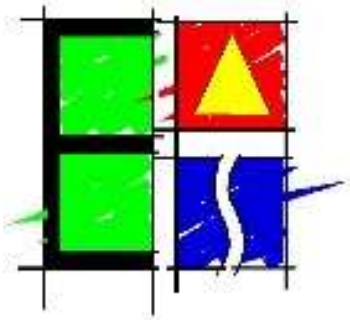
Environmental Management Plan for Proposed Borrow Pits, Umzimvubu & Matatiele Local Municipalities, Eastern Cape

Submitted in terms of Section 39 and of Regulation 52 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

Report Prepared by:



Engineering Advice & Services (Pty) Ltd

EAS Project Number: 1148

On behalf of:

MSBA Madan Singh Bester & Associates cc CESA

Report Prepared for:

Province of the EASTERN CAPE Roads & Public Works

DR&PW Contract Number: SCMU5-14/15-00027 & SCMU5-14/15-0025

Eastern Cape Department of Roads and Public Works

14 November 2014

Proposed Borrow Pits in Umzimvubu & Matatiele Local Municipalities (Alfred Nzo DM), Eastern Cape

For: Eastern Cape Department of Roads and Public Works

Private Bag X0022, Bhisho, 5605

By: Engineering Advice & Services (Pty) Ltd.

73 Heugh Road, Walmer, Port Elizabeth, 6013
Tel: +27 (0) 41 581 2421, Fax: +27 (0) 86 683 9899

On behalf of: Madan Singh Bester & Associates cc.

29 – 6th Avenue, Newton Park, Port Elizabeth
Tel: 041 365 6467, Fax: 041 365 6476

EAS Project Number: 1148
DMR Contract Number: SCMU5-14/15-00027 & SCMU5-14/15-0025

Compiled by:

Name	Company	Email
Mr Jamie Pote	Engineering Advice & Services (Biophysical and EMP)	jamiep@easpe.co.za
Mr Dieter Bester	Engineering Advice & Services (Geotech and Engineering)	dieterb@easpe.co.za
Mr Ray Parker	Engineering Advice & Services (Engineering and Review)	ray@easpe.co.za

14 November 2014

Table of Contents

List of Figures

List of Tables

Abbreviations

ASAPA	Association of South African Professional Archaeologists
BP	Borrow Pit
CARA	Conservation of Agricultural Resources Act 43 of 1983
CBA	Critical Biodiversity Area
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs (National)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DEMC	Desired Ecological Management Class
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry (former department name)
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Ecological Importance and Sensitivity Classification
EMC	Ecological Management Class
EMP	Environmental Management Plan
EMPr	Environmental Management Programme report
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LHS	Left Hand Side
LM	Local Municipality
LoM	Life of Mine
masl	meters above sea level
MIA	Mining Infrastructure Area
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act 107 of 1998
NEMBA	National Environmental Management: Biodiversity Act 10 of 2004
NFA	National Forest Act 84 of 1998
NOMR	New Order Mining Right
PEMC	Present Ecological Management Class
PES	Present Ecological State
RDL	Red Data List
RHS	Right Hand Side
RoD	Record of Decision
RoM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANBI	South African Biodiversity Institute
SARTM	South African Rural Traffic Model
SDF	Spatial Development Framework

SoER	State of the Environment Report
SSC	Species of Special Concern
TOPS	Threatened of Protected Species
ToR	Terms of Reference
+ve	Positive
-ve	Negative

Glossary

Corridors:	Have important functions as strips of a particular type of landscape differing from adjacent land on both sides. Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as "stepping stones" that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
Degraded habitat/land	Land that has been impacted upon by man's activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.
ECO/ESO:	Environmental Site/Control Officer – person responsible for the Day-to-Day Environmental Management on-site during construction.
Ecological Processes:	Ecological processes typically only function well where natural vegetation remains, and in particular where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened
Isisivane	Isisivane consist of large piles of stones of different sizes and heights. They are usually near rivers and mountain crossings. Their purpose and meaning is not fully understood, however some are thought to represent burial cairns while others may have symbolic value
Ecosystem status:	Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem.

Ecosystem:	All of the organisms of a particular habitat, such as a lake or forest, together with the physical environment in which they live
Endangered:	Endangered terrestrial ecosystems have lost significant amounts (more than **60 % lost) o**f their original natural habitat, so their functioning is compromised.
Endemic:	A plant or animal species, or a vegetation type, which is naturally restricted to a particular defined region. It is often confused with indigenous, which means 'native, occurring naturally in a defined area'.
Environment:	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Impact Assessment (EIA):	A study of the environmental consequences of a proposed course of action
Exotic:	Non-indigenous; introduced from elsewhere, may also be a *weed* or alien *invasive* species. Exotic species may be invasive or non-invasive.
Fragmentation (habitat):	Causes land transformation, an important current process in landscapes as more and more development occurs.
Habitat:	The home of a plant or animal species. Generally those features of an area inhabited by animal or plant which are essential to its survival.
Indigenous:	Native; occurring naturally in a defined area.
Least threatened terrestrial ecosystems:	These ecosystems have lost only a small proportion (more than 80 % remains) of their original natural habitat, and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).
Method statement (construction):	A method statement is prepared for each task on a particular site by the contractor; the group of work method statements are then packaged and included in the overall *Construction Plan.*
Off-sets:	Compensation for biodiversity loss resulting from authorized changes in land use. Can include assigning stewardship or protected area status to remaining conservation-worthy land or making a financial bequest for purposes of biodiversity conservation.
Riparian:	Pertaining to, situated on or associated with a river bank.
River corridors:	River corridors perform a number of ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
Scoping	A procedure to consult with stakeholders to determine issues and concerns and for determining the extent of and approach to the EIS, used to focus the EIA
Scoping Report	A written report describing the issues identified to date for inclusion in an EIA.
Transformation:	In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals.

	Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or landuse type into smaller fragments.
Transformed Habitat/Land	Land that has been significantly impacted upon by man's activities (Such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.
Tributary/ Drainage line:	A small stream or river flowing into a larger one.
Untransformed habitat/land	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Vulnerable:	Vulnerable terrestrial ecosystems have lost some (more than 60 % remains) of their original natural habitat, and their functioning will be compromised if they continue to lose natural habitat.
Weed:	An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They also can harbour and spread plant pathogens.
Wetlands:	A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.

Release Notes

Report Version	Date
Public Draft	14 November 2014
Final Report	~ 10 January 2015

1 Introduction & Overview

The Eastern Cape Department of Roads and Public works (DRPW) require material for general maintenance of provincial roads, in particular gravel roads. There are numerous existing borrow pits (BP's) that have been historically used to maintain these roads, however these are not formally registered with the Department of Mineral Resources (DMR).

EAS was appointed as the independent consultants to assess the environmental impacts and requirements in terms of the Mineral and Petroleum Resources Development Act (MPRDA, Act 28 of 2002). This includes submitting an application for a mining right (this document), to the DMR, for the sourcing of material for re-gravelling of roads in the area from 4 existing unlicensed borrow pits. This EMP is prepared in accordance with the requirements of the MPRDA and DMR

Applicants for mining permits, are herewith, in terms of the provisions of Section 29 (a) and in terms of section 39 (5) of the Mineral and Petroleum Resources Development Act, directed to submit an Environmental Management Plan strictly in accordance with the subject headings, and to compile the content according to all the sub items to the said subject headings referred to in the guideline published on the Departments website, within 60 days of notification by the Regional Manager of the acceptance of such application. This EMP document adheres to the standard format provided by the Department in terms of Regulation 52 (2).

1.1 Legal and Administrative Requirements

The permitting will be undertaken in accordance with the Mineral and Petroleum Resources Development Act (MPRDA; No. 28 of 2002). As an organ of state, the Department of Roads and Public Works (DRPW) has obtained exemption from the provisions of sections 16, 20, 22 and 27 (application process) of the MPRDA in respect of any activity to remove any material for the construction and maintenance of dams, harbours, roads and railway lines and for the purposes incidental thereto, as allowed by the said act in section 106 (1). As such the utilisation of resources is subject only to the preparation, submission and approval of an EMP, compiled in accordance with the requirements of the MPRDA.

The purpose of the EMP is to identify and assess potential impacts associated with the project through a process of environmental investigations, stakeholder and public consultation, and to provide sufficient detail on the project to the Department of Mineral Resources (DMR), in order to allow DMR to make an informed decision on the project.

1.1.1 MPRDA Section 106 (1)

Exemptions from certain provisions of Act

106. (1) The Minister may by notice in the Gazette, exempt any organ of state from the provisions of sections 16, 20, 22 and 27 in respect of any activity to remove any mineral for road construction, building of dams or other purpose which may be identified in such notice.

(2) Despite subsection (1), the organ of state so exempted must submit an environmental management programme for approval in terms of section 39(4).

(3) Any landowner or lawful occupier of land who lawfully, takes sand, stone, rock, gravel or clay for farming or for effecting improvements in connection with such land or community development purposes, is exempted from the provisions of in subsection (1) as long as the sand, stone, rock, gravel or clay is not sold or disposed of.

With regard to the environment, Section 37(1) of the MPRDA provides that the environmental management principles listed in Section 2 of the National Environmental Management Act (No. 107 of 1998) (NEMA) must guide the interpretation, administration and implementation of the environmental requirements of the MPRDA, and makes those principles applicable to all prospecting and mining operations. The NEMA principles apply throughout South Africa to the actions of all organs of state that may significantly affect the environment, and thus to decision making on mining applications. These principles require that impacts on biodiversity and ecological integrity are avoided, and if they cannot altogether be avoided, are minimised and remedied. They also specify that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment. Moreover the responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.

Furthermore, Section 37(2) of the MPRDA states that "any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations".

To ensure this, the MPRDA stipulates that:

1. The NEMA principles apply to all mining and serve as guidelines for the interpretation, administration and implementation of the environmental requirements of the MPRDA (Section 37(1)).
2. the holder of a permission/right/permit (Section 38):
3. must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment
4. must manage all environmental impacts
5. must – as far as is reasonably practicable, rehabilitate the environment to its natural or predetermined state, or to a land use which conforms to the generally accepted principle of sustainable development
6. is responsible for environmental damage, pollution or ecological degradation as a result of reconnaissance, prospecting or mining operations which may occur inside and outside the boundaries of the areas to which such right, permission or permit relates.
7. the permission/right/permit may be issued if the Minister is satisfied that it will take place within the framework of national environmental management policies, norms and standards (Section 48(2)).

The MPRDA includes some key legal and regulatory mechanisms:

1. EMP: this is the main tool used to mitigate and manage environmental impacts, detailing the proposed measures to be undertaken. The requirements of an EMP in the MPRDA (and dependent on the permission/right/permit to which it will be applied) are slightly different to those prescribed in Section 24N of NEMA (Amendment Act 62 of 2008), but generally both are giving effect to similar general objectives of integrated environmental management laid down in Section 23 of NEMA. The MPRDA requires mining operators to obtain environmental approval in advance of operations. It also imposes on-going environmental management and mitigation obligations throughout the mining life cycle. The EMP requires the applicant to undertake an EIA (see section 3.4 for more detail) and to set out the applicant's financial provision for mitigation. The MPRDA (Regulation 51(a)(i)) also requires that environmental objectives and goals for closure are included in the EMP, highlighting the need to plan with closure in mind.

2. MPRDA Pollution Control and Waste Management Regulations: provide that water management and pollution control comply with the provisions of the National Water Act. It further provides that control of erosion and soil pollution control comply with applicable legislative requirements.
3. Prohibition or restriction of mining or prospecting: in terms of Section 49 of the MPRDA, the Minister of Mineral Resources may completely prohibit or restrict the granting of any permission/permit/right if the land is residential area, public road, railway or cemetery, being used for public or government purposes or reserved in terms of any other law. This provision allows the Minister, in consultation with other relevant Departments, to prohibit or restrict granting permission/right/permit in certain areas of critical biodiversity, heritage and hydrological importance.
4. In addition to the MPRDA, mining companies also need to comply with a range of other laws which regulate mining impacts on the environment. These include:
5. Constitution of Republic of South Africa, 1996: Section 24(a) of the Constitution states that everyone has the right 'to an environment that is not harmful to their health or well-being'. Mines must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
6. NEMA: Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMAs) should guide decision making throughout the mining life cycle to reflect the objective of sustainable development25. Mining is prohibited in protected areas defined in the National Environmental Management Protected Areas Act (No. 57 of 2003; hereafter referred to as Protected Areas Act).
7. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the Biodiversity Act as it relates to loss of biodiversity.
8. EIA Regulations (GN No. R. 543) published in terms of NEMA trigger the need for applicants to undertake either a Basic Assessment or Scoping and Environmental Impact Assessment if the proposed activity is included in one or more of the three Listing Notices; and Listing Notice 3 (listing activities and sensitive areas per province, for which a Basic Assessment process must be conducted) (GN No. R. 546).
9. In some cases both the MPRDA and NEMA require the identification, assessment and evaluation of impacts, and the determination of appropriate mitigation measures. An EMP may be required for activities subject to an EIA under NEMA.
10. Water Use Authorizations: the National Water Act (No. 36 of 1998) requires that provision is made both in terms of water quantity and quality for 'the reserve', namely to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources, be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorizations.
11. Mine-water regulations (Government Notice (GN) No. R. 704) are aimed at ensuring the protection of water resources through restrictions on locality, material, and the design, construction, maintenance and operation of separate clean and dirty water systems. Detailed regulations on the use of water for mine-related activities were issued in 1999 under the National Water Act framework.
12. Liability for any environmental damage, pollution, or ecological degradation: arising from any and all mining-related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. This liability continues until such time as a closure certificate is issued by the Minister of Mineral Resources. Company directors or members of a close

corporation are jointly and individually liable for any unacceptable impact on the environment, regardless of whether it was caused intentionally or through negligence. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.

13. Public participation: Public consultation and participation processes prior to granting licenses or authorizations can be an effective way of ensuring that the range of ways in which mining's impact on the environment, social and economic conditions are addressed, and taken into account when the administrative discretion to grant or refuse the license is made. Further, under Section 10 of the MPRDA, which requires that interested and affected parties be made aware that an application has been accepted and are given 30 days to submit comments, any objections should initiate the establishment of a Regional Mining Development and Environmental Committee (RMDEC).
14. Provincial legislation, such as the Land Use Planning Ordinance (No. 15 of 1985) (LUPO) the Orange Free State's Townships Ordinance (No. 9 of 1969), and the Transvaal Province's Town-Planning and Townships Ordinance (No. 15 of 1986) which applies in Gauteng, Limpopo and Mpumalanga: to regulate land use and to provide for matters incidental thereto. Zoning schemes may have implications for mining and mining associated activities. Where mining is not permitted within a zoning scheme, the holder of a mining right or permit will need to apply for these areas to be rezoned in order to allow mining.
15. National Heritage Resources Act (No. 25 of 1999): describes the importance of heritage in the South African context, and designates the South African Heritage Resource Agency (SAHRA) as guardian of the national estate which may include heritage resources of cultural significance that link to biodiversity, such as places to which oral traditions are attached or which are associated with living heritage, historical settlements, landscapes and natural features of cultural significance, archaeological and paleontological sites, graves and burial grounds, or movable objects associated with living heritage. Further, formal protections under the Natural Heritage Resources Act include: national heritage sites and provincial heritage sites (some recognized globally under the World Heritage Convention), and protected areas amongst others.

A detailed list of Biodiversity and mining related legislation includes the following:

1. Mineral and Petroleum Resources Development Act (No. 28 of 2002)
2. National Environmental Management Act (No. 107 of 1998), as amended 2008
3. National Environmental Management Biodiversity Act (No. 10 of 2004)
4. National Environmental Management Protected Areas Act (No. 57 of 2003)
5. National Environmental Management Protected Areas Act (No. 57 of 2003)
6. National Environmental Management Waste Act (No. 59 of 2008)
7. National Environmental Management EIA Regulations (GN No. R. 543) and Listing Notices 1,2 and 3 (GN No. 544, 545 and 546 respectively)
8. National Forest Act (No. 84 of 1998)
9. National Veld and Forest Fire Act (No. 101 of 1998)
10. Mountain Catchment Act (No. 63 of 1970)
11. National Water Act (No. 36 of 1998)
12. Mine-water regulations (GN No. R. 704)
13. Promotion of Administrative Justice Act (No. 3 of 2000)
14. Promotion of Access to Information Act (No. 2 of 2000)

15. Land Use Planning Ordinance (No. 15 of 1985)
16. National Heritage Resources Act (No. 25 of 1999)
17. World Heritage Convention Act (No. 49 of 1999)
18. Municipal Systems Act (No. 32 of 2000)
19. Integrated Coastal Management Act (No. 24 of 2008)
20. Marine Living Resources Act (No. 18 of 1998)
21. Conservation of Agricultural Resources Act (CARA; No 43 of 1983) (as amended 2001)

1.2 NEMA principles of particular relevance to biodiversity:

1. Section 2(4)(a)(i): the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.
2. Section 2(4)(a)(ii): pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied.
3. Section 2(4)(a)(vi): the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardized.
4. Section 2(4)(a)(vii): a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.
5. Section 2(4)(e): responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.
6. Section 2(4)(o): The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.
7. Section 2(4)(p): The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.
8. Section 2(4)(r): Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal habitats including dunes, beaches and estuaries, reefs, wetlands, and similar ecosystems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

1.3 Responsibilities of Role Players

1.3.1 Developer

The Developer (DRPW) remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP. The developer is responsible for ensuring that sufficient resources (time, financial, human, equipment, etc0 are available to the other role players (e.g. the ECO, CLO and contractor) to efficiently and effectively perform their tasks in terms of the EMP. The Developer is liable for restoring the environment in the event of negligence leading to damage to the environment. The developer shall endure that the EMP is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMP. The developer is responsible for appointing an Environmental Control Officer (ECO) to oversee all the environmental aspects relating to the development.

1.3.2 Consulting Engineer

The Consulting Engineer, is bound to the EMP conditions through his/her contract with the developer, and is responsible for ensuring the she/he adheres to all the conditions of the EMP. The Consulting Engineer shall

thoroughly familiarise him/her-self with the EMP requirements before coming onto site and shall request clarification on any aspects of these documents, should they be unclear.

1.3.3 Contractor

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

1.3.4 Environmental Control Officer

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

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

1.3.5 Environmental Liaison Officer

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

1.4 Approach

This report incorporates all the information required by the Department of Minerals and Petroleum Resources Development regulations for Environmental Management Plans, namely:

1. A description of the environment likely to be affected by the proposed prospecting or mining operation.
2. Assessment of the potential impacts of the proposed prospecting or mining operation on the environment, socio- economic conditions and cultural heritage.
3. Summary of the assessment of the significance of the potential impacts and the proposed mitigation measures to minimize adverse impacts.
4. Planned monitoring and performance assessment of the environmental management plan.
5. Closure and environmental objectives.
6. Record of the public participation and the results thereof.
7. Environmental awareness plan.
8. Proof of financial provision.

9. Capacity to rehabilitate and manage negative impacts on the environment.
10. Undertaking to execute the environmental management plan.

1.5 Limitations

EAS has prepared this report for the sole use of the Department of Roads and Public Works (DRPW) in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of the Department of Roads and Public Works and EAS. No other warranty, expressed or implied, is made as to the professional advice included in this report.

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

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

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

1. Numerous site visits and assessments.
2. Public participation
3. Information on the biophysical environment (Mr Jamie Pote)
4. Geotechnical Testing of Borrow Pit material (Outeniqua Lab EC cc.)

1.6 Applicant and Consultant Details

Table 1: Details of Applicant

ITEM	APPLICANT CONTACT DETAILS
Name	Eastern Cape Department of Roads & Public Works
Tel No:	(040) 602 4000
Fax No:	(040) 602 4001
Call centre:	0800 864 951
Postal Address	Private Bag X0022, Bhisho, 5605

Table 2: Details of Consultant

ITEM	CONSULTANT CONTACT DETAILS
Name	Engineering Advice & Services (Pty) Ltd
Tel No:	041 581 2421
Fax No:	086 683 9899
E-mail Address:	jamiep@easpe.co.za
Postal Address	P.O. BOX 13867, Humewood, Port Elizabeth, 6013

1.7 Report Structure

This report is divided into 9 chapters:

Chapter 1:

Consists of the project introduction, background and Regional Context of the mining application and the area in which the Borrow Pits are located.

Chapter 2:

Specific Information relating to the individual Borrow Pits, grouped per borrow pit, addressing the following sections of the MPRDA:

- REGULATION 52 (2): Description of the environment likely to be affected by the proposed prospecting or mining operation
  a) The environment on site relative to the environment in the surrounding area.
  b) The specific environmental features on the site applied for which may require protection, remediation, management or avoidance.
  c) Map showing the spatial locality of all environmental, cultural/heritage and current land use features identified on site.
  d) Confirmation that the description of the environment has been compiled with the participation of the community, the landowner and interested and affected parties,

Chapter 3:

- REGULATION 52 (2) (b): Assessment of the potential impacts of the proposed prospecting or mining operation on the environment, socio- economic conditions and cultural heritage.
  a) Description of the proposed prospecting or mining operation.
    i. The main prospecting activities (e.g. access roads, topsoil storage sites and any other basic prospecting design features)
    ii. Plan of the main activities with dimensions
    iii. Description of construction, operational, and decommissioning phases.
    iv. Listed activities (in terms of the NEMA EIA regulations)
  b) Identification of potential impacts (Refer to the guideline)
  c) Potential impacts per activity and listed activities.
    i. Potential cumulative impacts.
    ii. Potential impact on heritage resources
    iii. Potential impacts on communities, individuals or competing land uses in close proximity. (If no such impacts are identified this must be specifically stated together with a clear explanation why this is not the case.)
    iv. Confirmation that the list of potential impacts has been compiled with the participation of the landowner and interested and affected parties,
    v. Confirmation of specialist report appended (Refer to guideline)
- REGULATION 52 (2) (c): Summary of the assessment of the significance of the potential impacts and the proposed mitigation measures to minimise adverse impacts.
  a) Assessment of the significance of the potential impacts
    i. Criteria of assigning significance to potential impacts
    ii. Potential impact of each main activity in each phase, and corresponding significance assessment
    iii. Assessment of potential cumulative impacts.

Chapter 4:

3. REGULATION 52 (2) (c): Summary of the assessment of the significance of the potential impacts and the proposed mitigation measures to minimise adverse impacts.
   a) Proposed mitigation measures to minimise adverse impacts.

i. List of actions, activities, or processes that have sufficiently significant impacts to require mitigation.
ii. Concomitant list of appropriate technical or management options (Chosen to modify, remedy, control or stop any action, activity, or process which will cause significant impacts on the environment, socio-economic conditions and historical and cultural aspects as identified. Attach detail of each technical or management option as appendices)
iii. Review the significance of the identified impacts (After bringing the proposed mitigation measures into consideration).

Chapter 5:

4. REGULATION 52 (2) (e): Planned monitoring and performance assessment of the environmental management plan.
    a) List of identified impacts requiring monitoring programmes.
    b) Functional requirements for monitoring programmes.
    c) Roles and responsibilities for the execution of monitoring programmes.
    d) Committed time frames for monitoring and reporting.

5. REGULATION 52 (2) (f): Closure and environmental objectives.
    a) Rehabilitation plan (Show the areas and aerial extent of the main prospecting activities, including the anticipated prospected area at the time of closure).
    b) Closure objectives and their extent of alignment to the pre-mining environment.
    c) Confirmation of consultation (Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties).

Chapter 6:

6. *REGULATION 52 (2) (g):* Record of the public participation and the results thereof.
    a) Identification of interested and affected parties. (Provide the information referred to in the guideline)
    b) The details of the engagement process.
        i. Description of the information provided to the community, landowners, and interested and affected parties.
        ii. List of which parties identified in 7.1 above that were in fact consulted, and which were not consulted.
        iii. List of views raised by consulted parties regarding the existing cultural, socio-economic or biophysical environment.
        iv. List of views raised by consulted parties on how their existing cultural, socio-economic or biophysical environment potentially will be impacted on by the proposed prospecting or mining operation.
        v. Other concerns raised by the aforesaid parties.
        vi. Confirmation that minutes and records of the consultations are appended.
        vii. Information regarding objections received.
    c) The manner in which the issues raised were addressed.

