stockpiling is activity taking place and by revegetating mining and stockpiling areas progressively where possible. Fine material must be kept to a minimum by practicing good housekeeping. All fines should be removed to the spoils area and covered with overburden and vegetated accordingly. Employ dust suppression measures on dry dusty surfaces. This may involve the spraying of water from water carts. Ensure fine materials being stored or transported are covered with tarps or equivalent material. Ensure that the district road accessing the site is maintained in a good condition with a suitable gravel surface. Heavy trucks may lead to the pulverizing of the gravel and increase the amount of dust produced. Operators exposed to high levels of dust (including cement dust) must be equipped with dust masks. This is a heath and safety requirement and must be

	managed via the mine's **Health and Safety Plan**. Ensure all equipment is in good operating order, and fitted with standard air emission control devices. Minimise idling of engines at all times.
Responsibility:	Site Agent.
Permit Requirements:	No permits are required in connection with this aspect.
Institutional and Training requirements:	The minimisation of dust and gaseous emissions and the use of protective equipment will form part of the health, safety and environmental awareness and training programmes. Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	Dust will be monitored by the EEA and the Health and Safety Auditor during the monthly site inspections.

6.6 Noise Disturbance	
Objectives:	To minimise the risk to human health through the minimisation of noise and the provision of protective equipment.
Targets:	Identify all potential sources of noise. Take the necessary measures to ensure that noise does not exceed the legal standards and where these standards are exceeded, to take the necessary precautionary measures to protect the health of the exposed persons.
Activities:	• All Mining Activities (operation of machinery etc) • Transportation of material.
Impact:	Excessive exposure to high level noise may result in temporary or permanent damage to hearing. Exposure to lower noise levels (eg from surrounding residential areas) may be of nuisance value (irritation).
Mitigation Measures:	No nighttime activities are to take place at the BPs until such time as these activities have been proven, through regular monitoring, not to constitute a noise disturbance. All activities with high noise levels should be restricted to daylight hours on weekdays. Working hours on Saturdays should be from 06h00-13h00. All operators exposed to noise in excess of 85dB will be equipped with hearing protection devices.

	The Site Agent shall take the necessary measures to limit noise levels on site to within legally acceptable limits. The regulations framed under the Machinery and Occupational Safety Act, 1983 (Act No. 6 of 1983) apply. All vehicles to be kept in a serviceable condition and fitted with silencers. Any warning hooters be so designed that they are only effective in the area of concern. Where possible physical barriers are to be placed between noise sources and the community. All compressors and pumps at the beneficiation plant be housed in purpose built structures to minimise noise transmission.
Responsibility:	Site Agent
Permit Requirements:	None
Institutional and Training requirements:	The minimisation of noise and the use of protective equipment will form part of the health, safety and environmental awareness and training programmes. Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	Noise will be monitored by the EEA and the Health and Safety Auditor during the monthly site inspections.

6.7 Surface Disturbance (Soil Compaction and Loss)	
Objectives:	To minimise the disturbance or loss of topsoil and subsoil through limiting the footprint of the operations and/or recovering and protecting soil for use in final rehabilitation of the site.
Targets	To ensure that all activities which might impact negatively on the soils are restricted to the smallest area possible. To ensure that rehabilitation is such that the minimum land with agricultural potential is compromised. To limit soil erosion and consequent degradation of soil and pollution of air and surface water.
Activities:	• Clearing and Grubbing • Stripping of topsoil
Impact:	Compaction of soil may result in the loss of soil viability (ie ability to sustain vegetation. Compacted soils decrease infiltration and increase runoff which increases the risk of erosion.

	Soil may be lost through erosion.
Mitigation Measure:	Topsoil should be viewed as a precious commodity on site. Every effort must be made to preserve topsoil from construction areas, to protect it from loss through erosion and to maintain its viability. Topsoil shall be removed from the following areas no longer than 30 days before activities, in each particular area, begin: • All areas to be mined / excavated; • Areas to be occupied by roads; • Areas for the storage of fuels; • Areas for stockpiling of construction materials; and • Areas for spoiling material. As the mine develops, all existing topsoil and overburden (decomposed rock) must be removed from the designated mining area for that mining phase. ie. avoid leaving extensive patches of bare earth. During site clearing and establishment activities, topsoil shall be excavated to a depth of 150 mm. Topsoil must be placed within the designated topsoil stockpile areas as indicated in the site development plan (refer to **APPENDIX C).** Topsoil stockpiles must be no higher than 1.5m and must be protected from compaction. The topsoil stockpiles must be vegetated using an suitable seed mix which includes fast growth annual species (such as Eragrostis teff) and perennial species. Vegetating the topsoil stockpiles will protect them from erosion and maintain their viability (organic content, seedbank) etc. The topsoil stockpiles shall be clearly demarcated with appropriate signage. Topsoil shall not be mixed with any other material (construction rubble, subsoils etc) and erosion of the topsoil stockpiles must be prevented by placing the stockpiles below the stormwater diversion berms where appropriate. Topsoil should under no circumstances be used to create diversion berms or for general erosion control measures. All overburden (decomposed rock) and subsoil must be stockpiled in the designated areas and protected from erosion by placing them downslope of the stormwater diversion berms. The size of required work areas and campsites must be restricted to the minimum required for efficient and effective work. The minimum amount of vegetation must be removed from the construction sites. Plan for the worst case, that is, for heavy rainfall and runoff events, or high winds. Care must be taken not to introduce alien plant material into the stockpile areas. All disturbed sites must be revegetated and rehabilitated immediately after construction on that site has been completed so as to limit the exposure of the