Chapter 7

7. SECTION 39 (3) (c) of the Act: Environmental awareness plan.
    a) Employee communication process (Describe how the applicant intends to inform his or her employees of any environmental risk which may result from their work).
    b) Description of solutions to risks (Describe the manner in which the risk must be dealt with in order to avoid pollution or degradation of the environment)t.
    c) Environmental awareness training (Describe the general environmental awareness training and training on dealing with emergency situations and remediation measures for such emergencies).

Chapter 8:

8. REGULATION 52 (2) (d): Financial provision. The applicant is required to-
    a) Plans for quantum calculation purposes (Show the location and aerial extent of the aforesaid main mining actions, activities, or processes, for each of the construction operational and closure phases of the operation).
    b) Alignment of rehabilitation with the closure objectives (Describe and ensure that the rehabilitation plan is compatible with the closure objectives determined in accordance with the baseline study as prescribed).
    c) Quantum calculations (Provide a calculation of the quantum of the financial provision required to manage and rehabilitate the environment, in accordance with the guideline prescribed in terms of regulation 54 (1) in respect of each of the phases referred to).
    d) Undertaking to provide financial provision (Indicate that the required amount will be provided should the right be granted).

Chapter 9

9. SECTION 39 (4) (a) (iii) of the Act: Capacity to rehabilitate and manage negative impacts on the environment.
    a) The annual amount required to manage and rehabilitate the environment (Provide a detailed explanation as to how the amount was derived)
    b) Confirmation that the stated amount correctly reflected in the Prospecting Work Programme as required

10. REGULATION 52 (2) (h): Undertaking to execute the environmental management plan.

2 Proposed Project Description

2.1 Motivation

Existing gravel roads subject to the proposed project in the Umzimvubu and Matatiele Local Municipalities have been identified by the department of Roads and Public Works as being in need of maintenance and re-gravelling. The specific roads in the abovementioned Local Municipal Areas are the DR08649 and DR08092 roads.

Gravel roads weather over relatively short periods of time and require periodical re-gravelling. The gravel roads identified for re-gravelling display defects such as corrugation, ravelling, and exposed oversized stones. The roads to be re-gravelled provide access to remote villages and the poor quality of the roads have a significant impact on the lives of the local residents as alternative routes to nearby towns are often too far to travel and add extra costs to travel for individuals.

In order to re-gravel the specified roads, large amounts of material is deeded for mostly the wearing course of the road. In some cases the material is of such a nature that is can be grid rolled to the appropriate size, and in others the material would be crushed due to the physical properties of the material. Quality control of material would include blending harder materials with fines to obtain an optimal material quality. The extensions of existing borrow pits for the collection of materials for the specified roads is being proposed.

2.2 Activity Description

After a preliminary screening of borrow pits along the DR08649 and DR08092 roads, 4 borrow pits were selected subject to criteria including material type, location, access, surrounding land use, slope, erosion, hydrology and sensitive vegetation. The borrow pits will be used exclusively for the upgrade/re-gravelling of the road they are situated adjacent to.

If approved, this EMP will be used as guidelines for the excavation of material from the proposed borrow pits and the rehabilitation thereof.

2.3 Activity Location

The locations of all the proposed borrow pits and the road sections they are to be used for are shown in Figure 1. The affected roads are situated south of Matatiele and north of Mount Frere.

2.4 Borrow Pit Locations

Table 3: Locality of proposed borrow pits.

Road	BP	LMA	Land Owner	Coordinates	Location description
DR08649	10.4	Matatiele	Mr Mark Newborn	30.46038 S 28.97966 E	Existing BP site; situated 10.4 km along the DR08649 south from the R56.
	20.0	Matatiele		30.48209 S 28.92033 E	Existing BP site; situated 10.4 km along the DR08649 south from the R56.
DR08092	0.9	Umzimvubu	Communal	30.65949 S 29.02533 E	Existing BP site; situated 0.9 km along the DR08092, west from the DR08017 (south of the R56).
	9.2	Umzimvubu	Communal	30.66196 S 28.96508 E	Existing BP site; situated 9.2 km along the DR08092, west from the DR08017 (south of the R56).

***Communal** – Department of Rural Development and Land Reform

2.5 Description of the Existing Environment

2.5.1 Introduction

A screening of Regional Biodiversity Features was undertaken, based on a model developed that included the following features:

1. Protected areas
2. World Heritage Sites and their legally proclaimed buffers
3. Critically Endangered and Endangered ecosystems
4. Critical Biodiversity Areas
5. River and wetland Freshwater Ecosystem Priority Areas (FEPAs), and
6. 100 m Buffer of rivers and wetlands
7. RAMSAR Sites
8. Protected area buffers
9. Trans-frontier Conservation Areas (remaining areas outside of formally proclaimed PAs)
10. High water yield areas
11. Coastal Protection Zone
12. Estuarine functional zones
13. Ecological support areas
14. Vulnerable ecosystems
15. Focus areas for land-based protected area expansion and focus areas.

A summary of these features (illustrated in Figure 4 to Figure 6) is provided in Table 4 below.

Table 4: Summary of Biodiversity features for the Borrow Pit sites.

Borrow Pit	Vegetation Type:	Status	Present land use:	CBA
DR08649/10.4	Drakensberg Foothill Moist Grassland	Least Threatened	Natural	2
DR08649/20.0	East Griqualand Grassland	Vulnerable	Natural	2
DR08092/0.9	East Griqualand Grassland	Vulnerable	Natural	1
DR08092/9.2	Drakensberg Foothill Moist Grassland	Least Threatened	Natural	3

2.5.2 Site Locality

The locations of all the proposed borrow pits and the road sections they are to be used for are shown in Figure 1. The affected roads are situated south of Matatiele and north of Mount Frere.

2.5.3 Topography

The surrounding area can generally be described as flat or gentle undulating lowland plains intersected by moderately rolling hills and mountains, much incised by river gorges. Drainage of the region is mainly in a south-easterly direction.

2.5.4 Geology and soils

As per the Geological Map in Figure 2, the Geology in the region consists of the following:

Symbol	Lithology	Formation
Jd	Volcanic Rocks, gabbro, pikriet (Dolerite)	Karroo sequence, Drakensberg Group
Jdb	Volcanic Rocks, Basaltic Lava, subordinate tuff and agglomerate	Drakensberg Group
TRm	Volcanic Rocks, Basaltic Lava, subordinate tuff and agglomerate	Karroo sequence, Drakensberg Group, Molteno Formation
TRb	Brownish Red and grey mudstone, sandstone (Sedimentary)	Karroo sequence, Beaufort Group, Tarkastad subgroup, Burgersdorp Formation
TRe	Brownish-red and grey mudstones, sandstone	Drakensberg Group, Elliot Formation
Alluvium	Alluvium	

The study area is underlain mostly by sedimentary rocks of the Early Triassic Period Karoo Supergroup, which was formed under fluvial conditions when the inland Karoo Sea was drying out and wide plains were being carved by large river systems. These rivers deposited the sands and muds on broad flood plains which over time became interbedded sandstone and mudstone of the Katberg and Burgersdorp Formations (both of the Tarkastad Subgroup, Karoo Supergroup).

The Katberg Formation has been mapped in the southern and south-western part of the site and is dominated by sandstone lithologies formed by multi-channelled braided river environments. The braided river system resulted in the development of a deeply eroded landscape with few fine-grained (mud and silt) overbank deposits developing. This formation therefore consists mainly of sandstone with sub-ordinate argillaceous (rock containing clay) maroon-coloured mudstone.

A return to a meandering river system is reflected in the mudstone-dominated strata of the Burgersdorp Formation, which has been mapped in the eastern and north-eastern parts of the study area. This formation is dominated by maroon, grey and olive-coloured mudstone and is considered a distal equivalent to that of the Katberg Formation.

These Beaufort Group rocks are interrupted by doleritic dykes (vertical intrusion) and sills (horizontal intrusion) formed during the Jurassic Period. These intrusions forced their way between the sedimentary strata during the eruption phases that formed the Drakensberg Group basalts. The sedimentary rocks into which the dolerite intruded are often altered (metamorphosed) in aureoles adjacent to intrusions (e.g. Hornfels). The dolerite has a

regional north-south trend around which the Sabalele Road has been constructed. This material is, therefore, likely to be intersected in outcrop in the southern part of the study area.

Geotechnical Interpretation

The Karoo Supergroup rocks generally reveal a subdued topography in the study area with a variable weathering profile. The sandstone lithologies tend to be more weathering resistant and are blanketed by a thinner soil cover than that of the softer, mudstone rocks. The completely weathered rock/ residual soil interface is commonly susceptible to dispersion and piping erosion, resulting in the development of the characteristic donga-marked landscape where sloping ground prevails.

The sandstone lithologies have a rock strength that is often considered too low for use as base course or sub base, yet it is too high (and has little binding capabilities) for use as a crushed wearing course on unsurfaced roads. This material is likely to require crushing for any aggregate application. The mudstone rocks also have a rock strength that is considered too low for use as base course or sub base. The rock is, however, often a preferred material for gravel wearing course applications, and breaks down easily on the roadway during mechanical placement. Most of the Karoo Supergroup rocks are considered suitable for select subgrade applications.

The intrusive dolerites can be highly variable in terms of rock strengths and weathering profiles. The geotechnical properties of these rocks are often affected by the cooling rates of the magma when they were formed; slow cooling magma forms larger crystals that develop into high strength rocks, whilst quickly cooling magma forms smaller crystals that can eventuate into low strength rocks. The dolerite also displays a weathering profile that can be deep (tens of metres) and dominated by fresh rock core stones of variable sizes, or shallow weathering with soil cover often less than one metre underlain by competent rock without core stones. The weathering profiles and rock strengths of dolerite are not easily ascertainable based on surface outcrop. It is common, nevertheless, for the dolerite outcrop to reveal a positively weathered landform in the study area, frequently associated with a very different vegetation cover to that of the surrounding Karoo Supergroup rocks.

The extremely weathered dolerite reveals a deep red-coloured soil cover often pock-marked with sub-rounded and well-rounded dolerite core stones. These weathered soils are often highly dispersive and erosion scours are common in areas where positive relief is not offered adequate protection from vegetation cover. Doleritic soil is frequently highly expansive and considered unsuitable for any road construction application. The materials' construction suitability improves with depth as the highly weathered rock (Sabunga) is considered suitable for gravel wearing course use in arid environments, whilst the moderately weathered, slightly weathered and fresh rock is a well-documented source of good sub base and base course.

2.5.5 Hydrology (Ground and surface water)

The drainage of the area generally flows in a south-easterly direction (Figure 3). The Mvenyane and Kinira Rivers, being tributaries of the Mzimvubu River is the main catchment system. The minor seasonal streams in the surrounding area in proximity to the Borrow Pits are tributaries of this system. Where Borrow Pits are in the vicinity of drainage lines and rivers, stormwater and runoff will need to be adequately managed to prevent increased turbidity of downstream river systems. With the proper implementation of the EMP it likely that any existing impacts that are currently present will be reduced. Rivers area is indicated on the close-up maps of the individual Borrow Pit descriptions.

Some wetlands (Natural and artificial) may be in proximity to seasonal wetlands. As for drainage lines above, runoff will need to be managed and will be dealt with in Borrow Pit descriptions accordingly. After rehabilitation

of the Borrow Pits, some areas will probably be natural accumulation areas for runoff from surrounding areas and become small dams or artificial wetlands in the long-term.

Groundwater resources could potentially be affected by the mining of Borrow pits due to inadvertent fuel and chemical spills. If the management measure prescribed below are adhered to it is not anticipated that groundwater resources would be significantly affected by the Borrow Pits.

2.5.6 Climate

The area is a predominantly summer rainfall area, with MAP of 780 mm (Kokstad), mostly in the form of thunderstorms. Mean annual temperatures in the Kokstad area is 12.9 – 15.6°C. Moderately severe mist and frost as well as occasional snowfalls do occur.

2.5.7 Air quality

Air quality levels in rural areas surrounding the Borrow Pit sites are typically good. The gravel roads are however a source of dust, especially during dry windy conditions. Air quality may be temporarily affected by the mining and concomitant road surfacing operations during the routine maintenance periods.

2.5.8 Noise

The Borrow pit sites are generally situated relatively close to provincial gravel roads, which are an existing source of noise. The current ambient noise levels are assumed to be relatively high due to road traffic. Noise receptors during mining operations would typically be residents in the villages nearest to the sites.

2.5.9 Paleontological resources

The Beaufort Group is Late Permian (255 million years) to Mid Triassic (237 million years) in age. Characteristic fossils include fish, amphibians and reptiles with a dominance of mammal-like reptiles (Theraptids). In addition, characteristic fossils include plant fossils of the *Glossopteris* flora with occasional invertebrate fossils (freshwater bivalve molluscs). Most of the fossil specimens represent groups that are now extinct. It is estimated that less than 5 % of sites have been identified in the Eastern Cape. There is a lack of identified sites in the District.

An internationally important record of life during the early diversification of land vertebrate is provided by the floodplain of the Beaufort Group (Karoo Supergroup). Giant amphibian coexisted with diapsid reptiles (the ancestors of dinosaurs, birds and most modern reptiles), anapsids (which probably include the ancestors of tortoises) and synapsids, the dominant of the group of the time which included the diverse therapsids (including the ancestors of mammals). The rocks provide the world's most complete record of the important transition from early reptiles to mammals.
Most plant and animals were decimated during the end-Permian extinction event with Therapsid diversity being a serious contender for the most severe extinction event to affect life on Earth. Ongoing research on the effects of this extinction event is facilitated by the detailed record (afforded by the Beaufort Group strata) of life immediately before and after the event, as well as the gradual recovery of life afterwards.

The Beaufort Group is subdivided into a series of biostratigraphic units on the basis of its faunal content. There is a marked faunal change that occurs between the *Dicynodon* and *Lystrosaurus* Assemblage Zones and approaches the tops of the Balfour Formation. This corresponds with the major extinction event associated with the Perno-triassic boundary. The *Lustrosaurus* Assemblage Zone spans the uppermost (Palingkloof) member of the Balfour

Formation, the Katberg Formation (Tarkastad Subgroup, Beaufort Group, Karoo Supergroup) and the lower part of the Burgersdorp Formation (Tarkastad Subgroup, Beaufort Group, Karoo Supergroup).

The *Lystrosaurus* Assemblage Zone is dominated by a single genus of dicynodont*, Lyystrosaurus,* which together with the captorhinid reptile (*Procolophon)* characterise this zone. Biarmosuchian and gorgonopsian Therapside do not survive into the *Lystrosaurus* Assemblage Zone, though therocephalian and cyndontian Therapside exhibit moderate abundance. Captohinid Reptilia are reduced, however, an unprecedented diversity of giant amphibian characterises this interval.
The effect of the end Permian extinction event are also evident in the extensive and important record of fossil plants present in the rocks of the Karoo. Whereas faunas of the Permian age are dominated by a wide range of early seed plants, the Glossopteridale (which probably include the ancestors of modern gymnosperms and ultimately angiosperms), this group appears to have gone entirely extinct during the end-Permian extinction. The rocks of the Karoo provide an unrivalled sequential record of these change and the diversification of other group of plants in the aftermath of the extinction. The strata of the Karoo basin have also yielded fossils insects and insect leaf damage of a range of ages.

Though including the uppermost level of the *Lystrosaurus* Assemblage Zone, the Burgersdorp Formation largely corresponds to the *Cynognathus* Assemblage Zone. Synapsid therapsid diversity does not demonstrate recovery between the *Lystrosaurus* and *Cynognathus* assemblage zones. The *Dicynodontia, Lystrosaurus* and *Myosaurus* are replace by *Kombuisia* and the giant *Kannemeyeria.* Therocephalia exhibit a turnover of taxa at a generic level, but an overall reduction in diversity. Cynodontia (Therapsida, Synasida) alone amongst synapsids demonstrate a slight increase in genera. These include the small advance Cynodont, *Cynognathus*, which together with the Cynodont *Diademodon* and the Dicynodont *Kannemeyeria,* characterise this assemblage zone. Eosuchid and captorhinid Reptilia are moderately common, though showing no generic continuity with taxa of the underlying zone. Amphibia remain diverse, though they are not as generically diverse as in the *Lystosaurus* Assemblage Zone and likewise demonstrate no genus level continuity therewith. Fossil fish reach their greatest known Karoo Supergroup diversity in the Burgersdorp Formation (*Cynognathus* Assemblage Zone). Plants (*Dadoxylon, Dicroidium* and *Schizoneura),* trace fossils (including both vertebrate and invertebrate burrows) and a freshwater bivalve (*Unio karooensis*) have also been recovered.
As Dolerite is an intrusive igneous rock, it contains no fossils.

2.5.10 Archaeological resources

Archaeological remains can consist of the following:

1. Human remains (graves, informal graves and cemeteries)
2. Stone artefacts and tools
3. Large Stone Features (*Isisivane* and circular stone walls)
4. Freshwater shell middens
5. Historical artefacts and features
6. Fossil Bone

1 Human Remains

Any, and all, human remains that are exposed during all phases of construction must be reported to the archaeologist, nearest museum or relevant heritage resources authority. Construction must then be halted until the archaeologist has investigated and removed the human remains. Human remains may be exposed when a grace or informal burial has been disturbed. Remains are either buried in a flexed position on the side, or in a

sitting position with a flat stone capping the location of the burial. Developer are requested to be aware of the exposing human remains.

2 Stone Artefacts

Stone artefacts can be difficult for the layman to identify. Large accumulations of flaked stones that do not appear to have been distributed naturally must be reported. If the stone artefacts are associated with bone / faunal remains or any other associated organic and material cultural artefacts, development must be halted immediately and reported to the archaeologist, nearest museum or relevant heritage resources authority.

3 Large Stone Features

Even though large stone features occur in different forms and sizes, they are relatively easy to identify. The most common features are roughly circular walls (most collapsed), usually dry packed stone, and may represent: stock enclosures, the remains of wind breaks or cooking shelters. Other features consist of large piles of stones of different sizes and height that are known as *isisivane.* These features generally occur near river and mountain crossings. The purpose and meaning of the *isisivane* are not fully understood, however, interpretations include the representation of burial cairns and symbolic value.

4 Freshwater Shell Middens

Accumulations of freshwater shell middens comprising mainly freshwater mussel occur along the muddy banks of rivers and streams and were collected by pre-colonial communities as a food resource. The freshwater shell middens generally contain; stone artefacts, pottery, bone and (sometimes) human remains. Freshwater shell middens may be of various sizes and depths. An accumulation that exceeds 1 m² in extent must be report to the archaeologist, nearest museum or relevant heritage resources authority.

5 Historical Artefact and Features

These are relatively easy to identify and include the foundations and remain of buildings, packed dry stone walling representing domestic stock kraals. Other items include historical domestic artefacts such as: ceramics, glass, metal and military artefacts and dwellings.

6 Fossil Bones

Fossil bones may be embedded in geological deposits. Any concentrations of bone (whether fossilized of not) must be reported to the archaeologist, nearest museum or relevant heritage resources authority.

2.5.11 Land Use

As indicated in Figure 6 the Borrow Pits are predominantly located within or adjacent to areas classified as Degraded, Cultivated and in some cases (Peri) Urban as per the SANBI Land Cover (2009) map.

2.5.12 Erosion Potential

The erosion potential of soils is the sensitivity of soils to the effects of wind and water on the soil structure. The erodability index is determined by combining the effects of slope and soil type, rainfall intensity and land use. A low value indicates a high erosion risk and a high value indicates a low erosion risk. The area falls within an erodability index of between 7 and 9, indicating that the area has a moderate to high susceptibility to erosion. Adequate measures must thus be implemented to minimise erosion.

2.5.13 Vegetation of Southern Africa

At a regional level, two vegetation types are recognised within the immediate vicinity of the borrow pit sites (Mucina & Rutherford, 2006), which are namely East Griqualand Grassland and Drakensberg Foothill Moist Grassland (Figure 4). Drakensberg Foothill Moist Grassland having a conservation status of *Least Threatened* and East Griqualand Grassland being *Vulnerable* (Mucina & Rutherford, 2006).

East Griqualand Grassland (Gs 12)

Present in the east Griqualand region around Kokstad and Mataliele, in hilly country with slopes covered by grassland in places, with patches of bush clumps with *Leucosidea sericea* (only wet sites) or *Diospyros lycioides*, *Acacia karroo* and *Ziziphus mucronata* in low-lying and very dry sites. The vegetation is grassland with occasional bushclumps and generally species poor. Occurs predominantly on Mudstones and Sandstones of the Beaufort Group, but also sedimentary rocks of the Molteno, Elliot and Clarens Formations. Soils generally well-drained with clay present.

Conservation: *Vulnerable*. Target - 23 %. Only 0.2 % statutorily conserved in the Malekgonyane (Ongeluksnek) Wildlife Reserve and Mount Currie Nature Reserve. Over a quarter already transformed for cultivation (maize), plantations and urban sprawl. *Acacia dealbata* and *Acacia* mearnsii are invading these grasslands in places. Overgrazed areas are prone to erosion.

Drakensberg Foothill Moist Grassland (Gs 10)

Distribution ranges within the KwaZulu-Natal and Eastern Cape Provinces. Broad arc of Drakensberg piedmonts covering the surrounds of Bergville in the north, Nottingham Road, Impendle, Bulwer in the east, and Kokstad, Mount Currie, Underberg (KZN) and the surrounds of Mt Fletcher, Ugie, Maclear and Elliot (Eastern Cape) in the southwest. Present on moderately rolling and mountainous, much incised by river gorges of drier vegetation types and by forest, and covering forb-rich grassland dominated by short bunch grasses including *Themeda triandra* and *Tristachya leucothrix*. The geology is dominated by mudstones and sandstones of the Tarkastad and the Molteno Formation (Karoo Supergroup) as well as intrusive dolerites of Jurassic age. The dominant soil on the sedimentary parent material are well drained, with a depth of more than 800 mm and lay content from 15 – 55 %, representing soil forms such as Hutton, Clovelly, Griffin and Oatsdale. On the volcanic parent material (dolerite) the soils are represented by forms such as Balmoral, Shortlands and Vimy. Most common land types are Ac and Fa.

Conservation: Least threatened. Target 23%. Only 2–3% statutorily conserved in the uKhahlamba Drakensberg Park, Ntsikeni Wildlife Reserve as well as in the Karkloof, Mount Currie, Coleford, Fort Nottingham, Impendle, Ngeli, and Umgeni Vlei Nature Reserves. Almost 20% already transformed for cultivation, plantations and by urban sprawl. Alien woody species of Rubus and Acacia dealbata and Solanum mauritianum may become invasive in places. Erosion is very low to moderate.

2.5.14 Eastern Cape Biodiversity Conservation Plan (ECBCP)

Critical biodiversity areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning (SANBI 2007). These form the key output of the conservation plan. They are used to guide protected area selection and should remain in their natural state as far as possible.

As indicated in Figure 5, the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007) the Borrow Pits are predominantly situated in areas designated a CBA 2 status (terrestrial), with one within designated CBA 1 area. Due to the limited size of these Borrow Pits, and their location within disturbed areas, their effect on Critical

Biodiversity Areas will be minimal. Individual Borrow Pits that are within CBA 1 or CBA 2 areas will be highlighted and appropriate measures recommended in the Impact and Mitigation sections of the report where necessary.

No Borrow Pits are located within designated Reserves (class 1 and class 2) none are within aquatic CBA's.

2.5.15 Implications of Regional Planning frameworks

The expansion of the borrow pits is unlikely to compromise the vegetation units significantly due to:

1. The small mining footprint.
2. The generally degraded state of the existing borrow pits and immediate vicinity.
3. The general close proximity to the road reserves.
4. The implementation of a formalized rehabilitation plan.

Loss of vegetation cover will thus tend to be highly localised and have a minimal impact (individual and cumulative) at a regional level. Furthermore it will most likely result in an overall improvement of the ecological integrity of existing sites that currently tend to be in a highly degraded state, as a result of inadequate historical remediation methods.

The impact of the expansion of existing Borrow Pits, generally located directly adjacent to roads in areas that are generally degraded is unlikely to have any significant negative impact on ecological processes occurring at a regional level. The implementation of best practice guidelines (as per the EMP) will most likely be effective management to minimise any negative consequences to being located within Critical Biodiversity Areas. In addition, since the existing Borrow Pits are currently inadequately managed, the implementation of the recommended management actions in the EMP will most likely result in an improvement to the status quo.

Any Borrow Pits that are significantly affected by the Regional Planning Frameworks will be dealt with accordingly in their relative Impact and Mitigation sections.

2.5.16 Species of Special Concern occurring in the region

Based on a desktop Assessment of existing online databases as well as field verification, the potential list of flora and fauna species that may occur in the vicinity of the Borrow Pits, is quite extensive. Common flora species such as: *Aloe arborescens, Aloe ferox, Aloe maculata, Bulbine abyssinica* and *Boophone disticha*, are common around some of the sites.

The Giant Bull Frog, may be present in wetlands, but are unlikely to be affected by the Borrow Pits, which will not likely impact on any wetlands.

Appendix E provides a detailed list of species protected in term of the P.N.C.O., for which permits may be required should they occur. However limited field assessments indicate that the majority of these species are unlikely to be present. Due to limited sampling time, Presence or absence cannot be confirmed without detailed seasonal site visits, but the risk of any Critically Endangered or Endangered species being present is Low. The limited expansion of the Borrow Pits is thus unlikely to result in any significant impact to species conservation.

No Red Listed Critically Endangered or Endangered species are recorded for the area, nor are likely to occur at disturbed Borrow Pit sites.

Table 5: Species of Special Concern known to occur in the vicinity of the sites.

Scientific Name	Family	Common name	Status	Endemic
Flora				
Albuca setosa	HYACINTHACEAE		PNCO	
Aloe arborescens	ASPHODELACEAE		PNCO	
Aloe ferox	ASPHODELACEAE		PNCO	
Aloe maculata	ASPHODELACEAE		PNCO	
Aristea anceps	IRIDACEAE		PNCO	
Bergeranthus multiceps	MESEMBRYANTHEMACEAE		PNCO	
Boophone disticha	AMARYLLIDACEAE		PNCO	
Brunsvigia grandiflora	AMARYLLIDACEAE		PNCO	
Bulbine abyssinica	ASPHODELACEAE		PNCO	
Bulbine asphodeloides	ASPHODELACEAE		PNCO	
Bulbine narcissifolia	ASPHODELACEAE		PNCO	
Cyrtanthus macowanii	AMARYLLIDACEAE		PNCO	
Delosperma repens	MESEMBRYANTHEMACEAE		PNCO	
Dierama atrum	IRIDACEAE		PNCO	
Dietes iridioides	IRIDACEAE		PNCO	
Drimia macrocentra	HYACINTHACEAE		PNCO	
Eulophia foliosa	ORCHIDACEAE		PNCO	
Gasteria excelsa	ASPHODELACEAE		PNCO	
Gladiolus longicollis subsp. longicollis	IRIDACEAE		PNCO	
Gladiolus mortonius	IRIDACEAE		PNCO	
Haemanthus humilis subsp. humilis	AMARYLLIDACEAE		PNCO	
Holothrix scopularia	ORCHIDACEAE		PNCO	
Hypoxis acuminata	HYPOXIDACEAE		PNCO	
Hypoxis angustifolia var. buchananii	HYPOXIDACEAE		PNCO	
Ledebouria cooperi	HYACINTHACEAE		PNCO	
Ledebouria revoluta	HYACINTHACEAE		PNCO	
Ornithogalum longibracteatum	HYACINTHACEAE		PNCO	
Ornithogalum tenuifolium subsp. tenuifolium	HYACINTHACEAE		PNCO	
Ruschia putterillii	MESEMBRYANTHEMACEAE		PNCO	
Satyrium longicauda var. longicauda	ORCHIDACEAE		PNCO	
Satyrium parviflorum	ORCHIDACEAE		PNCO	
Watsonia densiflora	IRIDACEAE		PNCO	
Watsonia pillansii	IRIDACEAE		PNCO	
Mammals				
Myotis tricolor	VESPERTILIONIDAE	Temminck's Hairy Bat	Near Threatened	
Reptiles				
None				
Amphibians				
Pyxicephalus adspersus	PYXICEPHALIDAE	Giant Bull Frog	NT	
Invertebrates				
Aslauga australis (Butterfly)	LYCAENIDAE	Southern Purple	Data Deficient	Yes
Chrysoritis lyncurium (Butterfly)	LYCAENIDAE	Tsomo River Opal	Vulnerable	Yes
Chrysoritis penningtoni (Butterfly)	LYCAENIDAE	Pennington's Opal	Vulnerable	Yes
Fish				
Clarias gariepinus	CLARIIDAE		NEMBA (NL)	

The plant and animal species of special concern listed above require permits if any individuals are to be removed, translocated or pruned according to the relevant legislation including the National Forests Act and the Provincial Nature Conservation Ordinance as well as Threatened and Protected Species (T.o.P.S.)

2.5.17 Social and economic environment

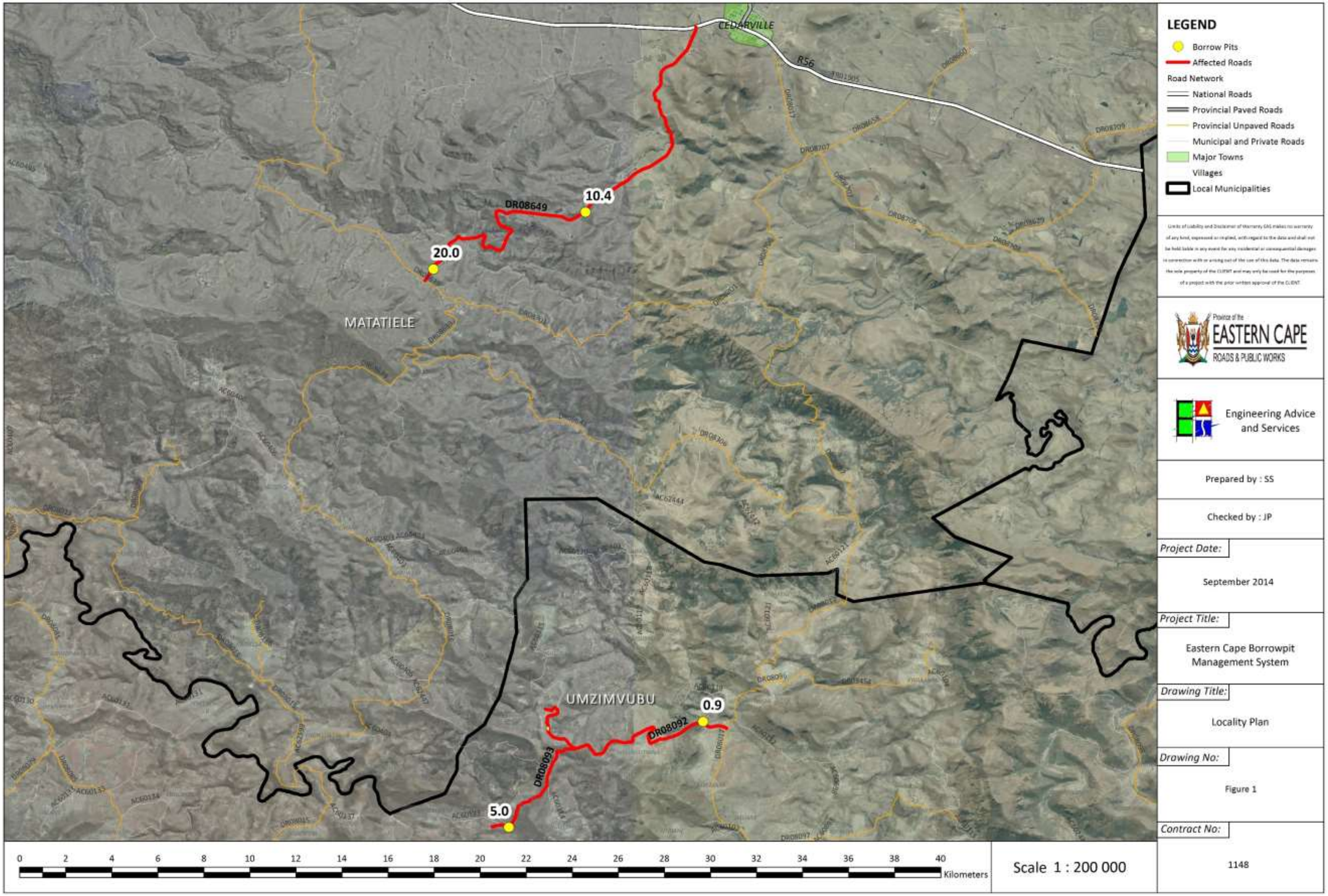
The Borrow Pits will be utilised for routine maintenance of gravel roads in the area. These roads connect the villages and urban areas, thus if they are not maintained there will be a negative impact on the people, their health (safety) and their livelihoods. Furthermore vehicular 'wear and tear' results in higher living costs. Formalisation of the Borrow Pits will allow for regular routine maintenance of the roads that will benefit not only local communities and residents but also all road users.

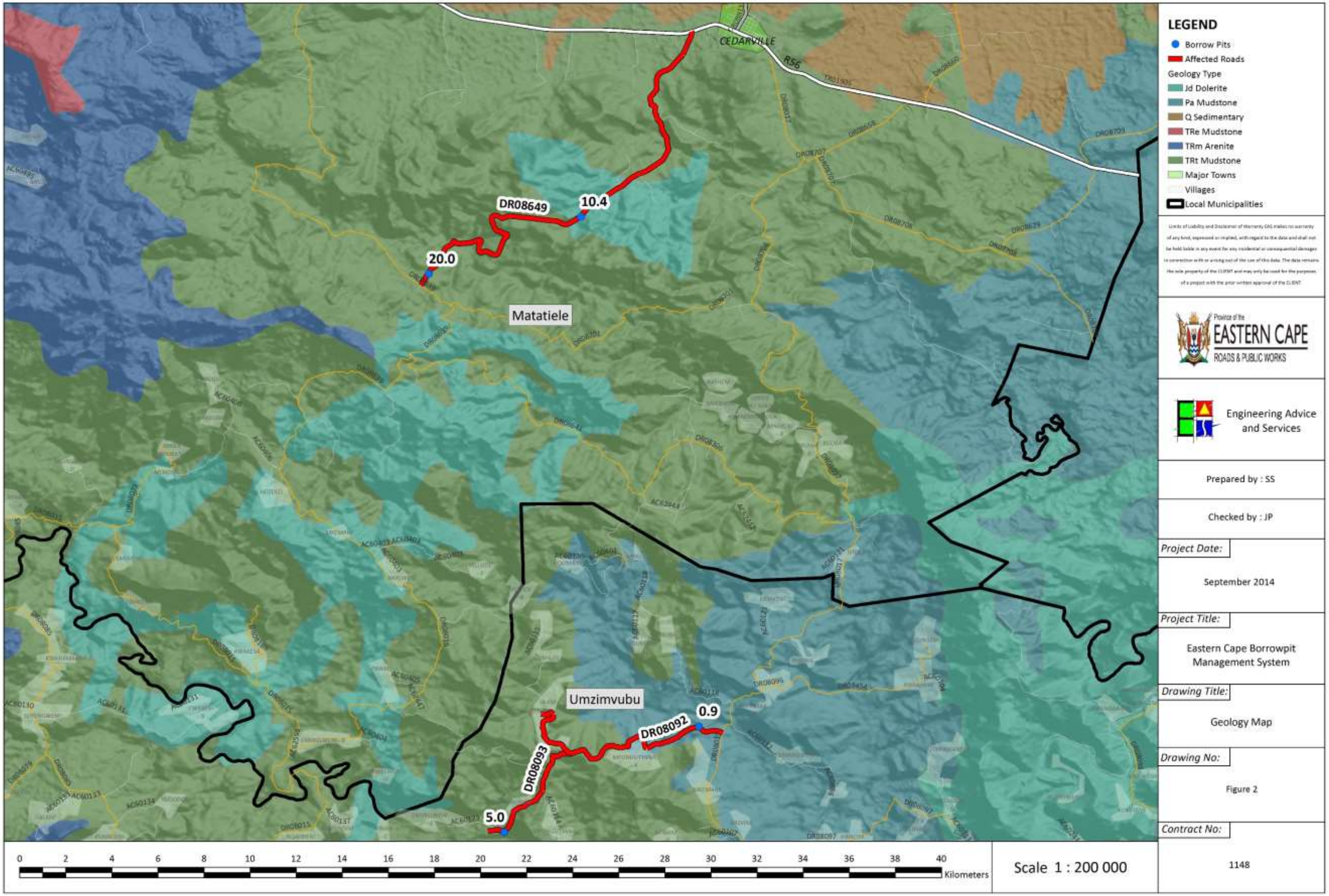
No people will be directly affected by the proposed mining of Borrow Pits, but there may be a temporary noise and dust increase on nearby residents. Potential Impacts will be assessed on an individual Borrow Pit basis in the following sections.

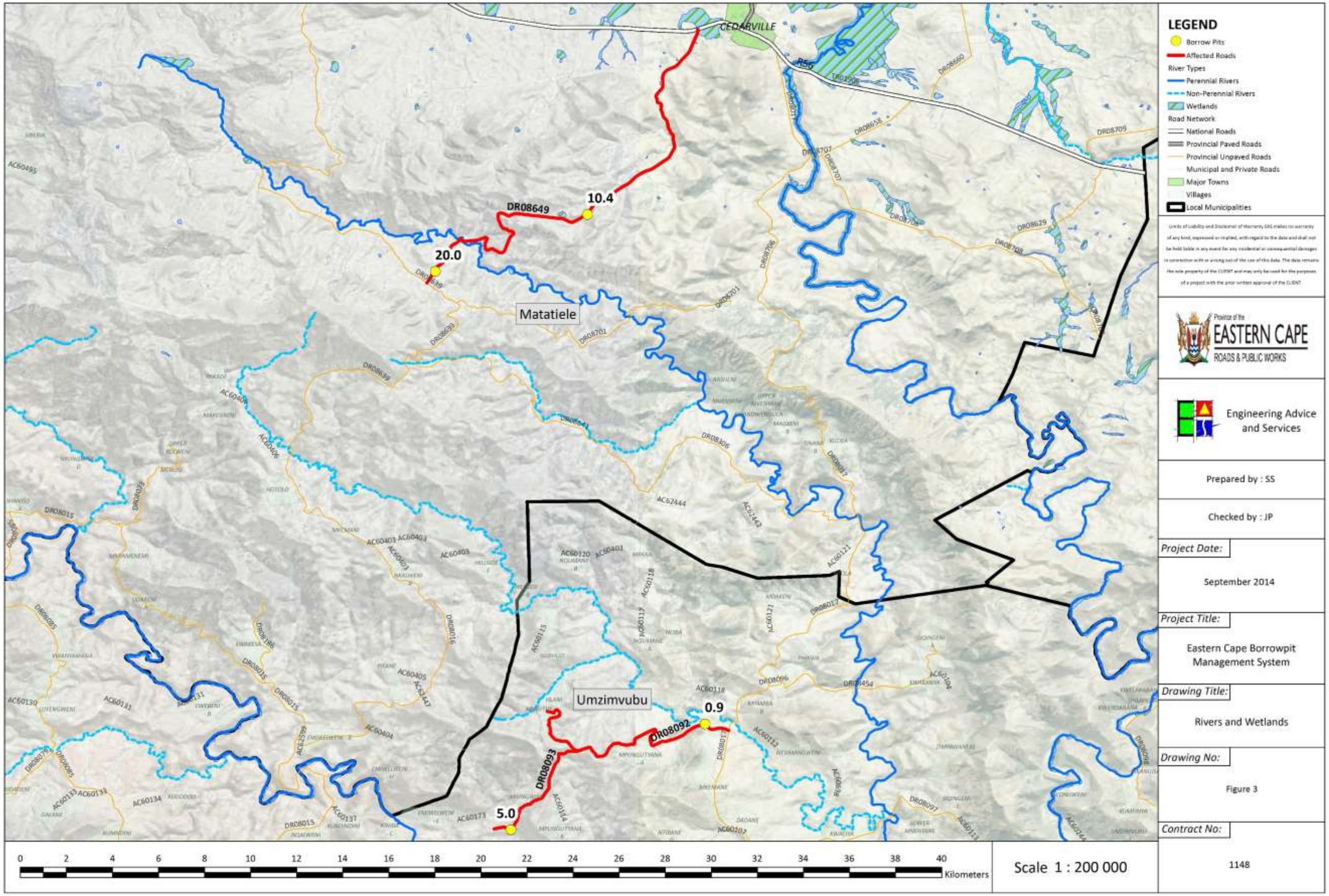
2.5.18 Health and Safety

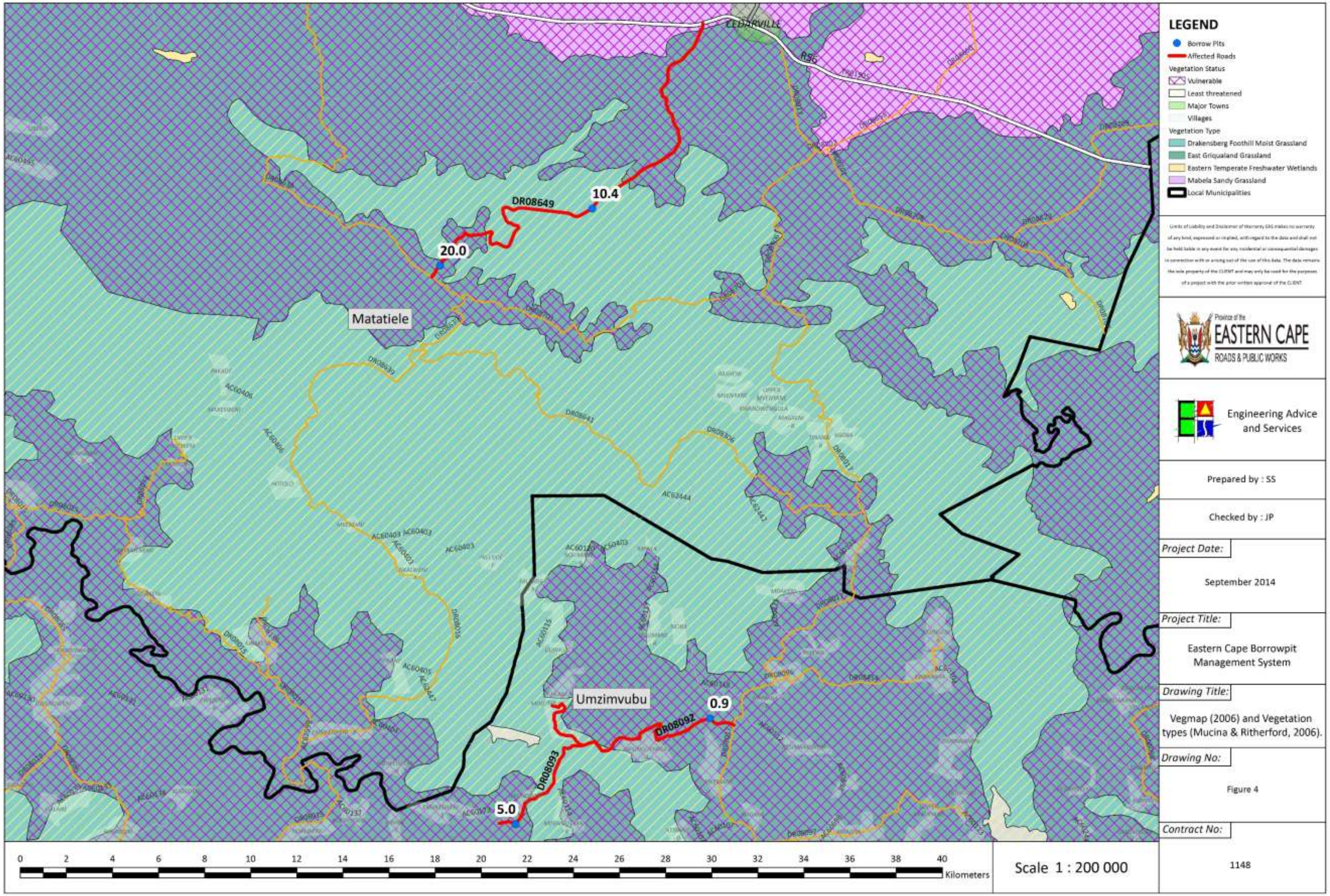
There are certain risks posed to human health and safety via exposure to high noise and dust levels, as well as steep and/or unstable faces formed during mining activities. Pools of standing water can also pose a risk to livestock and people in rural areas. Community health and safety risks should be controlled through the implementation of a Health and Safety Management Plan to be implemented by the Contractor. Existing unsafe excavations (with vertical faces) and deep excavations where standing water can accumulate should be "made safe" on closure using unused and stockpiled overburden and topsoil.