	disturbed areas to wind and water erosion. Topsoil which is placed on slopes steeper than 1:3 must be protected from erosion through the application of "soilsaver" or some other form of biodegradable geomesh. Should any soil become contaminated by pollutants (eg oil spillages), this must be dug up and removed from site for treatment and/or disposal at a licensed facility. No treatment of contaminated soils (e.g. bioremediation) shall be allowed on site.
Responsibility:	Site Agent
Permit Requirements:	No permits required
Institutional and Training requirements:	The protection and conservation of soil will form part of the health, safety and environmental awareness and training programmes. Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	Soil conservation and protection will be monitored as part of the monthly EEA visits and reported on in the environmental performance assessment reports.

6.8 Surface Disturbance (Vegetation degradation and loss)	
Objectives:	To minimise the impact on the vegetation, taking special consideration of species of high conservation value (rare or protected species). To protect and preserve as far as possible, the indigenous animal life affected by the construction operations.
Targets:	No loss of biodiversity. The reestablishment of indigenous vegetation following closure and rehabilitation of the sections of the mine. The prevention of the spread of alien invasive plant species.
Activities:	• Clearing and Grubbing
Impact:	Loss of vegetation, loss of animal habitat and spread of alien invasive vegetation.
Mitigation Measure:	Natural features, indigenous flora and fauna within the vicinity of the project works, should be protected and damage or disturbance prevented or minimised, specifically: No plant species outside of the designated mine site and associated areas may

	be removed. No mining staff may have access to indigenous vegetation outside of the Site area. The use of indigenous plants as firewood is prohibited. All fauna (including domestic livestock) within, and surrounding the site, shall be protected. They shall not be caught, poisoned, trapped, snared or killed. The minimum amount of vegetation must be removed. Excessive clearing of a site must be avoided. Disturbance outside of the immediate construction area must be avoided. Planning and construction must ensure that alien plants are not introduced to the disturbed areas. This can be accomplished by: • Utilising the saved topsoil from the construction area and regular monitoring during the revegetation phase and immediately after the revegetation phase. • Preventing continuous disturbances of the rehabilitated areas. • Alien invader species must be removed from the site and destroyed as per the DWA Working for Water specifications for that species. Any regrowth must be controlled in the same manner. • Soil should not be moved from one part of the site to another unnecessarily.
Responsibility:	Site Agent
Permit Requirements:	No Permit required.
Institutional and Training requirements:	Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits. The protection and rehabilitation of vegetation cover will form part of the environmental awareness training programme.
Monitoring:	Protection and rehabilitation will be monitored as part of the monthly EEA visits and reported on in the environmental performance assessment reports.

6.9 Surface Disturbance (Cultural Heritage)	
Objectives:	To identify, protect and preserve any sites of cultural, religious or archaeological significance.
Activities:	• Clearing and grubbing • Stripping of topsoil • Stripping of overburden
Impact:	Although no sites of cultural heritage significance have been identified on site, there is always some potential that sites may be uncovered during the site preparation and mining activities. It is necessary therefore to put in place an action plan for this eventuality.
Mitigation Measures:	All activities must be restricted to the smallest area possible. All areas outside of the designated mining area will be placed out of bounds. Should an archaeological or cultural site be located during preparation of the site or mining activities, it should immediately be reported to the South African Heritage Resource Agency. Failure to report a site of archaeological and/or cultural significance is a contravention of the National Heritage Act (Act No 25 of 1999). All construction site staff must be briefed to immediately report any potential sites which are encountered during the project. In the event of finding what appears to be an archaeological site or a cultural and/or historic site or object, work should be terminated until a qualified archaeologist or historian can examine the item or find. Should any sites be discovered, the Site Agent shall take reasonable precautions to prevent any person from removing or damaging any fossils, coins, articles of value or antiquity and structures and other remains of archaeological interest discovered on the Site, immediately upon discovery thereof and before removal. All works within the vicinity of the discovery must cease immediately and the area shall be cordoned off until such time as the SAHRA authorises resumption of the works in writing.
Responsibility:	Site Agent.
Permit Requirements:	No permits are required as there have been no sites identified. A demolition permit will be required from SAHRA should it be necessary to extend BP7 as far as the abandoned household (not anticipated).
Institutional and Training requirements:	The possible uncovering of sites of cultural heritage significance and the actions to be taken in event of this occurring will be covered by the Environmental Awareness Training Course. Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	The possible discovery of sites of cultural heritage significance will be monitored during the monthly ECO visits and reported during the environmental performance assessment reports.