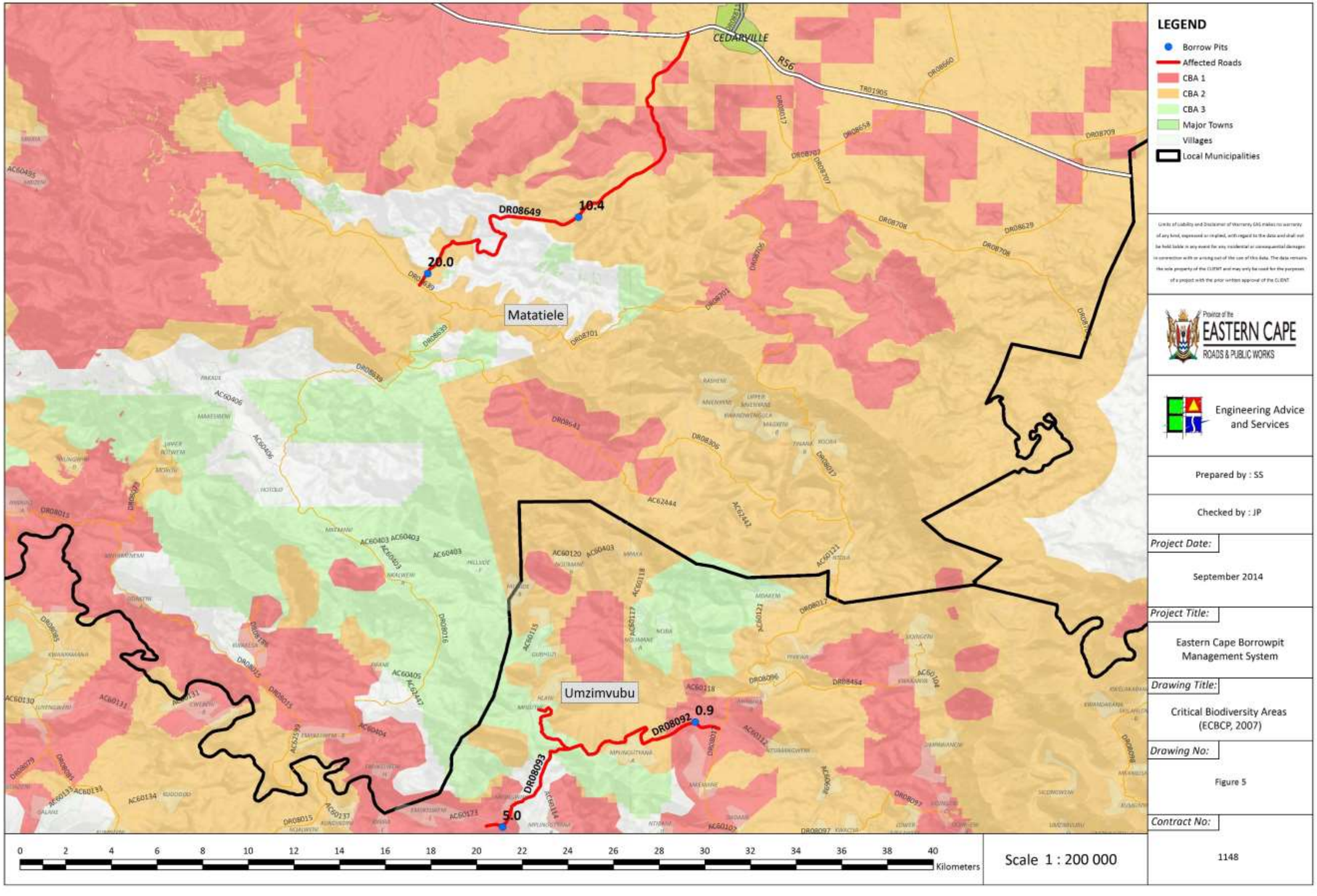
2.6 List of Maps

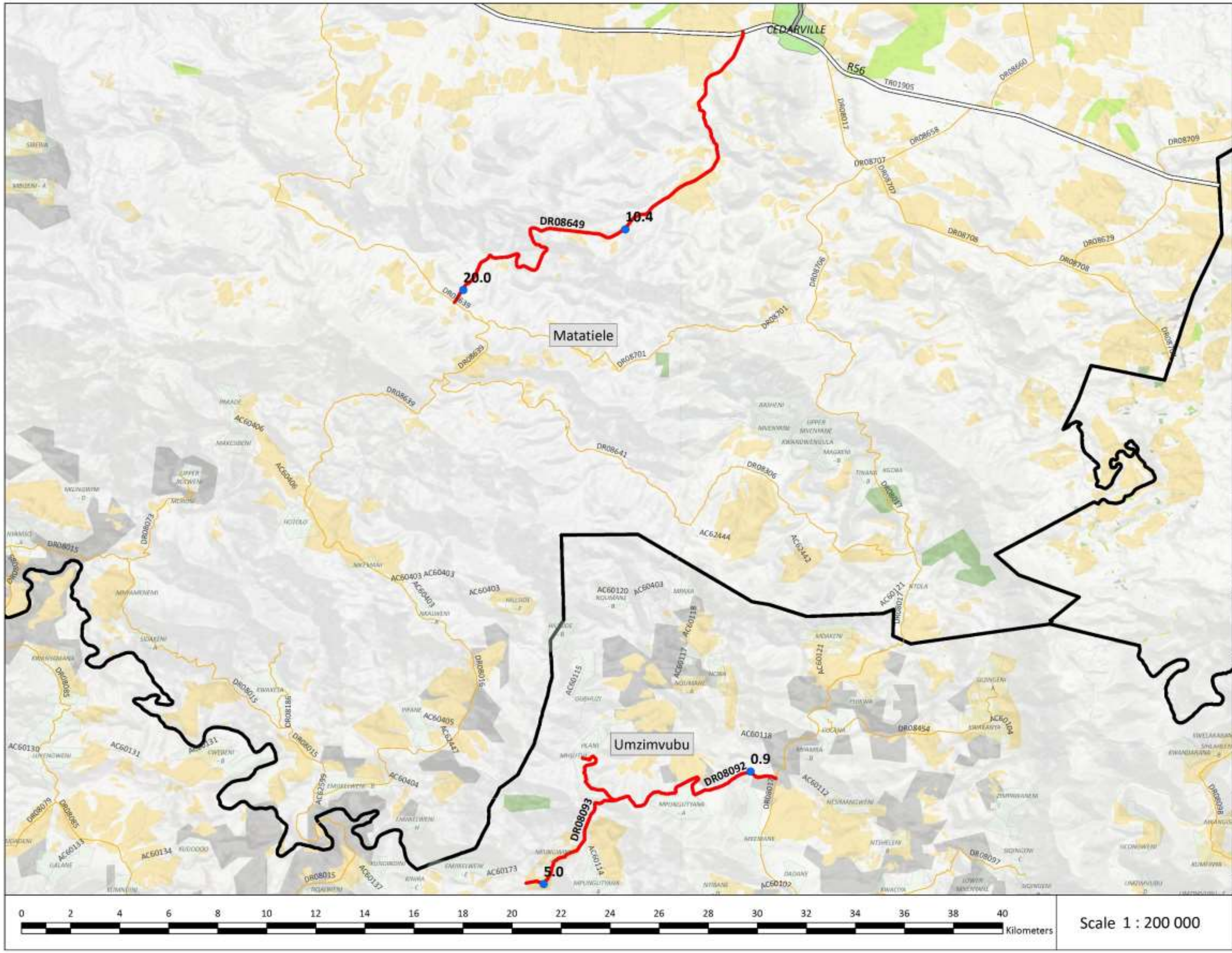

CEDARVILLE
R56
MATATIELE
UMZIMVUBU
DR08649
10.4
20.0
DR08092
0.9
DR08093
5.0
LEGEND
Borrow Pits
Affected Roads
Road Network
National Roads
Provincial Paved Roads
Provincial Unpaved Roads
Municipal and Private Roads
Major Towns
Villages
Local Municipalities
Limits of Liability and Disclaimer of Warranty: GAS makes no warranty of any kind, expressed or implied, with regard to the data and shall not be held liable in any event for any incidental or consequential damages in connection with or arising out of the use of this data. The data remains the sole property of the CLIENT and may only be used for the purposes of a project with the prior written approval of the CLIENT
Province of the EASTERN CAPE ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Locality Plan
Drawing No:
Figure 1
Contract No:
1148
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
Kilometers
Scale 1 : 200 000


CEDARVILLE
R56
DR08649
10.4
20.0
Matatiele
Umzimvubu
DR08092
0.9
DR08093
5.0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
Kilometers
Scale 1 : 200 000
LEGEND
Borrow Pits
Affected Roads
Geology Type
Jd Dolerite
Pa Mudstone
Q Sedimentary
TRe Mudstone
TRm Arenite
TRt Mudstone
Major Towns
Villages
Local Municipalities
Province of the EASTERN CAPE ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Geology Map
Drawing No:
Figure 2
Contract No:
1148


CEDARVILLE
R56
DR08649
10.4
20.0
Matatiele
Umzimvubu
0.9
DR08092
DR08093
5.0
LEGEND
Borrow Pits
Affected Roads
River Types
Perennial Rivers
Non-Perennial Rivers
Wetlands
Road Network
National Roads
Provincial Paved Roads
Provincial Unpaved Roads
Municipal and Private Roads
Major Towns
Villages
Local Municipalities
Province of the EASTERN CAPE ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Rivers and Wetlands
Drawing No:
Figure 3
Contract No:
1148
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 Kilometers
Scale 1 : 200 000


CEDARVILLE
R56
DR08649
10.4
20.0
Matatiele
Umzimvubu
0.9
DR08092
DR08093
5.0
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Kilometers
Scale 1 : 200 000
LEGEND
Borrow Pits
Affected Roads
Vegetation Status
Vulnerable
Least threatened
Major Towns
Villages
Vegetation Type
Drakensberg Foothill Moist Grassland
East Griqualand Grassland
Eastern Temperate Freshwater Wetlands
Mabela Sandy Grassland
Local Municipalities
Province of the
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice
and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit
Management System
Drawing Title:
Vegmap (2006) and Vegetation
types (Mucina & Ritherford, 2006).
Drawing No:
Figure 4
Contract No:
1148


CEDARVILLE
R56
TR01905
DR08649
10.4
20.0
Matatiele
Umzimvubu
DR08092
0.9
DR08093
5.0
LEGEND
Borrow Pits
Affected Roads
CBA 1
CBA 2
CBA 3
Major Towns
Villages
Local Municipalities
Province of the EASTERN CAPE ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Critical Biodiversity Areas (ECBCP, 2007)
Drawing No:
Figure 5
Contract No:
1148
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
Kilometers
Scale 1 : 200 000



LEGEND

- Borrow Pits
- Affected Roads
- Local Municipalities

Landcover

- Natural
- Plantations
- Mines
- Cultivated
- Degraded
- Urban Built-up

Province of the EASTERN CAPE ROADS & PUBLIC WORKS

Engineering Advice and Services

Prepared by : SS

Checked by : JP

Project Date: September 2014

Project Title: Eastern Cape Borrowpit Management System

Drawing Title: Land Use

Drawing No: Figure 6

Contract No: 1148

3 Individual Borrow Pit Assessments

This section of the report addresses REGULATION 52 (2) and REGULATION 52 (2) (b) of the MPRDA for each borrow pit. An overall summary of the impacts and general mitigation measures is provided in the next section.

- REGULATION 52 (2): Description of the environment likely to be affected by the proposed prospecting or mining operation
  a) The environment on site relative to the environment in the surrounding area.
  b) The specific environmental features on the site applied for which may require protection, remediation, management or avoidance.
  c) Map showing the spatial locality of all environmental, cultural/heritage and current land use features identified on site.
  d) Confirmation that the description of the environment has been compiled with the participation of the community, the landowner and interested and affected parties,

Each Borrow Pit description is comprised of the following:

5. Description of the Borrow Pit in a table
6. Contact Information
7. Location Details
8. Physical Details
9. Samples Collected and Tests Performed
10. Biophysical Environment Description
11. Social Environment Description
12. Issues raised by Interested and Affected Parties: Notification letters were sent to IAP's. Correspondence letters from landowner, municipal manager, Ward councilors and other I&AP's are included in Appendix B and any issues raised are summarised in the table.
13. Photographic Record of the Borrow Pit
14. Locality Plan and Aerial Photo of the Borrow Pit showing the surrounding area
15. Mining Plan
16. Mining Plan Details and Summary of important Potential Impacts and Mitigation Measures

Photo 1 & 2: Existing Mining Surface

Photo 3 & 4: Current Mined area

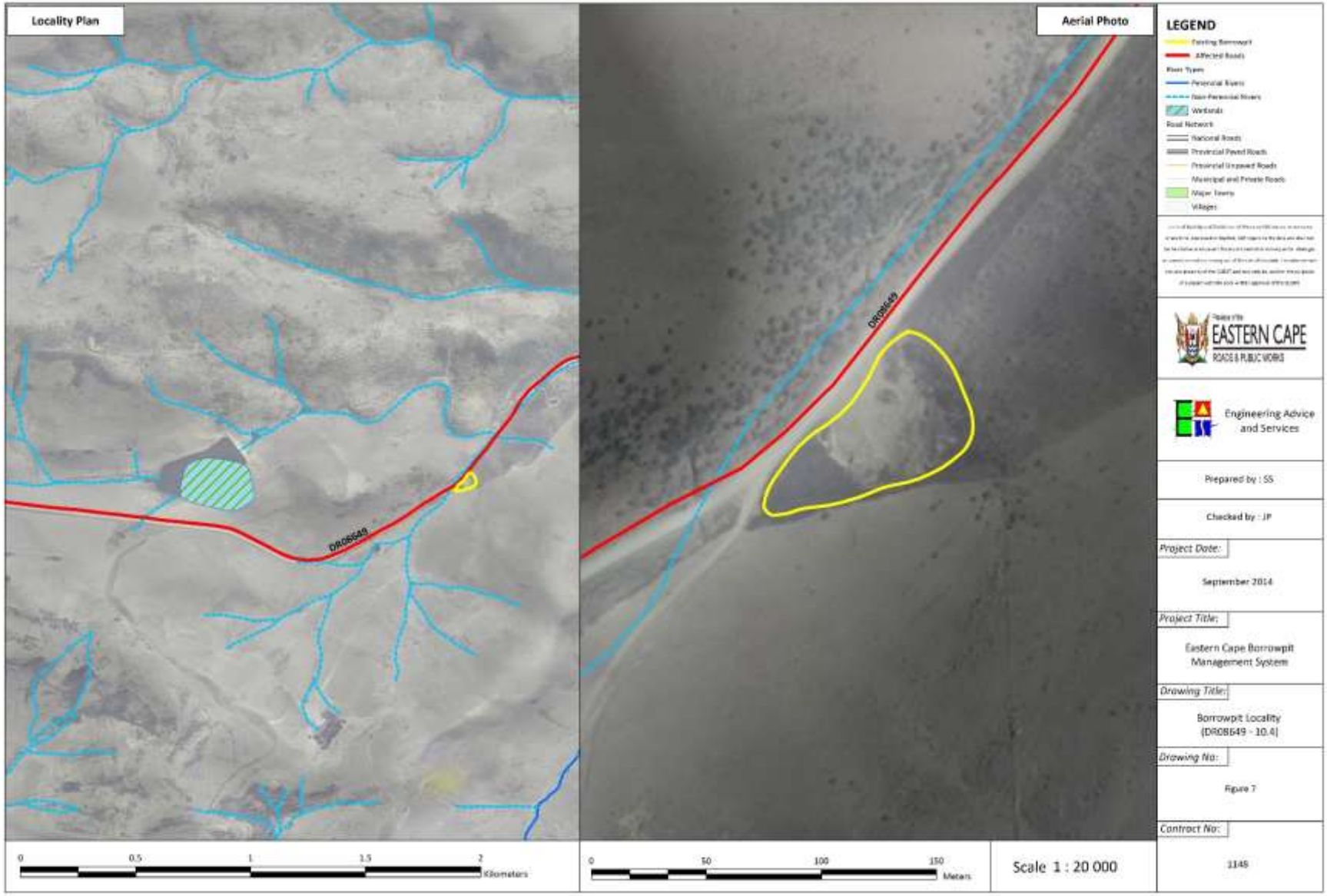
Photo 5 & 6: Expansion area

Photo 7 & 8: Sensitive areas

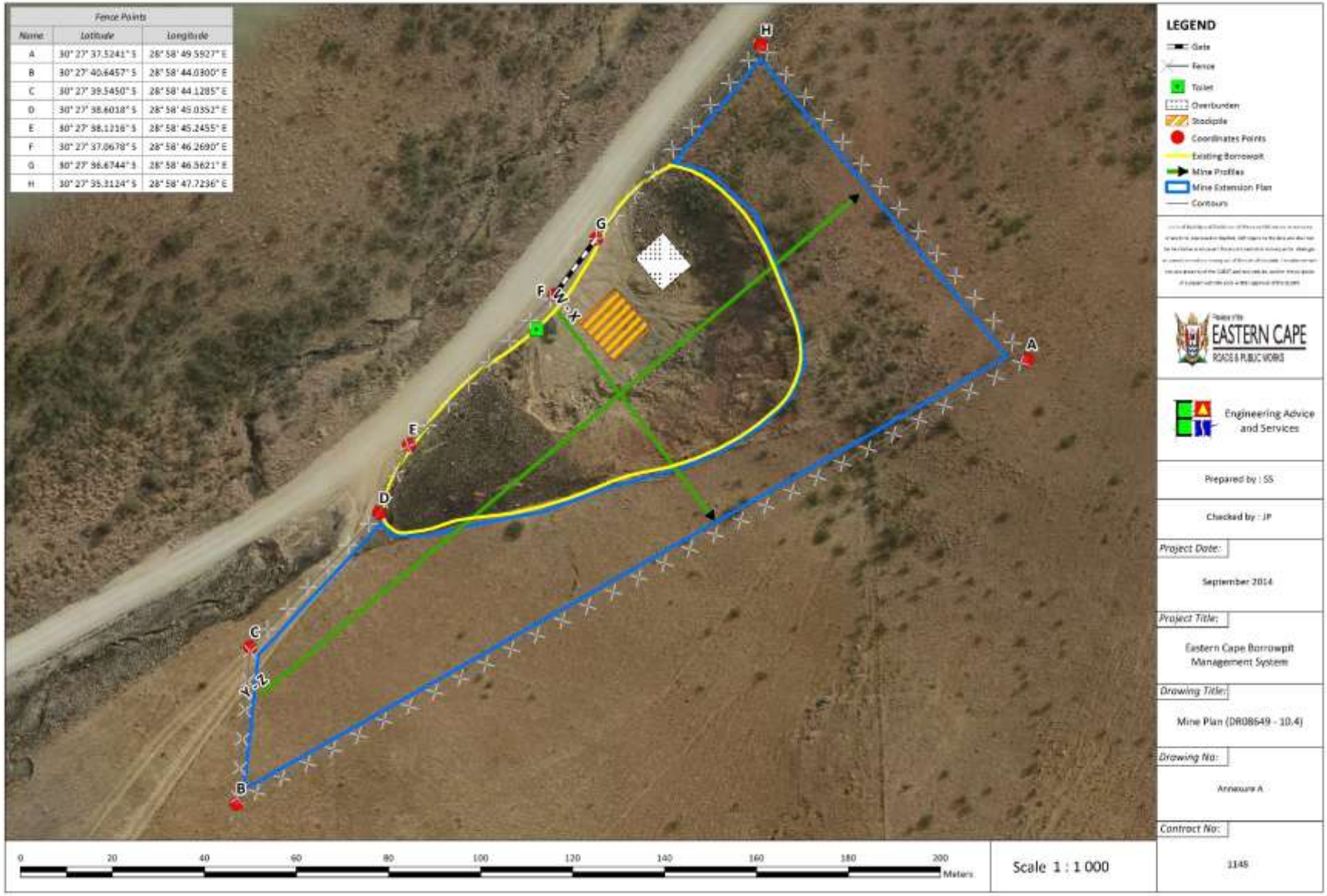
3.1 DR08649/10.4

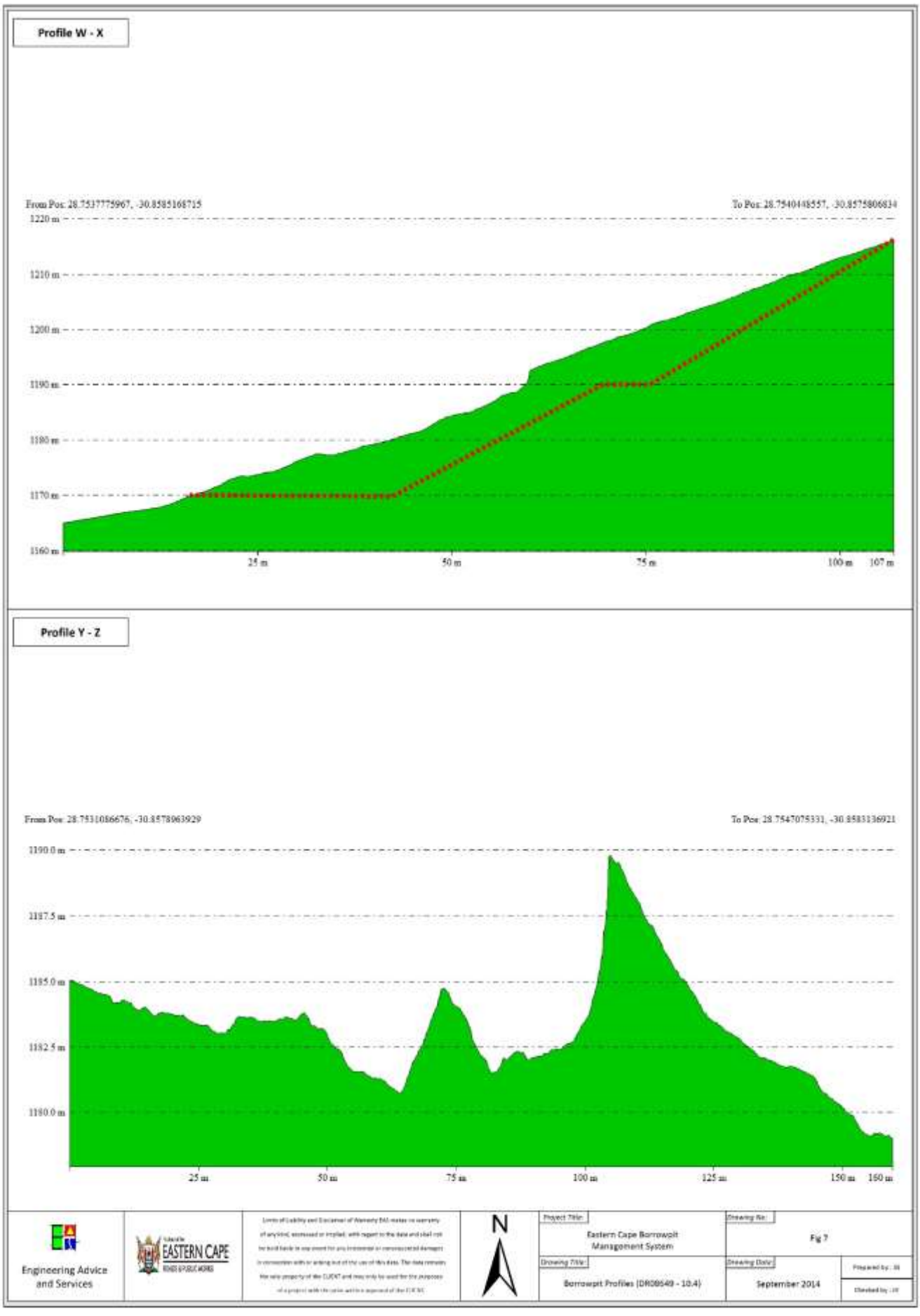
Contact Information		
Contact	**Name**	**Contact Number**
Landowner		
Ward Councillor		
Municipal Manager		
Location Details		
GPS Position:		
Topography:		
Distance from Road:		
Physical Details		
Access:		
Fencing:		
Borrow Pit Extent:		
Proposed Mining Direction:		
Material Availability:		
Material Type:		
Data Collection:		
Sample Collection and Tests Performed		
Dolerite		
Sandstone		
Biophysical Environmental Description		
Vegetation and Status		
Present Land Use		
CBA		
Land Use Type		
Agricultural features		
Alien invasive species		
Potential Faunal Habitat:		
Natural Drainage and Erosion		
Rivers and Drainage Lines		
Wetlands		
Quaternary Catchment		
Social Environment Description		
Heritage		
Palaeontology		
Archaeology		
Buildings and Structures		
Issus raised by I & AP's		
Mining Plan Details		
Proposed mining direction:		
Area to be mined		
Projected volume		
Access road		
Impact Assessment Mitigation		
Issue	**Description**	Recommendation
Visual Exposure:		

Natural Drainage and wetlands:		
Buildings:		
Overhead Services:		
Underground Services:		
Fences:		
Vegetation		
Fauna		
Agricultural features		
Grazing		


Locality Plan
Aerial Photo
DR08649
LEGEND
Existing Borrowpit
Affected Roads
River Types
Perennial Rivers
Non-Perennial Rivers
Wetlands
Road Network
National Roads
Provincial Paved Roads
Provincial Unpaved Roads
Municipal and Private Roads
Major Towns
Villages
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Borrowpit Locality (DR08649 - 10.4)
Drawing No:
Figure 7
Contract No:
1148
0 0.5 1 1.5 2 Kilometers
0 50 100 150 Meters
Scale 1 : 20 000

DR08649/10.4

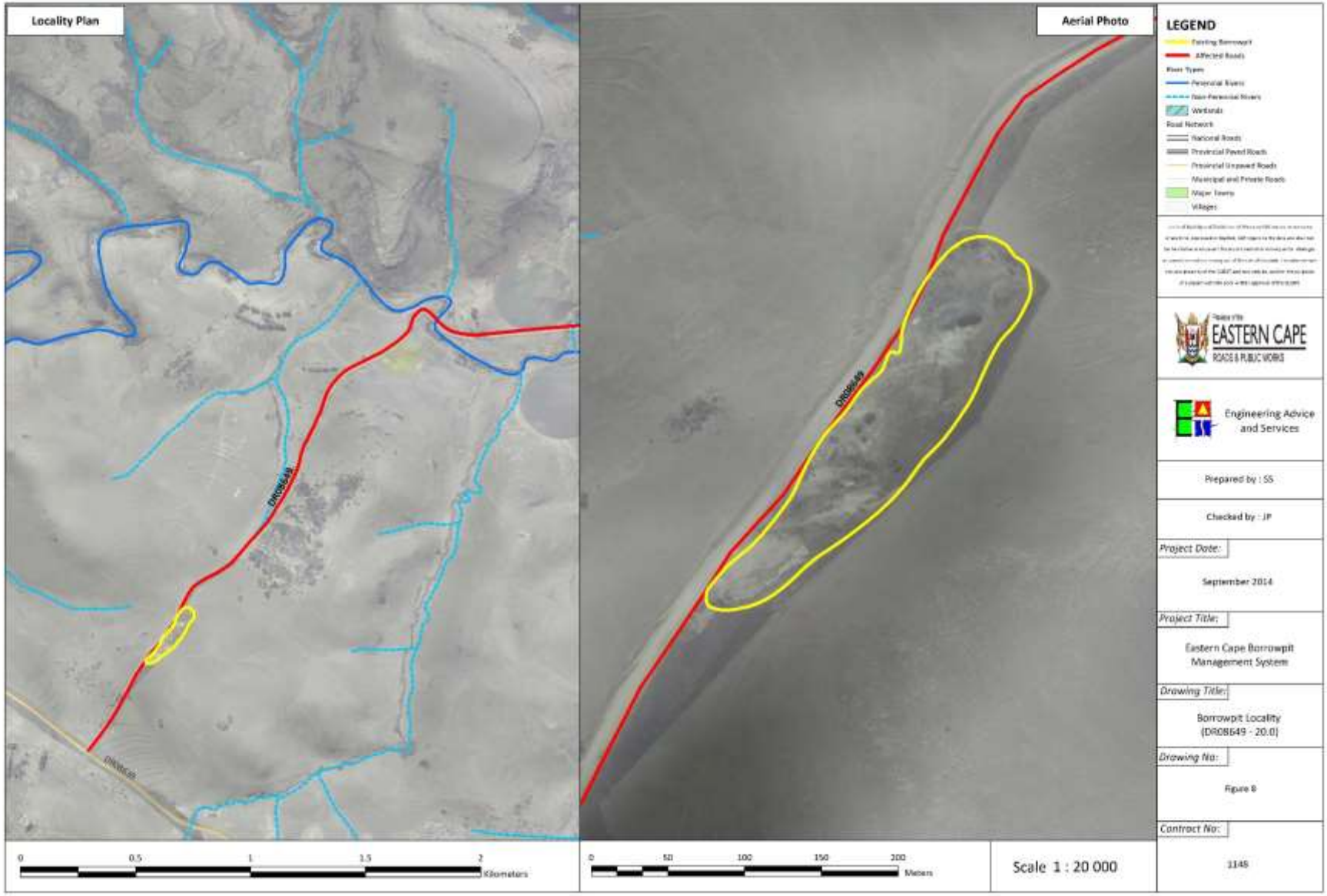

Fence Points
Name | Latitude | Longitude
A | 30° 27' 37.5241" S | 28° 58' 49.5927" E
B | 30° 27' 40.6457" S | 28° 58' 44.0300" E
C | 30° 27' 39.5450" S | 28° 58' 44.1285" E
D | 30° 27' 38.6018" S | 28° 58' 45.0352" E
E | 30° 27' 38.1216" S | 28° 58' 45.2455" E
F | 30° 27' 37.0678" S | 28° 58' 46.2690" E
G | 30° 27' 36.6744" S | 28° 58' 46.5621" E
H | 30° 27' 35.3124" S | 28° 58' 47.7236" E
LEGEND
Gate
Fence
Toilet
Overburden
Stockpile
Coordinates Points
Existing Borrowpit
Mine Profiles
Mine Extension Plan
Contours
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Mine Plan (DR08649 - 10.4)
Drawing No:
Annexure A
Contract No:
1148
0 20 40 60 80 100 120 140 160 180 200
Meters
Scale 1 : 1 000


Profile W - X
From Pos: 28.7537775967, -30.8585168715
To Pos: 28.7540448557, -30.8575806834
1220 m
1210 m
1200 m
1190 m
1180 m
1170 m
1160 m
25 m
50 m
75 m
100 m
107 m
Profile Y - Z
From Pos: 28.7531086676, -30.8578963929
To Pos: 28.7547075331, -30.8583136921
1190.0 m
1187.5 m
1185.0 m
1182.5 m
1180.0 m
25 m
50 m
75 m
100 m
125 m
150 m
160 m
Engineering Advice and Services
EASTERN CAPE
ROADS & PUBLIC WORKS
N
Project Title:
Eastern Cape Borrowpit Management System
Drawing No:
Fig 7
Drawing Title:
Borrowpit Profiles (DR09549 - 10.4)
Drawing Date:
September 2014
Prepared by:
Checked by:

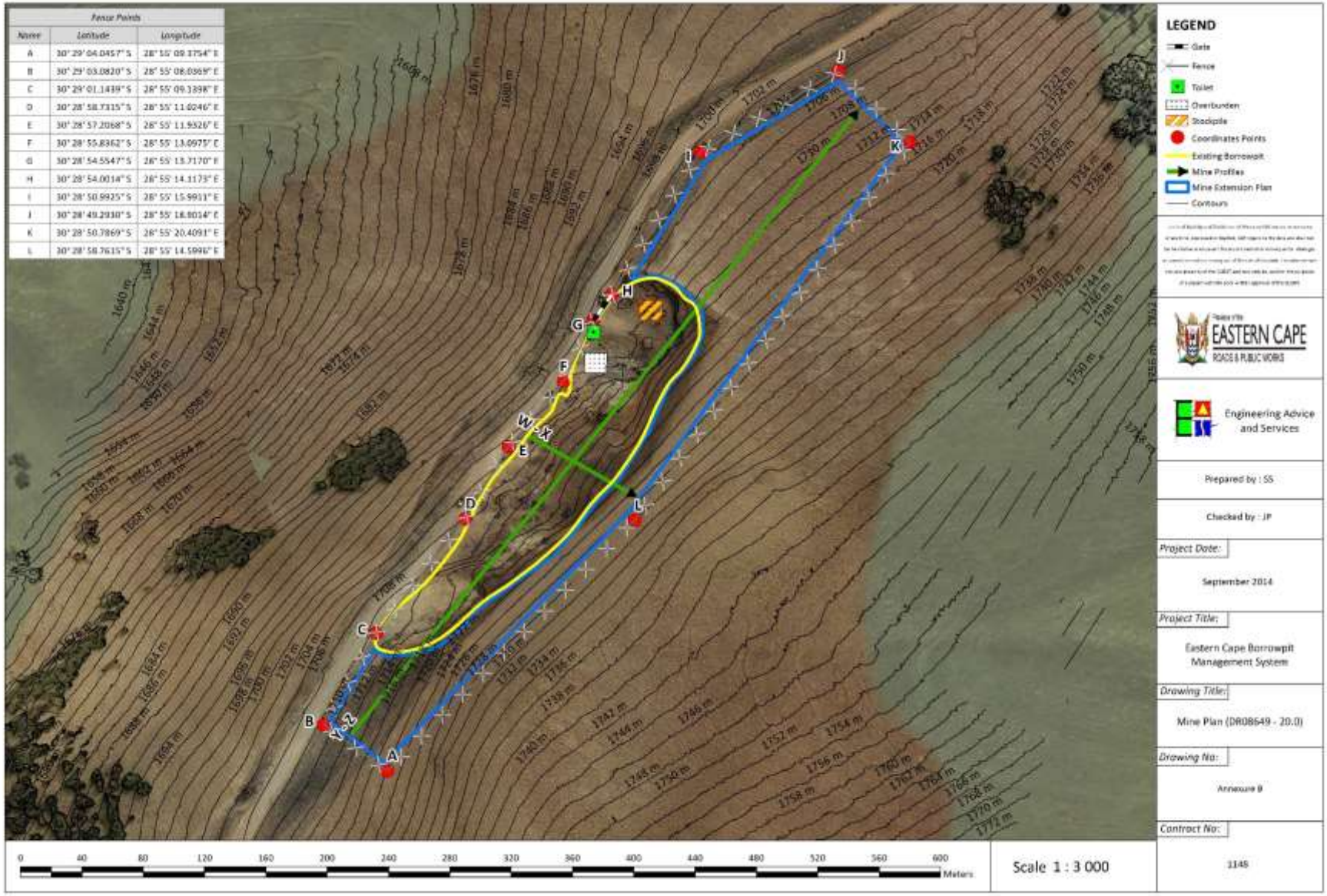
3.1 Borrow Pit DR08649/20.0

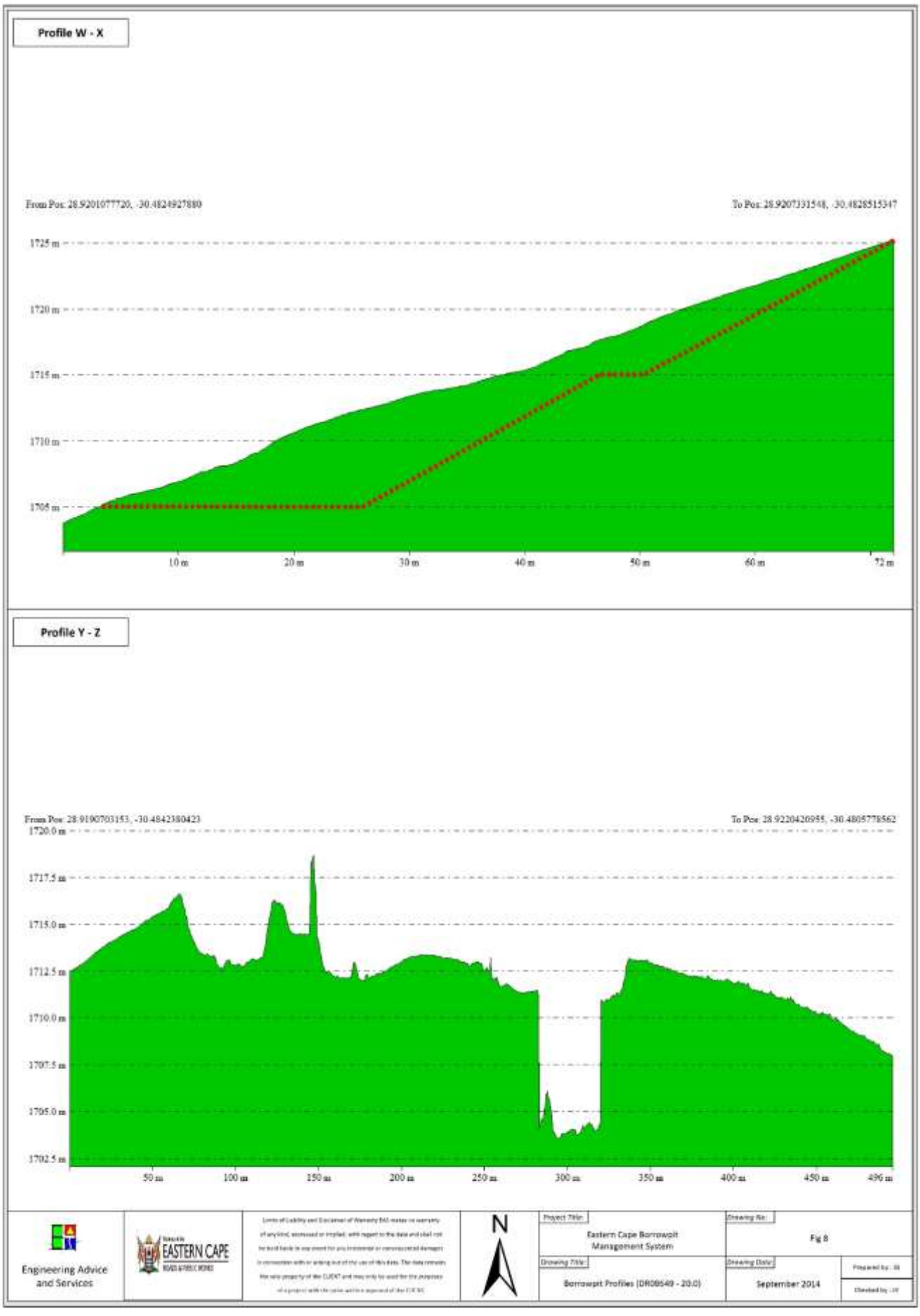
Contact Information		
Contact	**Name**	**Contact Number**
Landowner		
Ward Councillor		
Municipal Manager		
Location Details		
GPS Position:		
Topography:		
Distance from Road:		
Physical Details		
Access:		
Fencing:		
Borrow Pit Extent:		
Proposed Mining Direction:		
Material Availability:		
Material Type:		
Data Collection:		
Sample Collection and Tests Performed		
Dolerite		
Sandstone		
Biophysical Environmental Description		
Vegetation and Status		
Present Land Use		
CBA		
Land Use Type		
Agricultural features		
Alien invasive species		
Potential Faunal Habitat:		
Natural Drainage and Erosion		
Rivers and Drainage Lines		
Wetlands		
Quaternary Catchment		
Social Environment Description		
Heritage		
Palaeontology		
Archaeology		
Buildings and Structures		
Issus raised by I & AP's		
Mining Plan Details		
Proposed mining direction:		
Area to be mined		
Projected volume		
Access road		
<u>Impact Assessment Mitigation</u>		
Issue	**Description**	Recommendation
Visual Exposure:		
Natural Drainage and wetlands:		

Buildings:		
Overhead Services:		
Underground Services:		
Fences:		
Vegetation		
Fauna		
Agricultural features		
Grazing		


Locality Plan
Aerial Photo
LEGEND
DR08649
DR08649
0 0.5 1 1.5 2 Kilometers
0 50 100 150 200 Meters
Scale 1 : 20 000
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Borrowpit Locality (DR08649 - 20.0)
Drawing No:
Figure 8
Contract No:
1148

DR08649/20.0

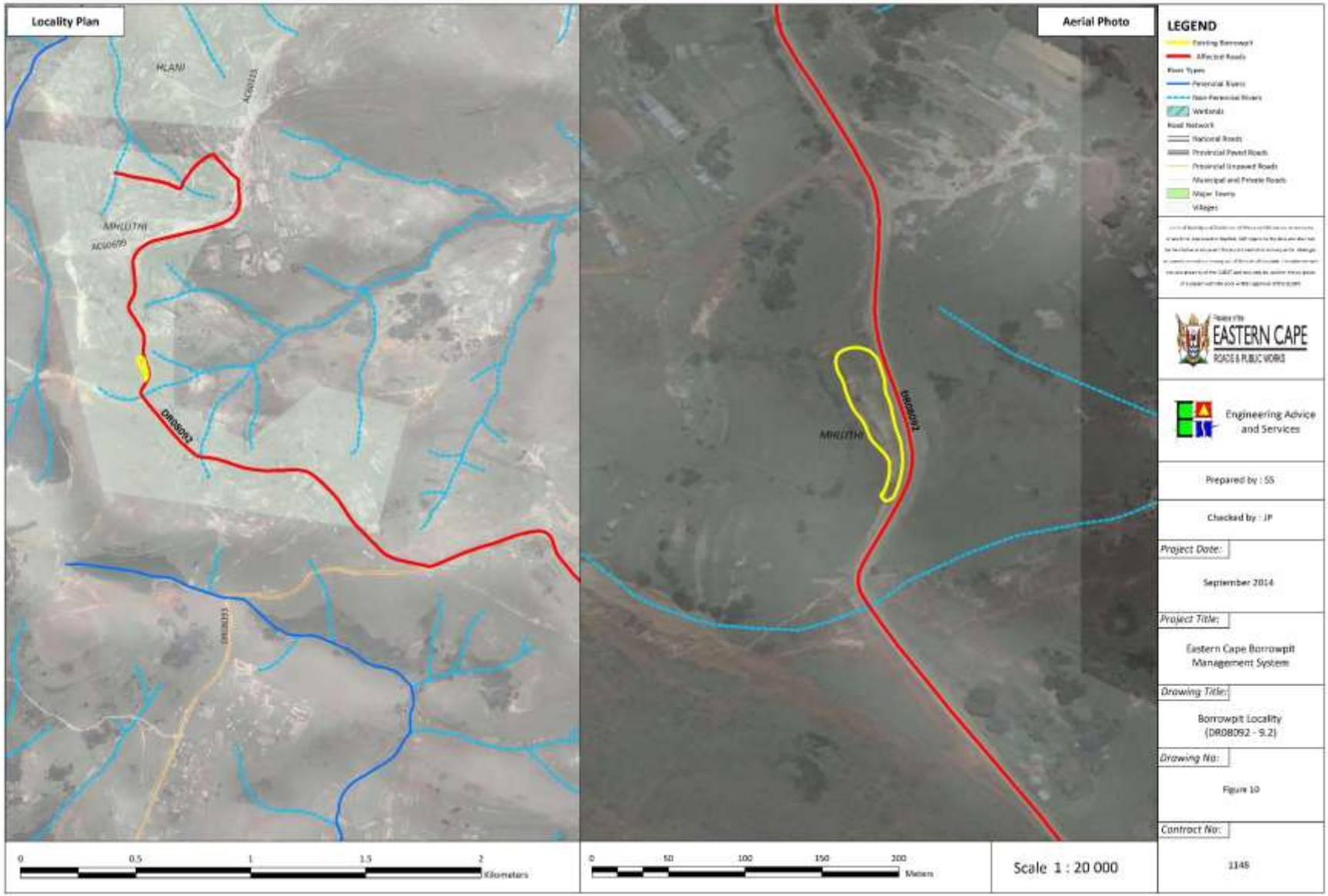

Fence Points
Name | Latitude | Longitude
A | 30° 29' 04.0457" S | 28° 55' 09.3754" E
B | 30° 29' 03.0820" S | 28° 55' 08.0369" E
C | 30° 29' 01.1439" S | 28° 55' 09.1398" E
D | 30° 28' 58.7315" S | 28° 55' 11.0246" E
E | 30° 28' 57.2068" S | 28° 55' 11.9526" E
F | 30° 28' 55.8362" S | 28° 55' 13.0975" E
G | 30° 28' 54.5547" S | 28° 55' 13.7170" E
H | 30° 28' 54.0014" S | 28° 55' 14.1173" E
I | 30° 28' 50.9925" S | 28° 55' 15.9911" E
J | 30° 28' 49.2930" S | 28° 55' 16.8014" E
K | 30° 28' 50.7869" S | 28° 55' 20.4091" E
L | 30° 28' 58.7615" S | 28° 55' 14.5996" E
LEGEND
Gate
Fence
Toilet
Overburden
Stockpile
Coordinates Points
Existing Borrowpit
Mine Profiles
Mine Extension Plan
Contours
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Mine Plan (DR08649 - 20.0)
Drawing No:
Annexure B
Contract No:
1148
0 40 80 120 160 200 240 280 320 360 400 440 480 520 560 600
Meters
Scale 1 : 3 000


Profile W - X
From Pos: 28.9201077720, -30.4824927880
To Pos: 28.9207331548, -30.4828515347
1725 m
1720 m
1715 m
1710 m
1705 m
10 m
20 m
30 m
40 m
50 m
60 m
72 m
Profile Y - Z
From Pos: 28.9190703153, -30.4842180423
To Pos: 28.9220420955, -30.4805778562
1720.0 m
1717.5 m
1715.0 m
1712.5 m
1710.0 m
1707.5 m
1705.0 m
1702.5 m
50 m
100 m
150 m
200 m
250 m
300 m
350 m
400 m
450 m
496 m
Engineering Advice and Services
EASTERN CAPE
Project Title:
Eastern Cape Borrowpit Management System
Drawing No:
Fig 8
Drawing Title:
Borrowpit Profiles (DR09549 - 20.0)
Drawing Date:
September 2014
Prepared by:
Checked by:
N

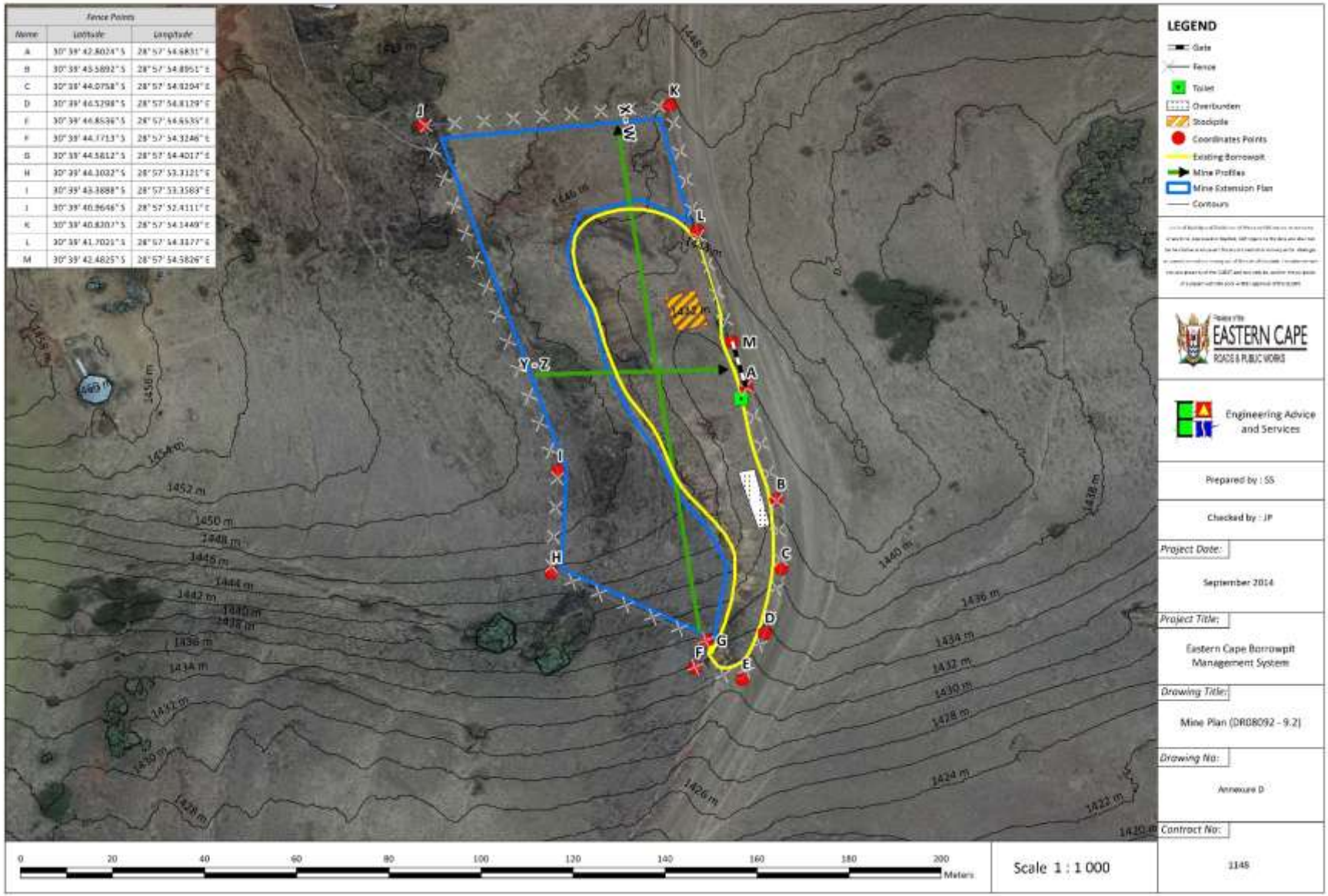
3.2 Borrow Pit DR08092/9.2

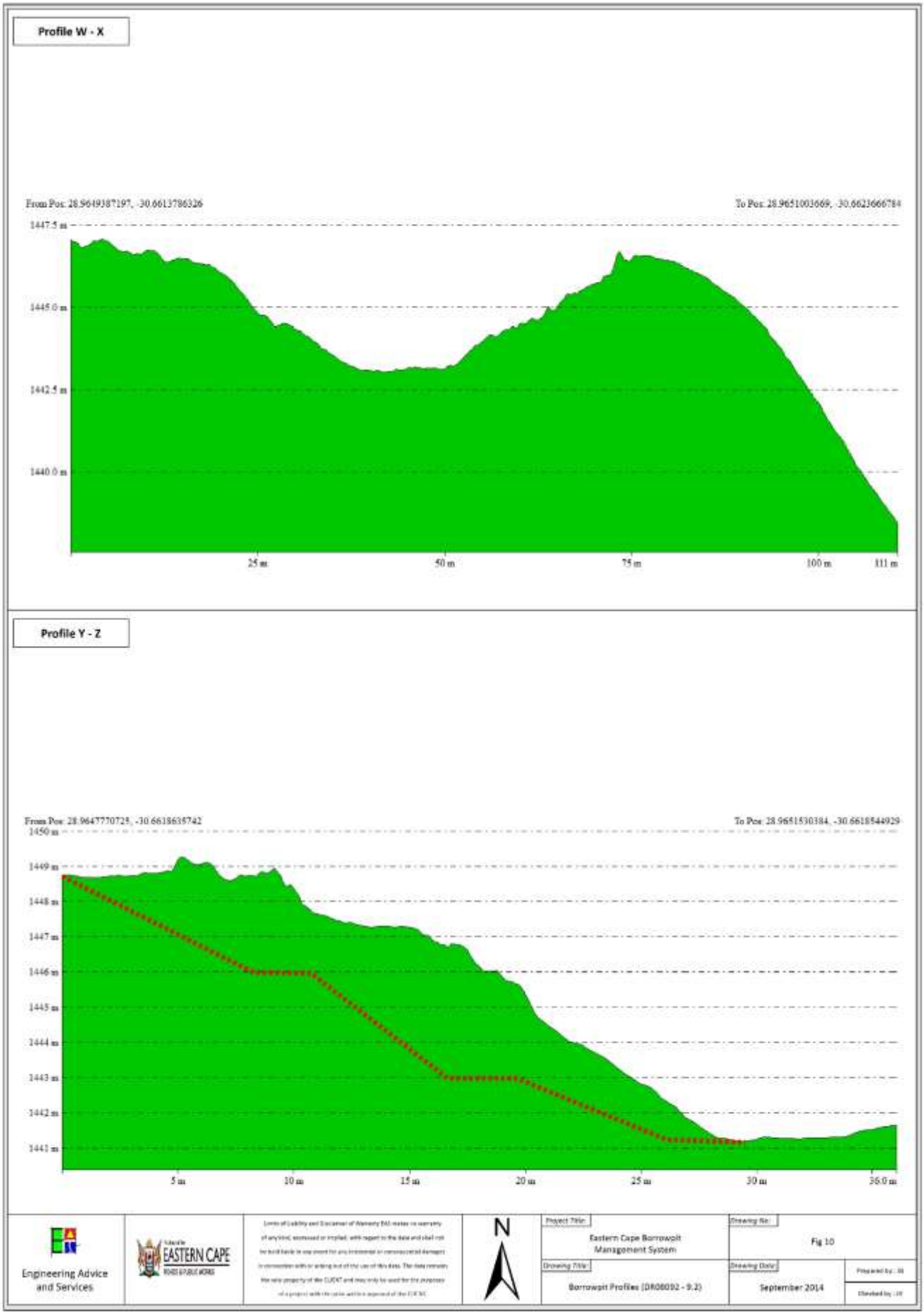
Contact Information		
Contact	**Name**	**Contact Number**
Landowner		
Ward Councillor		
Municipal Manager		
Location Details		
GPS Position:		
Topography:		
Distance from Road:		
Physical Details		
Access:		
Fencing:		
Borrow Pit Extent:		
Proposed Mining Direction:		
Material Availability:		
Material Type:		
Data Collection:		
Sample Collection and Tests Performed		
Dolerite		
Sandstone		
Biophysical Environmental Description		
Vegetation and Status		
Present Land Use		
CBA		
Land Use Type		
Agricultural features		
Alien invasive species		
Potential Faunal Habitat:		
Natural Drainage and Erosion		
Rivers and Drainage Lines		
Wetlands		
Quaternary Catchment		
Social Environment Description		
Heritage		
Palaeontology		
Archaeology		
Buildings and Structures		
Issus raised by I & AP's		
Mining Plan Details		
Proposed mining direction:		
Area to be mined		
Projected volume		
Access road		
<u>Impact Assessment Mitigation</u>		
Issue	**Description**	Recommendation
Visual Exposure:		
Natural Drainage and wetlands:		