6.10 Surface Disturbance (Landuse and Productivity)	
Objectives:	To minimise the impact on surrounding landuses during construction. To, where possible, return the affected areas to their previous landuse capabilities following completion of construction.
Targets:	Rehabilitation of the mined out areas and stockpiles in order to allow for the resumption of the previous landuse (ie grazing) within a reasonable time frame following completion of the mining operations.
Activities:	• Clearing and grubbing • Stripping of topsoil • Stripping of overburden • Stockpiling and spoiling • Mining operations (General)
Impact:	The mining operations will result in a temporary change of landuse. The land will not be available for its current use (grazing) for the duration of the mining operations.
Impact Ref:	None
Mitigation Measure:	All activities must be restricted to the smallest area possible. All areas outside of the mining area should be placed out of bounds. Measures outlined in 8.7.11 (vegetation), above, are to be implemented in order to return the site to the previous landuse on closure.
Responsibility:	Site Agent
Permit Requirements:	No permits are required.
Institutional and Training requirements:	Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	This impact will be monitored by an independent EEA on completion of the mining operations and rehabilitation programme

6.11 Surface Disturbance and Changes in Landform and Topography (Aesthetics)	
Objectives:	To minimise as far as possible the visual impacts resulting from the borrowpit construction activities and to return the land to its previous condition as far as possible on completion of the mining operations.
Activities:	• Clearing and grubbing • Stripping of topsoil • Stripping of overburden • Stockpiling and Spoiling • Mining Operations (General)
Impact:	The impact of the mine establishment and operation on the aesthetics of the general landscape surrounding the mining area.
Mitigation Measure:	In additional to the mitigation measures described under Section 8.7.10, the following will apply: Photographic records to be kept throughout construction, starting prior to any activities getting underway. Fixed point photo sites are to be selected. These photographic site records should be used to ensure that the affected topography and vegetation can be reinstated, where practical, to a state which closely approximates the natural situation. Mining is to take place according to the proposed mine development plans included in **APPENDIX C**. Mined out areas are to be used a spoil site thereby facilitating rehabilitation. All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of area disturbed. The Site Agent shall provide the EEA with a plan of the site camp showing the layout / positioning of all infrastructure including wash bays, fuel storage areas, materials storage areas, sewage infrastructure and buildings. The Site Agent shall maintain a map of the site layout that indicates where the wash bays, fuel storage areas, topsoil sites etc are located. The EEA and RE must approve this. The EEA shall approve all stockpiling and spoiling sites and confirm the end-use or rehabilitation plans for these sites. The stockpiles should be located within demarcated specified sites. Material must be stockpiled in such a way as to minimise the spread of materials and the impact on the natural vegetation. The Site Agent should ensure that no materials "creep" into "no-go" areas. The Site Agent shall ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the "no go" areas at any time.
Responsibility:	Site Agent
Permit Requirements:	None
Institutional and Training	Appointment of a designated Environmental Control Officer (ECO) on site.

requirements:	Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits.
Monitoring:	The visual impact of the mining operations will be assessed as part of the monthly ECO site visits and reported on in the environmental performance assessment reports.

6.12 Changes in Landform and Topography (Public Health and Safety)	
Objectives:	To prevent any injury to staff or members of the public which might incur through access to unstable surfaces, high faces etc.
Activities:	• Mining Activities (General)
Impact:	Injury or death incurred as a result of access to unstable areas and high rock faces.
Mitigation Measure:	A **Health and Safety Plan and Programme** is to be complied and implemented on site. The mining area must be placed out of bounds to members of the public and other unauthorised persons. Security must be put in place to prevent unauthorised access to the site. The entire mining area is to be fenced. Appropriate warning signage is to be erected around the mining and processing area.
Responsibility:	Site Agent Health and Safety Officer
Permit Requirements:	None
Institutional and Training requirements:	Appointment of a health and safety officer. All staff are to be go through the health and safety training programme
Monitoring:	Health and Safety to be monitored by an external, independent health and safety professional.