Buildings:		
Overhead Services:		
Underground Services:		
Fences:		
Vegetation		
Fauna		
Agricultural features		
Grazing		


Locality Plan
Aerial Photo
LEGEND
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Borrowpit Locality (DR08092 - 9.2)
Drawing No:
Figure 10
Contract No:
1148
Scale 1 : 20 000
Kilometers
Meters

DR08092/9.2

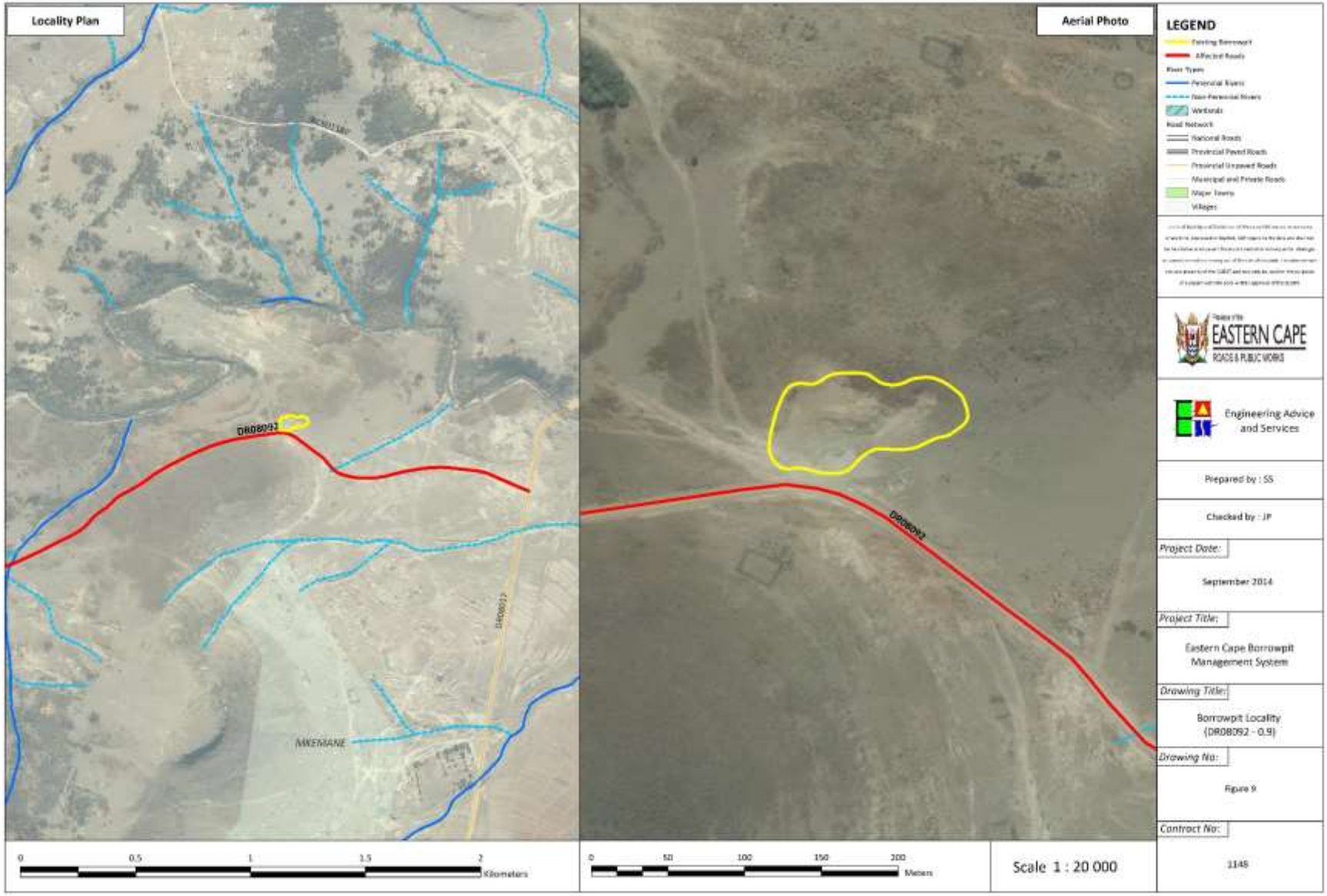

Fence Points
Name | Latitude | Longitude
A | 30° 39' 42.8024" S | 28° 57' 54.6831" E
B | 30° 39' 45.5892" S | 28° 57' 54.8951" E
C | 30° 39' 44.0758" S | 28° 57' 54.9204" E
D | 30° 39' 46.5298" S | 28° 57' 54.8179" E
E | 30° 39' 46.8536" S | 28° 57' 54.6535" E
F | 30° 39' 44.7713" S | 28° 57' 54.3246" E
G | 30° 39' 44.5812" S | 28° 57' 54.4017" E
H | 30° 39' 44.3032" S | 28° 57' 53.3121" E
I | 30° 39' 43.3888" S | 28° 57' 53.3583" E
J | 30° 39' 40.9646" S | 28° 57' 52.4111" E
K | 30° 39' 40.8307" S | 28° 57' 54.1449" E
L | 30° 39' 41.7021" S | 28° 57' 54.3177" E
M | 30° 39' 42.4825" S | 28° 57' 54.5826" E
LEGEND
Gate
Fence
Toilet
Overburden
Stockpile
Coordinates Points
Existing Borrowpit
Mine Profiles
Mine Extension Plan
Contours
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Mine Plan (DR08092 - 9.2)
Drawing No:
Annexure D
Contract No:
1148
0 20 40 60 80 100 120 140 160 180 200 Meters
Scale 1 : 1 000


Profile W - X
From Pos: 28.9649387197, -30.6613786326
To Pos: 28.9651003669, -30.6623666784
1447.5 m
1445.0 m
1442.5 m
1440.0 m
25 m
50 m
75 m
100 m
111 m
Profile Y - Z
From Pos: 28.9647770725, -30.6618635742
To Pos: 28.9651530384, -30.6618544929
1450 m
1449 m
1448 m
1447 m
1446 m
1445 m
1444 m
1443 m
1442 m
1441 m
5 m
10 m
15 m
20 m
25 m
30 m
36.0 m
Engineering Advice and Services
EASTERN CAPE
ROADS & PUBLIC WORKS
N
Project Title:
Eastern Cape Borrowpit Management System
Drawing No:
Fig 10
Drawing Title:
Borrowpit Profiles (DR08092 - 9.2)
Drawing Date:
September 2014

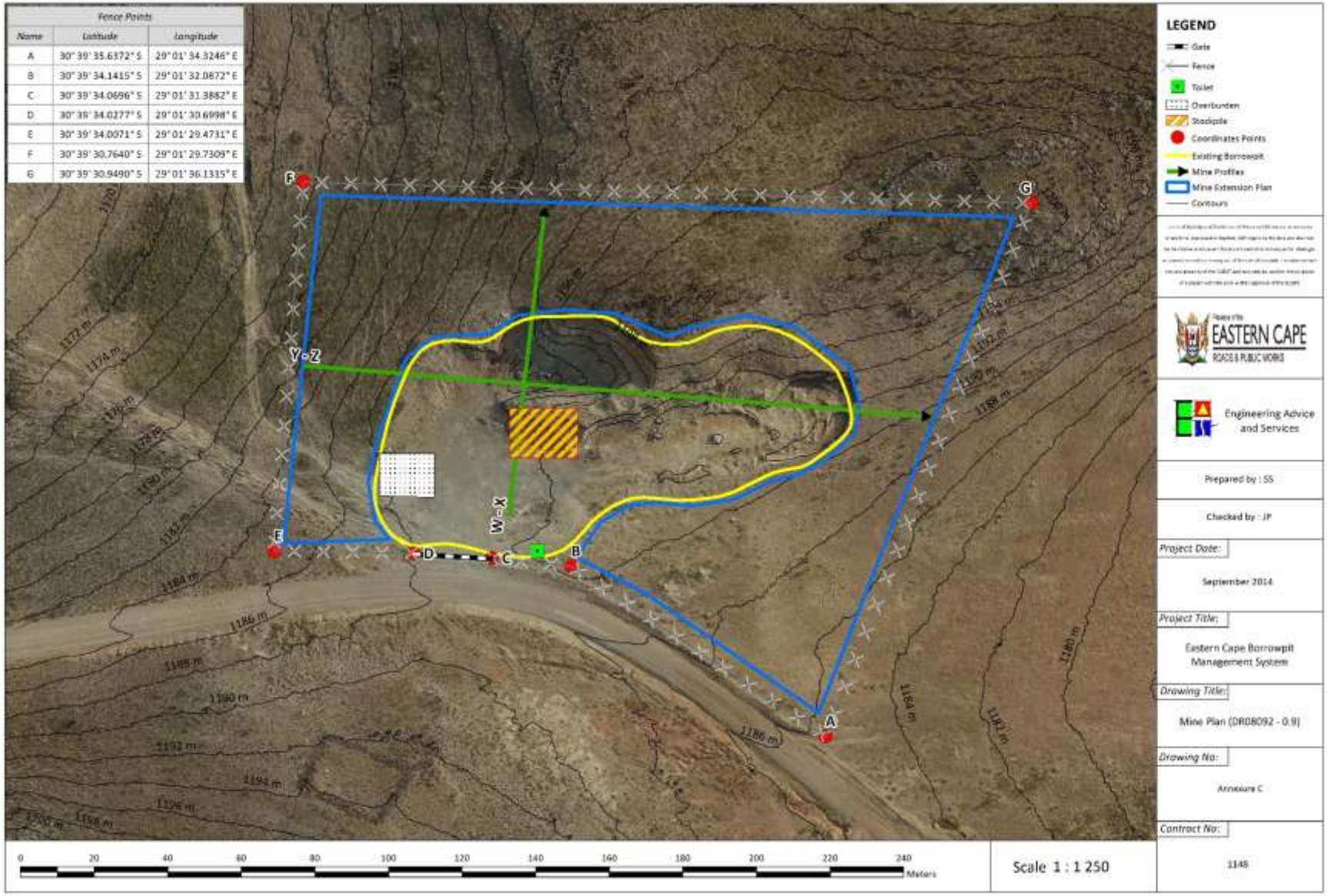
3.3 Borrow Pit DR08092/0.9

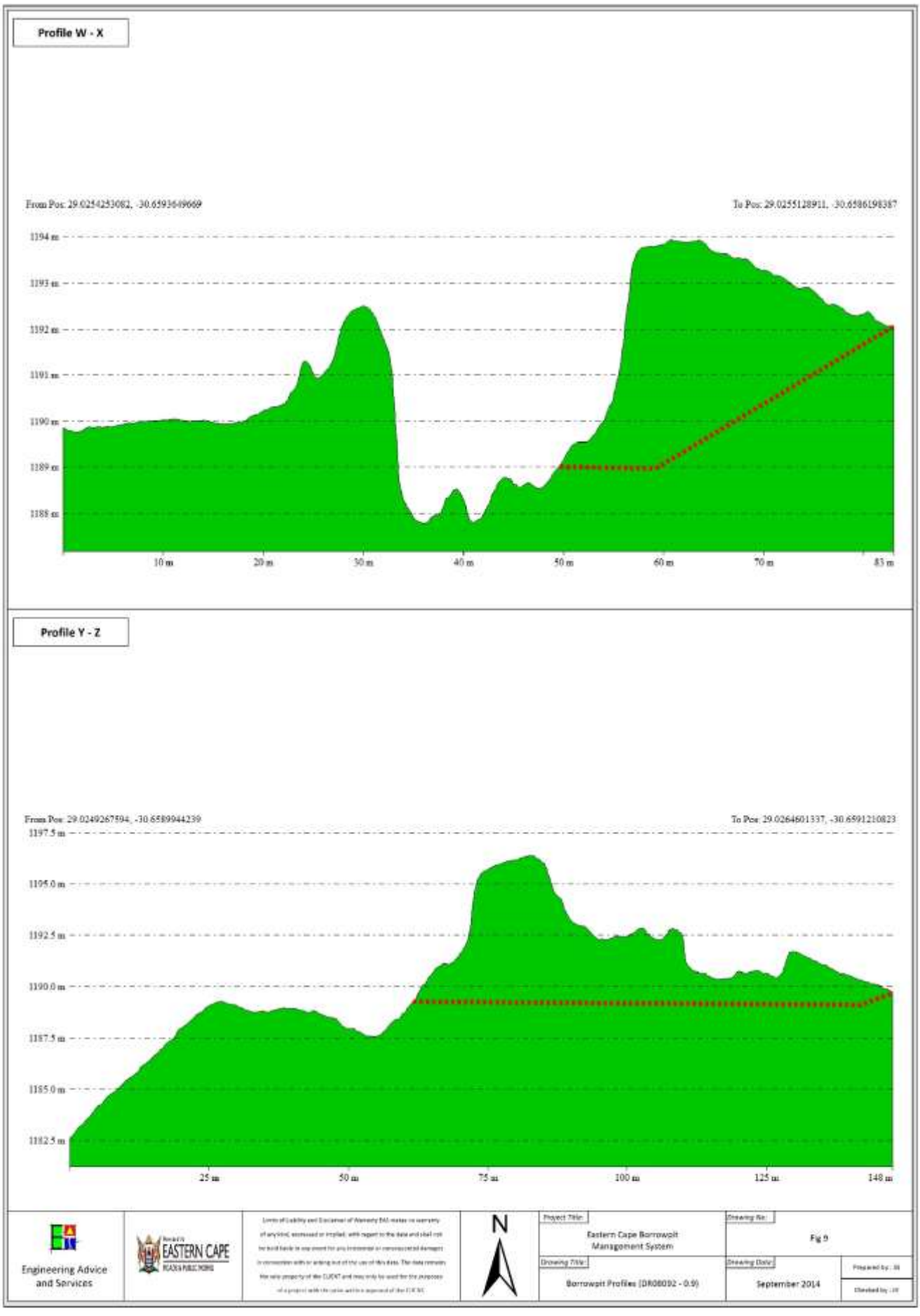
Contact Information		
Contact	**Name**	**Contact Number**
Landowner		
Ward Councillor		
Municipal Manager		
Location Details		
GPS Position:		
Topography:		
Distance from Road:		
Physical Details		
Access:		
Fencing:		
Borrow Pit Extent:		
Proposed Mining Direction:		
Material Availability:		
Material Type:		
Data Collection:		
Sample Collection and Tests Performed		
Dolerite		
Sandstone		
Biophysical Environmental Description		
Vegetation and Status		
Present Land Use		
CBA		
Land Use Type		
Agricultural features		
Alien invasive species		
Potential Faunal Habitat:		
Natural Drainage and Erosion		
Rivers and Drainage Lines		
Wetlands		
Quaternary Catchment		
Social Environment Description		
Heritage		
Palaeontology		
Archaeology		
Buildings and Structures		
Issus raised by I & AP's		
Mining Plan Details		
Proposed mining direction:		
Area to be mined		
Projected volume		
Access road		
<u>Impact Assessment Mitigation</u>		
Issue	**Description**	Recommendation
Visual Exposure:		
Natural Drainage and wetlands:		

Buildings:		
Overhead Services:		
Underground Services:		
Fences:		
Vegetation		
Fauna		
Agricultural features		
Grazing		


Locality Plan
Aerial Photo
LEGEND
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Borrowpit Locality (DR08092 - 0.9)
Drawing No:
Figure 9
Contract No:
1148
DR08092
MKEMANE
0 0.5 1 1.5 2 Kilometers
0 50 100 150 200 Meters
Scale 1 : 20 000

DR08092/0.9


Fence Points
Name | Latitude | Longitude
A | 30° 39' 35.6372" S | 29° 01' 34.3246" E
B | 30° 39' 34.1415" S | 29° 01' 32.0872" E
C | 30° 39' 34.0696" S | 29° 01' 31.3882" E
D | 30° 39' 34.0277" S | 29° 01' 30.6998" E
E | 30° 39' 34.0071" S | 29° 01' 29.4731" E
F | 30° 39' 30.7640" S | 29° 01' 29.7309" E
G | 30° 39' 30.9490" S | 29° 01' 36.1315" E
LEGEND
Gate
Fence
Toilet
Overburden
Stockpile
Coordinates Points
Existing Borrowpit
Mine Profiles
Mine Extension Plan
Contours
EASTERN CAPE
ROADS & PUBLIC WORKS
Engineering Advice and Services
Prepared by : SS
Checked by : JP
Project Date:
September 2014
Project Title:
Eastern Cape Borrowpit Management System
Drawing Title:
Mine Plan (DR08092 - 0.9)
Drawing No:
Annexure C
Contract No:
1148
Scale 1 : 1 250
Meters


Profile W - X
From Pos: 29.0254253082, -30.6593649669
To Pos: 29.0255128911, -30.6586198387
1194 m
1193 m
1192 m
1191 m
1190 m
1189 m
1188 m
10 m
20 m
30 m
40 m
50 m
60 m
70 m
83 m
Profile Y - Z
From Pos: 29.0249267594, -30.6589944239
To Pos: 29.0264601337, -30.6591210823
1197.5 m
1195.0 m
1192.5 m
1190.0 m
1187.5 m
1185.0 m
1182.5 m
25 m
50 m
75 m
100 m
125 m
148 m
Engineering Advice and Services
EASTERN CAPE
N
Project Title:
Eastern Cape Borrowpit Management System
Drawing No:
Fig 9
Drawing Title:
Borrowpit Profiles (DR08092 - 0.9)
Drawing Date:
September 2014

4 Summary of the potential impacts, significance assessment and the proposed mitigation measures

- REGULATION 52 (2) (b): Assessment of the potential impacts of the proposed mining operation on the environment, socio- economic conditions and cultural heritage.
    a) Description of the proposed mining operation.
        i. The main activities (e.g. access roads, topsoil storage sites and any other basic prospecting design features)
        ii. Plan of the main activities with dimensions
        iii. Description of construction, operational, and decommissioning phases.
        iv. Listed activities (in terms of the NEMA EIA regulations)

4.1 Assessment of the significance of the potential impacts

4.1.1 Criteria of assigning significance to potential impacts

The following methodology is to be applied in the specialist studies for the assessment of potential impacts.

Criteria	Explanation
Nature of impact	Review the type of effect that a proposed activity will have on the environment and should include "what will be affected and how?"
Extent	Indicate whether the impact will be: • *(S) local* and limited to the immediate area of development (the site); • (L) limited to within 5 km of the development; or • (R) whether the impact may be realized regionally, nationally or even internationally.
Duration	Review the lifetime of the impact, as being: • *(V) very short term* (0 - 1 years), • *(S) short term* (1 - 5 years), • (M) medium (5 - 15 years), • *(L) long term* (>15 years but where the impacts will cease after the operation of the site), or • *(P) permanent*.
Intensity	Establish whether the impact is destructive or innocuous and should be described as either: • *(L) low* (where no environmental functions and processes are affected) • *(M) medium* (where the environment continues to function but in a modified manner) or • *(H) high* (where environmental functions and processes are altered such that they temporarily or permanently cease).
Probability	Consider the likelihood of the impact occurring and should be described as: • *(I) improbable* (low likelihood) • *(P) probable* (distinct possibility) • *(H) highly probable* (most likely) or • *(D) definite* (impact will occur regardless of prevention measures).
Status of the impact	Description as to whether the impact will be positive (a benefit), negative (a cost), or neutral.
Degree of confidence	The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as high, medium or low.
Significance	• *(L) Low:* Where the impact will not have an influence on the decision or require to be significantly accommodated in the project design • *(M) Medium*: Where it could have an influence on the environment which will require modification of the project design or alternative mitigation; • *(H) High*: Where it could have a 'no-go' implication for the project unless mitigation or re-design is practically achievable.

Significance Rating

		Duration				
		Permanent	**Long term**	**Medium term**	**Short term**	**Very short term**
	High Intensity					
Extent	**National**	High	High	High	High	Medium
	Regional	High	High	High	High	Medium
	Local	High	High	Medium	Medium	Medium
	Site specific	Medium	Medium	Medium	Medium	Medium
	Medium Intensity					
Extent	**National**	High	High	High	Medium	Medium
	Regional	High	High	High	Medium	Medium
	Local	Medium	Medium	Medium	Medium	Medium
	Site specific	Medium	Medium	Medium	Medium	Low
	Low Intensity					
Extent	**National**	Medium	Medium	Medium	Medium	Medium
	Regional	Medium	Medium	Medium	Medium	Medium
	Local	Medium	Medium	Medium	Medium	Low
	Site specific	Medium	Medium	Medium	Low	Low

Furthermore, the following must be considered:

1. Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
2. All impacts should be evaluated for both the construction, operation and decommissioning phases of the project, where relevant.
3. The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.
4. Management actions: Where negative impacts are identified, specialists must specify practical mitigation objectives (i.e. ways of avoiding or reducing negative impacts). Where no mitigation is feasible, this should be stated and the reasons given. Where positive impacts are identified, management actions to enhance the benefit must also be recommended.
5. Monitoring: Specialists should recommend monitoring requirements to assess the effectiveness of mitigation actions, indicating what actions are required, by whom, and the timing and frequency thereof.

4.2 Identification of potential impacts

4.2.1 Possible impacts on biodiversity during mining construction and operations

Mining construction and operations can result in a range of negative impacts on terrestrial, marine and other aquatic ecosystems if not properly managed. Table 6 describes impacts that may potentially occur in the individual Borrow Pits (as per DMR guidelines) as well indicating the relevant EMP section in Appendix C. The predicted significance of these are summarised inTable 7, where **SB** = Significance BEFORE mitigation and **SA** = Significance AFTER mitigation. No significant ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines and railways, which can impact on biodiversity and ecosystem services are expected other than minor access roads.

4.2.2 List of actions, activities, or processes that have sufficiently significant impacts to require mitigation

Refer to Table 6, No specific potential impacts on communities were identified, where issues may have been present, it has been addressed through the selection of Borrow Pits, or avoidance via the mine area indicated in the Mine Plans.

and EMP guidelines Section.

4.2.3 Appropriate technical or management options

Where issues of significant importance have been identified during the planning phase, appropriate measures have been implemented in the mine planning phase to accommodate them. In addition, during a site selection and feasibility phase, any Borrow Pits deemed to have any biophysical or social features that could not be successfully mitigated or avoided were not selected for this permitting process.

4.2.4 Review the significance of the identified impacts

Whilst the residual Impact after the implementation of mitigation measures will be Low to Negligible on most Borrow Pits, the following Borrow Pits and Activities are deemed to have a Moderate or higher residual significance after implementation of the EMP and the implementation of the recommended mitigation measures:

- No identified Borrow Pits with Moderate or Higher residual impact after mitigation.

Table 6: List of potential Impacts relating to the expansion of Borrow Pits

Impact	Impact Description	Relevant EMP Section describing Mitigation Measures (clickable link)
Topography	Alteration of topography through excavation of borrow pits and material removal	Topsoil and Subsoil Replacement
Erosion	Increased erosion risk resulting from removal of vegetation and stockpiling of topsoil	Drainage and Erosion Control
Geology	Permanent alteration of Geology through the removal of material from BP's	
Soils	Potential loss of soil from BP's due to removal of topsoil and stockpiling for rehabilitation	Topsoil and Subsoil Replacement
Surface Water	Potential increased sediment load in runoff water from borrow pits and road works (Directly into Wetlands or Rivers)	Drainage and Erosion Control
Groundwater	Potential impacts on groundwater as a result of seep contamination with chemicals as well as fuels and lubricants required for operation of plant machinery	Waste Management and Ablution Facilities
Air quality/Dust	Nuisance impacts of dust generated from excavating, blasting, crushing, stockpiling and road works on traffic on the roads and nearby residents.	Dust
Vegetation	Damage to or clearing of natural habitat, fencing off of areas and/or increased vehicular traffic, leading to loss of ecological communities, habitat for species, changes to ecosystem services, and fragmentation or isolation of habitats.	Biodiversity Requirements
Fire	Increased risk of fire may interfere with natural fire regimes and adversely affect biodiversity.	Biodiversity Requirements
Alien species	Introduction or spread of alien invasive species, feral fauna (including agricultural and commercial exotic species) and diseases of native flora and fauna.	Biodiversity Requirements
Habitat	Habitat fragmentation, the disruption of migratory routes of faunal species or ecological corridors enabling ecological or evolutionary processes, collisions and road kills, dust generation and fallout.	Biodiversity Requirements

Impact	Impact Description	Relevant EMP Section describing Mitigation Measures (clickable link)
Fauna	Potential small scale loss of fauna, particularly small animals confined to borrow pit, resulting from habitat loss. It is not anticipated that endangered or rare species will be present.	Biodiversity Requirements
Land capability/Agriculture	No permanent significant impact on land capability is expected.	Topsoil and Subsoil Replacement
Grazing	Loss of grazing to Landowner as a result of Borrow Pit	Topsoil and Subsoil Replacement
Fences	Significant changes to landowners fencing as a result of BP expansion	Fencing
Noise	Noise impacts during blasting and crushing activities are expected on nearby residents.	Noise
Over/Under Services	Blasting activities at the borrow pits may affect the nearby houses and infrastructure.	Exiting Services
Visual Impact	An existing visual impact occurs at all the borrow pits as they are existing sites which have not been properly rehabilitated previously. After rehabilitation, the proposed activities may substantially improve the visual impact on the environment.	Visual Impacts Amelioration
Waste management	Pollution of construction and domestic waste as well as waste water could lead to other visual impacts and loss of natural habitat.	Waste Disposal
Socio-Economic Impacts	Formalisation of the borrow pits would allow for regular routine maintenance of the roads that will benefit local communities and residents and all road users along the route.	
Archaeology	(Depends on HIA)	Historical, Archaeological and Paleontological Sites
Heritage	(Depends on HIA)	Historical, Archaeological and Paleontological Sites
Palaeontology	(Depends on PIA)	Historical, Archaeological and Paleontological Sites
Buildings and Structures	Impacts to Buildings and Structures in close proximity to the site	Demarcation the Mining Area

4.2.5 Listed activities (in terms of the NEMA EIA regulations)

Table 8 provides a list of activities associated with borrow pit mining that may be applicable for specific borrow pits.

4.2.6 Potential cumulative impacts

No cumulative impacts are expected as a result of the expansion of the Borrow Pits, due to the limited disturbance area.

4.2.7 Potential impact on heritage resources

No specific potential impacts on heritage resources were identified, where issues may have been present, it has been addressed through the selection of Borrow Pits, or avoidance via the mine area indicated in the Mine Plans.

4.2.8 Potential impacts on communities, individuals or competing land uses in close proximity.

No specific potential impacts on communities were identified, where issues may have been present, it has been addressed through the selection of Borrow Pits, or avoidance via the mine area indicated in the Mine Plans.

4.2.9 Confirmation that the list of potential impacts has been compiled with the participation of the landowner and interested and affected parties

Refer to Appendix B for public participation notices and correspondence from IAP's.

4.2.10 Confirmation of specialist report appended

No separate specialist reports are included.

*Table 7: Summary indicating significance of potential impacts relating to mining activities (**SB = Significance BEFORE Mitigation; SA = Significance AFTER Mitigation**)*

Impact								
Topography								
Erosion								
Geology								
Soils								
Surface Water								
Groundwater								
Air quality/Dust								
Vegetation								
Fire								
Alien species								
Habitat								
Fauna								
Land capability/Agriculture								
Grazing								
Fences								
Noise								
Over/Under Services								
Visual Impact								
Waste management								
Socio-Economic Impacts								
Archaeology								
Heritage								
Palaeontology								
Buildings								
OVERALL								

Table 8: Listed Activities associated with Borrow Pits

Listed Activity				
LN1: 23				
LN1: 24				
LN3: 12				
LN3: 13				
LN3: 14				
Land transformation for mining purposes (23, 24 of LN1; 15 of LN2)	(LN1: 23) The transformation of undeveloped, vacant or derelict land to – (i) residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or (ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares; -			
	(LN1: 24) The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule such land was zoned open space, conservation or had an equivalent zoning.			
	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;			
Land clearance for mining purposes and/or ancillary activities (12, 13 and 14 of LN3)	(LN3: 12) The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.	Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;		
		(b) Within critical biodiversity areas identified in bioregional plans;		
	(LN3: 13) The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.	Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority.		
		National Protected Area Expansion Strategy Focus areas.		
		Outside urban areas, the following: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Core areas in biosphere reserves; (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (gg) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined. iii. In urban areas, the following: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; (cc) Areas seawards of the development setback line; (dd) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no mentioned in Listing Notice 1.		
	(LN3: 14) The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation	All areas outside urban areas		

5 Closure and environmental objectives

The decommissioning phase and closure of the quarry will involve removal of all debris and rehabilitation of areas not rehabilitated during the operational phases of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and regenerating all prepared surfaces. The crusher and screening plants will be dissembled and all other infrastructural development such as haulage roads and stock pile areas will be rehabilitated.

Mine closure upon completion of the mining operation needs to be conducted in accordance to the objectives outlined in this report. The recommendations outlined in this report regarding precision blasting of quarry sides, topsoil replacement and re-vegetation all need to be complied with before mine closure can be considered.

The stages for rehabilitation, which need to be adhered to in order to meet the closure objectives, are as follows:

- Over the lifespan of the borrow pit, rehabilitation should commence initially in areas that are no longer being mined.
- If mining is expanded into the proposed extension, rehabilitation is the adjacent quarry should be commenced at least twelve months before commencement of that phase.
- The same strategy will be applied to future mining phases during the quarries lifespan.
- Upon completion of the final mining phase, final quarry rehabilitation (which will involve the rehabilitation of the areas currently being mined out and the storage and processing areas) will be completed within 12 months of operation closure.
- The proposed closure costs will be absorbed throughout the operation life of the quarry, as rehabilitation towards final closure objectives will be conducted continuously during mining operations.

5.1 Rehabilitation plan

Refer to Mine Plans and EMP for the detailed Rehabilitation Plan.

5.2 Closure objectives and their extent of alignment to the pre-mining environment

The overall environmental Objective for mine closure is as follows:

- **To render the mining area safe and in an environmentally acceptable condition on completion of the mining, rehabilitation and closure activities.**

Specific environmental goals include:

- To return the mining area, as closely as possible, to its original condition and land use, through the re-shaping and landscaping of the surface and through establishment of an indigenous grass cover emulating the surrounding environment.
- To minimise the residual impacts through ensuring that erosion is controlled, the slopes are stable, the vegetation cover is established satisfactorily and that the area is left in a condition which does NOT pose a safety hazard to humans, livestock and indigenous fauna.
- To minimise the visual impacts of the mine on closure by way of landscaping and the establishment of an indigenous grass cover emulating the surrounding environment.
- To obtain the necessary Mine Closure certificate from the DMR, after which final payments can be made.

5.3 Confirmation of consultation

No specific comments regarding closure requirements were received from the landowner(s), interested and affected parties or surrounding communities. During establishment, the contractor should liaise with the landowner and/or affected community via the appointed Community Liaison Officer (CLO) or Social Facilitator, appointed by the Department of Roads and Public Works in order to identify any specific requirements.

6 Monitoring and Performance

In order to ensure that this EMP is effectively implemented, it is important that regular external audits of the EMP are conducted.

The Department of Roads and Public Works must appoint an independent Environmental Control Officer (ECO) in order to oversee compliance with the EMP by undertaking monthly site inspections, quarterly audits and post construction/operation site visits. The audits shall aim at addressing environmental issues identified on site and to provide recommendations through the audit reports. Furthermore the Contractor must employ a responsible and suitably qualified person to oversee the day to day environmental requirements in consultation with the appointed resident engineer.

Audit Reports must be provided to the Department of Roads and Public Works, the project Manager/Engineer and the Department of Mineral Resources. The table below provides a template for the environmental audit process.

Requirements/ Conditions/Mitigation Measures	Responsibility	C	Comment
ENVIRONMENTAL AUTHORIZATION			
Notification of DEA&DP for any project changes/ deviations	DRPW		
Notification of DEA &DP on ECO appointment	DRPW		
Notification of DEA&DP on the commencement of the project			
Notification of Interested and Affected Parties in the vicinity of construction of commencement date and completion	Contractor		
Copy of the Environmental Authorisation kept on site			
Copy of the Construction EMP kept on site.			
ECO's monitoring and audit reports to be kept on site and be available for inspection by any relevant and competent authority			
An environmental audit report must be submitted to DEA&DP upon completion of the construction and rehabilitation activities			
Environmental Agreement between DRPW and Contractor	DRPW & Contractor		
FILING SYSTEM FOR ENVIRONMENTAL DOCUMENTATION (METHOD STATEMENTS)			
Construction camp location and layout	Contractor to submit a method statement of how he will handle the following		
Site Clearing			
Handling of Hazardous Substances			
Solid Waste Management			
Handling of Wastewater			
Erosion and Sediment Control			
Fire Preventative Measures			
Cement and Concrete Batching			
Vegetation and Rehabilitation			
ENVIRONMENTAL PERMITTING REQUIREMENTS			
National Water Act (No. 36 of 1998) – River crossing	Contractor		
National Water (No. 36 of 1998) – Water abstraction			
Minerals and Petroleum Resources Development Act (No. 28 of 2002) – Borrow pits			
National Heritage Resources Act (No. 25 of 1999)			
National Environmental Management: Waste Act (No. 59 of 2008) – Waste Management			
ADMINISTRATION			
Organogram of contractor's management structure available	Contractor		

Requirements/ Conditions/Mitigation Measures	Responsibility	C	Comment
Has a ELO been appointed			
Is the ELO permanently on site			
Is the ELO submitting reports to the resident engineer on a monthly basis			
ENVIRONMENTAL AWARENESS TRAINING			
Is the ELO appropriately trained to carry out training and mentoring on environmental management?	Contractor		
Has Environmental Awareness Training (EAT) been carried out?			
Are records of EAT available			
CAMP DEPOT			
Perimeter fencing erected and maintained	Contractor		
Water available for human consumption at the site office and working areas points on site			
Provision of appropriate ablution facilities			
Housing of labour force			
Storage of equipment and material at designated areas			
MAINTENANCE & REFUELLING			
Dip trays for emergency repairs should be provided	Contractor		
Suitable containers should be provided for collecting waste oil			
Vehicle servicing areas should be demarcated			
Leaking vehicles should be repaired immediately			
Refuelling areas should be designated			
Refuelling areas should be protected against pollution or surfaced			
Wastewater collection measures should be in place at vehicle washing areas			
ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION ACTIVITIES			
Work restricted to 07h00 – 17h00 on weekdays	Contractor		
Work restricted to 07h00 – 14h00 on Saturdays			
Work only allowed after hours in exceptional circumstances			
Notifications of interruption of service due to construction			
Inform nearby I&APs of noisy after hours work			
Inform landowners of any planned damage to properties			
Maintenance of photographic record of damage			
Compensation for damage to property			

Requirements/ Conditions/Mitigation Measures	Responsibility	C	Comment
Demarcation of no-go areas and proper signage			
Designate smoking areas where smoking can occur in a controlled environment			
Prevent casual access to the construction site			
Contractor's employees to be clearly identifiable			
Blasting to comply with relevant regulations			
No unemployed labour seekers to gather on site			
Inform employees of site specific environmental risks			
Cover material loads in transit			
SAFETY & SECURITY			
Road users and pedestrians should be informed of alternative routes			
General compliance with the Occupational Health and Safety Act (No. 85 of 1993)			
Protection of workers during thunderstorms	Contractor		
Periodic checking of excavations			
Appropriate traffic signs displayed			
CEMENT & CONCRETE BATCHING PLANT			
Cement mixed in allocated areas			
Cleaning of cement mixing trays be done on proper cleaning trays			
Proper storage of cement bags before disposal	Contractor		
Excess concrete should be disposed of at a licensed landfill site			
Cement laden runoff from concrete stockpile should be controlled			
STORAGE OF HAZARDOUS SUBSTANCES			
Suitable storage of hazardous substances			
Hazard signs indicating the hazardous substance at storage site			
Petroleum tanks contained in a bund wall, which is more than 10% its capacity	Contractor		
Material and safety data sheets should be readily available for hazardous substances			
Run-off from storage site should be contained			
HAZARDOUS WASTE			
Proper collection and disposal of contaminated soils at approved facilities/site			
Proper storage of used oils before disposal	Contractor		
Appropriate disposal of hazardous waste at approved landfill sites			

Requirements/ Conditions/Mitigation Measures	Responsibility	C	Comment
Unused or rejected bituminous products should be returned to the supplier not disposed or buried in a landfill site.			
Waste disposal tracking records			
WASTEWATER			
Oil separation/settlement system should be placed for water run-off from washing areas, workshops, fuel depots to pass through	Contractor		
Wastewater shouldn't be disposed into municipal stormwater system			
Conservancy tanks should be used for wastewater collection			
PRIVATE PROPERTY ACCESS AND SECURITY			
Notify landowners prior to undertaking construction work	Contractor		
Access to adjacent private properties prohibited except under official business			
REHABILITATION			
Suitable rehabilitation of cut and fill slopes	Contractor		
Topsoil replacement			
All construction residue removed after construction			
All structures should be removed			
Contaminated soil should be removed and properly disposed			
Scarify areas compacted by vehicle movements			
Rehabilitation plan should be in place			
Borrow pits reshaped to even surfaces and closed off			
COMPLIANCE AND PENALTIES			
Non-compliance directive been issued to the contractor	ECO		
Non-compliance directive been recorded in a dedicated register and reported in monthly reports and at monthly site meetings	ELO		
Has a penalty for non-compliance been implemented by engineer?	RE/ELO		

7 Public Participation

The public participation process for utilisation of Borrow Pits identified in this report was held in conjunction with the public participation process for all the identified road sections and their relevant borrow pits.

7.1 Identification of interested and affected parties

7.1.1 Details of the engagement process

Public participation was initiated by the placement of a legal notice (English and Xhosa) in The Herald on (date). Refer to adverts and correspondence is included in Appendix B.

- A website was compiled with draft EMP reports (www.easemp.co.za) for Interested and Affected parties.
- The general public were given 30 days to register as Interested and Affected Parties and to submit any issues/concerns they might have regarding this proposed project, either via a registration link on the website or via phone postal and email.
- Due to the scattered nature of the Borrow Pits, no signboards were placed.
- Any affected landowners or Interested and Affected parties present during the site assessments were also verbally notified of the process.
- A letter of notification and Background Information Document was sent to the identified landowners, Interested and Affected Parties as well as the Ward Councillors and Municipal Managers for the area concerned as indicated in Table 9 and Table 10.

Table 9: List of Municipal Managers and Ward Councillors.

Person Name	Position	LMA	Tel. No.	Sending method	Date sent

Table 10: List of Regional Interested and Affected Parties.

Name	Organisation	Position	E-mail	Postal address1	Sending method	Date sent
Ms Deidré Watkins	DMR		deidre.watkins@dmr.gov.za	Department of Mineral Resources Private Bag X6076 Port Elizabeth 6000	email	
Jimmy Calder	WESSA	Regional WESSA	jimjan@iafrica.com	PO Box 2909, Beacon Bay, 5205	email	
Phillip Wilkinson	WESSA	Regional WESSA	phillip@wessabk.co.za	PO Box 2909, Beacon Bay, 5205	email	
Ms. Mariagrazia Gamlimberti	SAHRA	APM Impact Assessor	mgalimberti@sahra.org.za	South African Heritage Resources Agency, PO Box 4637, Cape Town 8000	email	
Sello Mokhanya	Eastern Cape Provincial Heritage Resources Authority	Regional Heritage	info@ecphra.org.za	ECPHRA, Corner Scholl and Amalinda Drive East London, 5247	email	

Name	Organisation	Position	E-mail	Postal address1	Sending method	Date sent
Andrew Lucas	Dept. of Water Affairs- EC	Regional Water Affairs	lucasa@dwaf.gov.za	Department of Water Affairs and Forestry PO Box 7019, EL, 5200	email	
	ANDM	Municipal Manager				
	ANDM	Director: Eng.			email	
	ANDM	Roads Dept.			email	
	ANDM	Director: Health & Community Services			email	
	DEDEAT	Regional Director (ANDM)			email	
	DR&PW	EPWP Regional Manager			email	
	DEDEAT	Regional Director (ANDM)			email	
	DEDAET	Regional Manager			email	
		Deputy Director: Alfred Nzo (Land Reform)	MEMolokoane@ruraldevelopment.gov.za		email	
		Deputy Director: Alfred Nzo (REID)	MWNGANGANI@ruraldevelopment.gov.za		email	

No additional I&AP's from the general public registered who required information to be sent in response to the notifications and advertisements at this stage.

7.1.2 Description of the information provided to the community, landowners, and interested and affected parties

- A cover letter and Background Information Document was sent to the identified interested and affected parties as well as the Ward Councillors and Municipal Managers for the area concerned.

7.1.3 List of which parties identified in 7.1 above that were in fact consulted, and which were not consulted

- All Interested and Affected Parties identified above were consulted.

7.1.4 List of views raised by consulted parties regarding the existing cultural, socio-economic or biophysical environment

- No specific comments were received from Interested and Affected Parties to date.

7.1.5 List of views raised by consulted parties on how their existing cultural, socio-economic or biophysical environment potentially will be impacted on by the proposed prospecting or mining operation.

- No comments were received from any consulted Interested and affected parties, other than confirmation that they received the said notification.
- General comments from the general area, regarding the proposed projects indicated that employment opportunities must give preference to local communities and contractors.

7.1.6 Other concerns raised by the aforesaid parties

- None were identified.

7.1.7 Confirmation that minutes and records of the consultations are appended

- All correspondence is included in Appendix B

7.2 The manner in which the issues raised were addressed

- **Any issues raised have been addressed by altering the mine layout plan if necessary and/or are covered in the EMP section.**

8 Environmental awareness plan

8.1 Employee communication process

The on-site manager is responsible for the training of all staff. Regular training sessions are recommended and ***shall*** include basic environmental awareness. It is important that training registers are kept as proof for auditing purposes.

8.2 Description of solutions to risks

The following environmental training ***should*** be included:

- The importance of conformance with all environmental policies.
- Environmental impacts of the proposed activities (actual or potential).
- Improved personal performance and the environmental benefits thereof.
- Roles and responsibilities of achieving conformance with environmental policy and procedures.
- Associated procedures and emergency preparedness and response requirements.
- Potential consequences of departure from specified operating procedures.
- Mitigation measures required to be implemented when carrying out their work activities.

8.3 Environmental awareness training

Before the commencement of any work on site, the Contractor's site management staff shall attend an environmental awareness training session, of at least one-hour duration, presented by the ECO and RE. The Contractor shall liaise with the ECO prior to the commencement date to fix a date and venue for the training session. The Contractor shall provide a suitable venue with facilities, and ensure that the specified employees attend the training session.

The information presented at the course shall be communicated by the Contractor to the rest of his employees on the site, to any new employees coming onto site after the initial training course and to his/her suppliers. The presentation shall be conducted, as far as is possible, in the employees' language of choice. As a minimum, training shall include:

- Explanation of the importance of complying with the EMP;
- Discussion of the potential environmental impacts of construction activities;
- Explanation of the management structure of individuals responsible for matters pertaining to the EMP;
- Explanation of the manner in which environmental risks and impacts must be dealt with in order to avoid pollution and the degradation of the environment;
- Employees' roles and responsibilities, including emergency preparedness;
- Explanation of the mitigation measures that must be implemented when carrying out their activities;
- Explanation of the specifics of the EMP; and
- Explanation of the Environmental DO's and DON'T's (below).