6.13 Solid Waste Generation and Disposal

Objectives:	To ensure that the mine establishment and operation does not have a significant negative impact on the environment through the manner in which solid waste is stored, handled or disposed of.
Targets:	Minimise the quantities of solid waste by reducing, reusing and recycling materials wherever possible. To store, handle and dispose of all solid waste according to sound environmental principles and in accordance with the legal requirements.
Activities:	• Mining operations (General)
Impact:	Inappropriate handling and disposal of waste may result in contamination of water sources, soils and general pollution of the surrounding environment
Mitigation Measure:	No construction or other waste may be disposed of on site. All waste generated during the construction of the site must be removed from the site and disposed of at a registered waste disposal site. Adequate litter drums or other containers must be located throughout the construction camp and at all construction sites to ensure that no litter is generated on site. The containers should be fitted with suitable lids and pegged to the ground so that dogs or any other scavengers cannot gain access to the container when the sites are unattended. No burning of refuse is to take place on site. Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, fine vegetation, refuse and paper shall have appropriate cover to prevent them spilling from the vehicle during transit. The Site Agent shall be responsible for any clean-up resulting from the failure of his employees, or suppliers, to properly secure transported materials. No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur. All solid waste shall be disposed of off site at least once weekly at an approved landfill site. The Site Agent shall provide the EEA with documentary proof of disposal during the biannual compliance audit site inspection.
Responsibility:	Site Agent
Permit Requirements:	None
Institutional and Training requirements:	Appointment of a designated Environmental Control Officer (ECO) on site. Appointment of an External Environmental Auditor (EEA) to conduct monthly site inspections and audits. Solid Waste Management will form part of the environmental awareness training to take place on site.

Monitoring:	Solid waste management to be monitored by the EEA during the monthly site visits and to be reported on in the environmental performance assessment reports.

6.14 Hazardous Waste Generation and Disposal	
Objectives:	To manage the hazardous waste component so as to minimise the potential to cause harm to the human and the natural environment.
Targets:	To have zero spillages of hazardous materials on site.
Activities:	• Vehicle and plant repair and maintenance.
Impact:	The pollution of soil, surface water and groundwater as a result of spillages of hazardous substances.
Mitigation Measure:	Hazardous substances used on site will likely include fuel, oil and certain degreasers. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the MSDSs shall be followed in the event of an emergency situation. Fuel may be stored on Site and the fuel storage area shall be located at the workshop, or a fuel storage depot, located within the construction camp. The Site Agent shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut or in bowsers. The tanks / bowsers shall be situated within a concrete bundwall with a concrete base. The volume inside the bund shall be 110% of the total capacity of all the storage tanks / bowsers. The bunded area shall be covered to prevent the collection of rainwater. The Site Agent shall prevent unauthorised access into the fuel storage area. The Site Agent shall ensure that all fuels and chemicals are handled and stored in a manner so to minimise the risk of spills, leaks or structural failures. The Site Agent shall have on Site all the necessary materials and equipment to deal with spills of any of the substances stored on Site. The Site Agent shall set up a procedure to deal with a spillage or pollution event. Staff shall be appropriately trained to deal with any spills or pollution threat. No smoking shall be allowed within the vicinity of the fuel storage area. The Site Agent shall ensure that there is adequate fire-fighting equipment at the fuel stores. Gas and fuels shall not be stored in the same storage area. Where reasonably practical, plant shall be refuelled at the depot, or at the workshop, as applicable. If it is not reasonably practical, then the surface under the refuelling area shall be protected against pollution.

	The Site Agent shall ensure that there is always a supply of absorbent material readily available to absorb / breakdown hydrocarbon spills, and where possible, be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill. Where practical, all maintenance and repair of equipment and vehicles on Site shall be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, then drip trays must be used. Only emergency repair and maintenance work is allowed outside of the workshop. The Site Agent shall ensure that there is no contamination of the soil, or vegetation, in the workshop and other plant maintenance facilities, including those areas where emergency plant maintenance has been conducted. The workshop shall have a smooth impermeable concrete floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil). When servicing equipment, drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall also be provided for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles). Drip trays shall be inspected and emptied daily, and serviced when necessary. Drip trays shall be closely monitored during rain events to ensure that they do not overflow. All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from the Site. The washing of equipment shall be restricted to urgent, or preventative maintenance requirements only. All washing shall be undertaken in a wash bay area which must be equipped with a suitable impermeable floor and sump / oil trap. The use of detergents for washing shall be restricted to low phosphate and nitrate containing, low sudsing-type, detergents. The appropriate danger / warning signs must be erected at the diesel bowser, mine / quarry entrance and workshops. Fuel lubricants, solvents, paints, and other chemicals must be stored within the contractors campsite in a facility secured with lock and key. Storage should be on a bunded, impervious site (secondary containment). Storage of all chemicals and herbicides should be in a bunded area and on an impervious site with secondary containment. All used oil is to be collected and placed in drums stored on a concrete surface. Used oil must be recycled by a licensed dealer or disposed of at a registered landfill site, where the permit conditions of the landfill allow.
Responsibility:	Site Agent
Permit	None