DO'S AND DON'T'S	MOETS EN MOENIES	EMAZENZIWE NE MAZINGENZIWA
Workers & equipment must stay inside the site boundaries at all times	Werkers en gereedskap moet ten alle tye binne die terreingrense bly	Abasebenzi nezixhobo abazisebenzisayo mabanaphumi nazo ngaphaya kwesayiti
Do not swim in or drink from streams Do not throw oil, petrol, diesel, concrete or rubbish in the stream Do not work in the stream without direct instruction Do not damage the banks or vegetation of the stream	Moenie van strome drink of daarin swem nie Moenie olie, petrol, diesel, sement of Rommel in strome gooi nie Moenie in strome werk sonder direkte instruksie nie. Moenie stroomoewers en plantgroei beskadig nie.	Sukuqubha okanye usele amanzi omlambo Sukugalela ioil, petrol, diesel, concrete okanye inkukuma emlanjeni Sukonakalisa iindonga (zomlambo) okanye izintyalo
Protect animals on the site Ask your supervisor or Contractor's Manager to remove animals found on site	Beskerm diere op die konstruksieterrein Vra u toesighouer of Kontrakbestuurder om diere van die terrein verwyder	Khusela izilwanyana ezilapho esayitini Xelela isupervisor ukuba zomkiswe ezozilwanyana
Do not damage or cut down any trees or plants without permission Do not pick flowers	Moenie enige plante of bome beskadig of afsny sonder toestemming nie Moenie blomme pluk nie	Ungonakalisi okanye ugawule imithi ngaphandle kwemvume Sukwemba izityalo
Put cigarette butts in a rubbish Do not smoke near gas, paints or petrol Do not light any fires without permission Know the positions of firefighting equipment Report all fires Do not burn rubbish/vegetation without permission	Gooi sigaretstompies in 'n asblik Moenie rook naby gas, verf of petrol nie Moenie sonder toestemming enige vure maak nie Weet waar brandbestrydingstoerusting gestoor word Meld alle vure onmiddelik aan Moenie Rommel verbrand sonder toestemming nie	Xa ugqibile ukutshayo galela emgqomeni (izitompi zecuba) Sukubasa umlilo ngaphandle kwemvume Zazi izicima mlilo apho zikhoyo Sukutshisa inkunkuma naaphandle kwemvume
Work with petrol, oil & diesel in marked areas Report any petrol, oil & diesel leaks or spills Use a drip tray under vehicles & machinery	Werk slegs in gemerkte areas met petrol, olie & diesel Meld alle petrol, oile en diesel lekkasies aan Gebruik 'n drupbak onder voertuie en mosjinerie	Sebenzisa ipetrol, oil ne diesel endaweni yayo Faka isitya sokukhongozela phansi kwemashini Ungagaeli oil emlanjeni
Empty drip trays after rain & throw away where instructed	Maak drupbakke leeg na reen, maar nie in riviere nie	Zama ungenzi uthuli fefa ngamanzi emhlabeni

DO'S AND DON'T'S	MOETS EN MOENIES	EMAZENZIWE NE MAZINGENZIWA
Try to avoid producing dust – wet dry ground & soil	Probeer on nie stof te maak nie - Maak droe grond nat met water	
Do not make loud noises around the site, especially near schools and homes Report or repair noisy vehicles	Moenie harde geluide maak op die terrain nie, veral naby skole en huise Meld reserige voertuie aan of herstel dit	Sukwena ingxolo eshayitini ngakumbi kufuphi nesikolo nezi ndlu Yazisa ulungise isithuthi esonakeleyo
Use the toilets provided Report full or leaking toilets	Gebruik die toilette wat voorsien is Meld vol of lekkende toilette aan	Sebenzisa itoilet (izindlu zangasese) Xela xa zizeleyo
Only eat in demarcated eating areas Never eat near a river or stream Put packaging & leftover food into rubbish bins	Eet slegs in gemerkte gebiede Moenie naby riviere of strome eet nie Gooi verpakking en orige kos in vullisblikke	Tyela kwindawo eyenzelwe oko Sukutyela kufuphi nomlambo Lahla emgqomeni yonke inkukuma
Do not litter – put all rubbish (especially cement bags) into the bins provided Report full bins to your supervisor The responsible person should empty bins regularly	Moenie vullis rondstrool nie – gooi alle vullis (veral sementsakke) in vullishouers Mel vol vullishouers aan by u toesighouer Vullishouers moet gereeld leeggemaak word	Sulahla inkukuma phantsi Galela emgqomeni yonke inkukuma xela Xa izele imigqomo Xela xa umgqomo uzele
Always keep to the speed limit Drivers – check & report leaks Ensure loads are secure & do not spill	Moet nooit die spoedperk oorskry nie Bestuurders- gaan voertuie na en meld lekkasies of rokerige voertuie aan Maak seker dat alle vragte stewig is en nie mors nie	Gcina isantya Umqhubi makayilungise inqwelo xa yonakele Qononondisa umthwalo ubotshiwe enqweleni
Know all emergency phone numbers	Maak seker dat u alle nood telefoonnommers ken	Zazi inombolo zengozi
Spot fines of between R20 and R2000 Removal from site Construction may be stopped	Boetes tussen R20 en R2000 Verwydering vanaf die konstruksieterrein Konstruksie mag gestop word	Intlawulo ngokwaphula umthetho yi R20 – R2000 Okanye ugxothwe emsebenzini Contract leyo imiswe
Report any breaks, floods, fires, leaks and injuries to your supervisor Ask questions!	Meld alle brekasies, vure, vloede, lekkasies en beserings aan by u toesighouer Vra Vrae!	Ripota wonke umanakalo ofana nokuqhekeza, isiphango umlilo, ukuvusa kwemashini nengozi kwi supervisor Buza xa unombuzo

9 Financial provision

9.1 Plans for quantum calculation purposes

Refer to the Mine Plans provided in Section 3 of this report and Table 11 below for area of existing and expansion areas.

9.2 Alignment of rehabilitation with the closure objectives

Implementation of the Environmental Management Plan provided in conjunction with the approved Mine Plans will ensure that mine closure objectives are attained.

Due to the historical neglect of Borrow Pits, contractual provisions must be made by the DR&PW during future works to not only rehabilitate areas mined during that specific contract period, but also to allow for Contactors to initiate the re-shaping, landscaping and rehabilitation of areas that were historically abandoned. It is suggested that a portion of the funds indicated in the Quantum calculation should be allocated to future contracts for this to be implemented.

9.3 Quantum calculations

Rehabilitation of the borrow pit upon mining completion will include the clearing up of access roads, mining infrastructure and the site office. It should be noted at this stage that rehabilitation should be commenced immediately on sites that are no longer mined or to be mined in the following three years.

The Quantum of Financial Provision is calculated using the official Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine (2005). These guidelines, provided by the DME, are used in all quantum calculations regarding borrow pit rehabilitation.
In terms of the above mentioned guideline, the borrow pits in this EMP are classified as class C mines (Table B.13 of the guidelines), derived from the material types present:

1. Dolerite
2. Basalt
3. Mudstone
4. Sandstone

Further the Sensitivity is determined from Table B.4 of the guidelines, taking the biophysical, social and economic features of the borrow pit into account. The table below shows the process of calculating the quantum rehabilitation provision for each borrow pit including the entire footprint of the quarry.

Table 11: Table indicating proposed mining area and quantum calculation.

Borrow Pit		Sensitivity (Table B4)	BP size (ha)	Rate per hectare (Table B.11)	Quantum
Total:					R 1 171 966.00

9.4 Undertaking to provide financial provision

The required amount must be provided for by the DR&PW should the right be granted.

10 SECTION 39 (4) (a) (iii) of the Act: Capacity to rehabilitate and manage negative impacts on the environment

10.1 The annual amount required to manage and rehabilitate the environment

The amount indicated in the financial provision for each Borrow Pits must be allocated over the expected life-span of the individual Borrow Pits for rehabilitation to be achieved.

10.2 Confirmation that the stated amount correctly reflected in the Mining Work Programme as required

Signed letters for financial provision are included in Appendix A.

11 REGULATION 52 (2) (h) Undertaking to execute the Environmental Management Plan

Signed letters for undertaking are included in Appendix A.

12 Appendices

Appendix A: Environmental Management Plan

Appendix B: Detailed Impact Assessment scores

Appendix C: Potential Species list

Appendix D: References

Appendix E: Financial Provision and Undertaking Letters

Appendix F: Borrow Pit Geological Test Results

Appendix G: Interested and Affected Party Correspondence

12.1 Appendix A: Environmental Management Plan

This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the mining right after approval of the EMP.

The impacts identified and listed in Table 1 of the previous chapter will be managed / controlled as set out under mitigating measures and as detailed in this part for the more significant impacts during the operational phase.

12.1.1 General Requirements

- The layout plans required for EMP approval are included in Section 3 above of this report.
- The mining area must be clearly demarcated by means of beacons at its corners. These beacons must be firmly erected and maintained in their correct positions throughout the life of the mine.
- The existing quarry scar should be shaped so that the working behaves as a localised sump to ensure run-off is contained after wet periods thereby reducing siltation of the drainage channel downstream.
- Areas not earmarked for future mining activities should be rehabilitated with topsoil to encourage vegetation regrowth. The old workings and stockpiles should be levelled and excavation scars covered with topsoil to encourage grass regrowth and rehabilitation of land surface.
- No disused stockpiles should occur / be placed outside of the mining footprint upon project completion.
- Future mine faces need not be rehabilitated but should be sloped to prevent unnecessary erosion.
- A stockpile should be left within the mine footprint for future patch gravelling and road repair programmes outside this contract.
- Note that the stockpile should not be placed in the lowest part of the quarry where there is a possibility of it being partly or completely submerged by accumulating water.
- It is recommended that the quarry be extended eastern and western directions to avoid moving too close to the housing settlement to the south of the quarry.
- Working hours shall be deemed as normal working hours of 07:00 to 17:00, Mondays to Fridays, 07:00 to 13:00 on Saturdays, excluding public holidays. These conditions can, however, be changed after written communication with the Regional Manager (DME).

Responsibility

The environment affected by the mining operations shall be rehabilitated by the holder, as far as is practicable, to its natural state or to a predetermined and agreed to standard or land use which conforms with the concept of sustainable development. The affected environment shall be maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof.

It is the responsibility of the holder of the mining right to ensure that the contractor on the site and the employees are capable of complying with all the statutory requirements, which must be met in order to mine, which includes the implementation of this EMP.

If operations are to be conducted in an area that has already been disturbed, the holder must reach specific agreement with the Regional Manager concerning the responsibilities imposed upon themselves pertaining to the rehabilitation of the area and the pollution control measures to be implemented.

The EMP recommendations contained in the Mitigation section of this report should be read and applied in conjunction with the measures mentioned throughout this report.

RE-GRAVELLING OF SECTIONS OF DIVISIONAL DR08248, DR08247, DR08041 & DR 8504 IN THE INTSIKA YETHU, SAKHISIZWE & ENGCOBO LOCAL MUNICIPALITIES, CHRIS HANI DISTRICT MUNICIPALITY: PROPOSED BORROW PIT DEVELOPMENT

Contract No. _____

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)

MADE AND ENTERED BETWEEN:

The Eastern Cape Government: Department of Roads and Public Works (DRPW)

Herein represented by:_____

In his/her capacity as:_____

Duly authorized hereto

Hereafter referred to as "DRPW"

AND

Herein represented by: _____

Duly authorized hereto

Hereafter referred to as the "THE CONTRACTOR"

The parties record that the Contractor shall bear the following obligations in terms of this Agreement:

1. Comply with all provisions of the EMP;
2. Comply with the requirements of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996);
3. Bind any Sub-Contractors to comply with the EMP to which this agreement is appended;
4. Enforce compliance with the EMP by:
   - Appointing an Environmental Officer (or Site Agent); and
   - Ensuring that all staff is familiar with the EMP
5. Protect the environment of the site against environmental damage;
6. To make good any environmental damage; and
7. Failure to comply with the EMP may result in fines and reported non-compliance may result in the suspension of work or termination of the contract.

SIGNATORIES

Signed at _____ on this _____ day of _____ 201____

For **DRPW**

Signature _____

Print Name _____

(duly authorised)

As Witnesses:

1. _____

2. _____

Signed at _____ on this _____day of _____ 201____

For **CONTRACTOR**

Signature _____

Print Name _____

(duly authorised)

As Witnesses:

1. _____

2. _____

Layout Plan

- Copies of the layout plans are included in this report and *must* be available at the mining site. These plans *must* include the following:
  - Details on site locality.
  - Site boundaries.
  - Layout of waste management facilities.
  - Access roads and entry points to each site.
  - Drainage features and stormwater control (for the reduction of potential erosion).
  - Storage facilities (water, fuel and lubricants, chemicals and other materials, stockpiles, topsoil and spoil areas).
  - Intended mitigation measures to reduce potential impacts.
- The plan *must* be updated on a regular basis and forwarded to the Regional Manager. pdates *should* include the actual progress of the establishment of surface infrastructure, mining operations and rehabilitation.
- Final layout plans *will* be submitted at closure of the borrow pits or upon the cessation of operations.

Demarcation the Mining Area

- The mining areas *must* be clearly demarcated. Demarcation be means of beacons at corner and along boundaries (if there is no visibility between the comer beacons).
- Permanent beacons *must* be firmly erected and maintained in their correct positions for the duration of the operation. Permanent beacons are indicated on the layout plans or prescribed by the Regional Manager.
- Mining and resultant operations *shall* only take place in demarcated areas.
- It is important that a detailed photographic record of the demarcated areas is taken before the commencement of operations. These records are to be kept (by the Contractor) for reference purposes during the rehabilitation phase of the sites.

Fencing

- The perimeter of the mining areas (as indicated on the layout plans) *will* be fenced with stock-proof fencing.

- Access gateways for the proposed mining areas *must* be secured with a suitable lock.

Signage

- 'No unauthorised access' signs *will* be erected at the gates to the borrow pits.
- Heavy vehicle crossings *will* be at the intersections of the access tracks and the roads.
- Cautions signs and 40 km/h signs *shall* be placed at regulation distances from heavy vehicle crossing signs.

Restrictions on Mining

- The Regional Manager may prohibit the conducting of mining operations in vegetated areas on assessment of the applications.
- No operations *will* be conducted within 5 m of excluded areas.

Exiting Services

- Existing services infrastructure (Telkom and Escom lines and water pipelines) *must* be clearly marked and not damaged in any way.
- Consent *should* be obtained from the relevant service providers and the relevant landowner *should* be notified in advance should services need to be interrupted for any reason.

12.1.2 Biodiversity Requirements

Protection of Flora and Fauna

- Search and rescue operations for Red List Species *must* be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation *should* be temporarily stored during mining operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- A faunal specialist is required to remove and relocate any faunal species disturbed by the mining processes.
- No animals are to be harmed or killed during the course of mining.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the land owner and *must* not be disturbed, upset or used without their express consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the mining operations may be felled or cleared only be the express written permission of the ECO.
- Weeds and alien species *must* be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during mining activities. Disturbed areas include (but are not limited to) access roads, construction camps, borrow pits areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer my order the removal of alien plants (when necessary). Areas within the confines of the borrow pits are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.

- Rehabilitation of vegetation of the site *must* be done as described in the Rehabilitation Plans.

Fires

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent land owners/users/managers *should* also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor *must* strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making *must* be strictly prohibited.
- The Contractor *should* take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the EO.
- The Contractor *must* ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor *must* supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and "hot work" *must* be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area *must* be away from flammable stores. All events must be under management's supervision and a fire extinguisher *will* be immediately available. "Low-smoke" fuels must be used (e.g., charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor *must* take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

Soil Aspects

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the mining footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

12.1.3 Historical, Archaeological and Paleontological Sites

Archaeological Sites

- If concentrations of archaeological heritage material and human remains are uncovered during construction activities, ALL (including the immediate vicinity) work *must* cease immediately and be reported to the Eastern Cape Provincial Heritage Resources Authority so that systematic and professional investigation / excavation can be undertaken. Human remains include:
    - Remnants of stone-made structures
    - Indigenous ceramics
    - Bones
    - Stone artefacts
    - Ostrich eggshell fragments

  - Marine shells
  - Charcoal / ash concentrations
- The contractor *must* take reasonable precautions to prevent removal or damage to any such article. The Engineer *must* be informed immediately upon discovery.
- Work may only resume once clearance is given in writing by the archaeologist.
- Robbing or removal of any material from these sites for construction purposes is strictly prohibited. Disturbance or alteration is a criminal offence punishable by law.
- Only existing roads may be used during development phase. Informal access roads *should* first be surveyed for heritage sites before construction may commence.

Graves

If a grave site is uncovered or discovered before the commencement of work, all work in the immediate vicinity MUST be stopped and the Engineer informed. The following are to be adhered to upon discovery of graves during mining activities and the management of grave sites:

- Where possible, the area where the grave site is located *should* not be disturbed, particularly in instances where exhumation cannot be undertaken or is deemed not permissible by SAHRA.
- Where it is necessary to exhume and re-bury graves, the Contractor will need to apply for the necessary permissions / permits. This includes the acquisition of permits from:
  - SAHRA
  - Nation and provincial health departments
  - Community (and next of kin) consultation
  - Collaboration with a forensic archaeologist if new graves are located during construction or operation.
- Unless such a time as permission for exhumation is granted, all site preparation and operations *will* stop.
- The mine *will* adhere to the requirements laid out by the Human Tissues Act (No 65 of 1983) and the National Heritage Resources Act (No 25 of 1999).
- Respect *must* be given to the customs and beliefs of the affected relatives. Where requested, exhumation will be conducted in the presence of the relatives or community representatives.
- Exhumations under the Human Tissues Act will be conducted under the supervision of an undertaker or specialist.
- Exhumations conducted under the National Heritage Resources Act will be conducted under the supervision of an archaeologist.
- In the event that additional graves are located during construction and operation, SAHRA *must* be notified and permits for relocation of graves permitted.

Paleontological Sites

- Awareness of potential fossil bones on sites *must* be maintained by the Contractor and ECO. A palaeontologist *must* be notified if any fossil bones are uncovered.

12.1.4 Visual Aspects

- The surface crust *must* be broken up on completion of the project, to obliterate temporary roads or working surfaces. Earth embankments *will* then be established where appropriate to prevent erosion.
- The demolition and removal of the remains of all structures erected at borrow pits *will* be done on the completion of the project.
- It is important that all rehabilitated areas merge with the immediate environment. Any negative visual impacts *must* be rectified to the Regional Managers satisfaction.
- Overburden *will* be placed back into excavation as part of the rehabilitation programme.

12.1.5 Noise

- Any blasting activities and road construction *must* be limited to daylight hours. If any complaints are received, the hours of the activities *will* be reviewed.
- Compliance with the appropriate legislation with respect to noise is mandatory.
- Regular maintenance of equipment and vehicles *must* be undertaken.
- The contractor *will* communicate with potentially affected communities in the event that activities continue outside of the stipulated hours. This *must* be done prior to commencement of such activities.
- Should member of the surrounding communities wish to lodge complains, a complaints register *must* be made available on the sites. The contractor is responsible for dealing with the complaint appropriately and timeously.

12.1.6 Dust

- To manage complaints relation to impacts on the nearby communities, a dust register *will* be developed.
- If required, water spray vehicles *will* be used to control wind cause by strong winds / mining activities on the works.
- No over-watering of the mining area or road surfaces.
- Wind screens *should* be used to reduce wind and dust in open areas.

12.1.7 Waste Management and Ablution Facilities

- It is important to identify a suitable site for spoiling excavated material. Excavated spoil *must* be stockpiles and used in profiling and rehabilitation of the borrow pits.
- Sufficient weather and scavenger- proof bins with lids (to prevent the escape of litter) *will* be provided, and be easily accessible at all points where wastes are generated.
- Sites *must* be kept clean and free of litter. No litter from the site *should* be allowed to disperse to surrounding areas.
- All personnel *should* be instructed to dispose of all waste in the proper manner.
- It is recommended that recycling is practised. The Contractor *must* identify and separate materials, and provide separate marked bins for these items.
- Construction materials *must* be suitable stored and protected so that they do not become damaged and unusable.
- The responsibility of regular disposal of all waste generated as a result of the construction, falls to the Contractor. This must be done at suitable and licensed municipal waste disposal facilities. Waste disposal slips *must* be kept for auditing purposes.
- Excess material may also be spoiled in used borrow pits as part of the rehabilitation process.
- Construction waste *must* be removed immediately upon completion of each phase of the project and disposed of appropriately.
- A safe disposal slip *must* be kept on record as proof of final disposal of potentially hazardous substances.
- No waste may be burned on site.
- General waste is to be collected either by the local Municipality or removed by the contractor. The frequency of collections *should* be such that waste containment receptacles do not unduly accumulate or overflow.
- The holder of the mining permit *must*, as a minimum requirement, provide pit latrines for employees in such a way that they do not cause water or other pollution. Proper hygiene measures *will* be established.
- Portable toilets *shall* be provided adjacent to the site entrance indicated on the layout plans and *must* be screened with shade cloth.

- The use of existing facilities *must* take place in consultation with the landowner.
- The effluent water from the camp washing facility must be disposed of in a properly constructed French drain situated as far as possible, but not less than 200 meters, from any stream, river, pan, damn, spring or borehole.
    - Only domestic type wash water *must* enter this drain.
- Any effluent containing oil, grease or other industrial substances *must* be collected in suitable receptacles and removed from the sites, either for sale or for appropriate disposal at a recognised facility.
- Spills *must* be cleaned up immediately to the satisfaction of the Regional Manager. It is important to remove the spillage together with the polluted soil and dispose of them at a recognised facility.
- Non-biodegradable refuse (glass bottles, plastic bags, metal scrap, etc.) *should* be stored in a container at a collecting point and collected on a weekly basis. It *must* then be disposed of at a recognised disposal facility. Specific precautions *must* be taken to prevent refuse from being dumped or in the vicinity of the sites.
- Biodegradable refuse *must* either be handled as indicated above or be buried in a pit excavated for that purpose and covered with layers of soil, incorporating a final 0.5 meter thick layer of topsoil (where possible). Provision should be made for future subsidence of the covering.

12.1.8 Infrastructural Requirements

Topsoil

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the mining footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

Access to the Site

Existing roads are adequate, but if future mining operations do require the construction of roads, the following must be adhered to:

- The access to the mining area must be established in accordance with the authorisation from the various government departments (Department of Economic Affairs Environment and Tourism (DEAET), Department of Roads and Transport (DRT) and the Department of Minerals and Energy) and existing roads shall be used as far as practical.
- Should a portion of the access road be newly constructed the following must be adhered to:
    - The route shall be selected that a minimum disturbance to natural vegetation
    - Water courses and steep gradients shall be avoided as far as practical.
    - Adequate drainage and erosion protection in the form of cut-off berms or trenches shall be provided where necessary.
    - Authorisation may be required from the DEAET if the road is constructed in “sensitive areas”, as this represents a listed activity in terms of environmental legislation.
- The erection of gates in a fence line and the open and closed status of gates shall be clarified in consultation with the landowner and maintained throughout the operational period.

- No other routes shall be used by vehicles or personnel for the purpose of gaining access to the site.
- Newly constructed access roads shall be adequately maintained so as to minimise dust, erosion or undue surface damage.
- The liberation of dust into the surrounding environment shall be effectively controlled by the use of inter alia, water spraying and /or other dust-allaying agents. The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used.
- The access roads to the quarry sites must be strictly maintained during the operation process. Sections of the access road that erodes during the mining process shall be suitably rehabilitated upon completion of the project.

Stormwater and Erosion Control

- Stormwater Management Plans ***must*** be developed for each borrow pit. They ***should*** include the following:
  - The management of stormwater during construction.
  - The installation of stormwater and erosion control infrastructure.
  - The management of infrastructure after completion of construction.
- Drainage works are required to prevent stormwater from entering or exiting the borrow pits and quarries to prevent silt laden surface water from draining into river systems in proximity to the borrow pits and quarry sites. Stormwater ***must*** be prevented from entering or running of borrow pits and quarry sites.
- To ensure that borrow pits are not subjected to excessive erosion and capable of drainage run-off with minimum risk of scour, their slops ***should*** be profiled at a maximum 1:3 gradient.
- Diversion channels ***should*** be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean run-off and divert it around disturbed areas into the natural drainage system downstream of the borrow pits.
- Rehabilitation is necessary to control erosion and sedimentation of all existing mined areas (where works will take place).
- Existing vegetation ***must*** be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of borrow pits and quarries are planned and completed in such a way that the run-off water will not cause erosion.
- Visual inspections ***will*** be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden run-off from cleared ares ***must*** be prevent from entering rivers and streams.
- No river or surface water may be affected by sill emanating from the borrow pits or quarries.

Site Office / Camp Sites

- No site offices or camp sites will be constructed on the site under current operating conditions.
- Should a site office be temporarily required, a moveable container type ***must*** be used and placed in a disturbed area within the existing borrow pit.

Vehicle Maintenance and Secured Storage Area

- Since the vehicles are not owned by the quarry owner, there will be no vehicle maintenance or storage area required.

Maintenance of Vehicles and Equipment

- The maintenance of vehicles and equipment used for any purpose during the mining operation will take place off-site.
- Equipment used in the mining process must be adequately maintained so that during operations it does not spill oil, diesel or hydraulic fuel.
- Machinery or equipment used in the mining area must not constitute a pollution hazard in respect of the above substances. The Regional Manager (DME) shall order such equipment to be repaired or withdrawn from the site if she considers the equipment or machinery to be polluting and irreparable.

Waste Disposal

- Suitable covered receptacles shall be available at all times and conveniently placed for the disposal of waste.
- All used oils, grease or hydraulic fluids shall be placed therein and these receptacles will be removed from the site on a regular basis for disposal at a registered or licensed disposal facility.
- All spills must be cleaned up immediately to the satisfaction of the Regional Manager be removing the spillage entirely together with the polluted soil and by disposing of them at a recognized facility.
- Fuel spillage should be contained with a hydrocarbon absorbent and thoroughly removed once spillage control and clean-up has been achieved.
- On site operators should also have contact details for properly trained on-site accident assistance such as Waste-Tech, which can be called upon in emergency situations.

Operating Procedures in the Mining Area

- Mining shall only take place within the approved demarcated mining area.
- Mining may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the mining permit shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment, or adapted grass / vegetation will be re-established on completion of mining activities, where applicable.
- No firewood to be collected on site, and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed mining activity, or the access road.

Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated mining area.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Waste as described in Chapter 4.2 will not be permitted within the mine footprint.

- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previous stored topsoil shall be returned to its original depth over the mine area.
- The area shall be fertilised if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

Blasting Activities

5. Blasting *should* be designed based on a risk level of 0.03.
6. Maximum charge per delay *must* be restricted to 112 kg.
7. Stemming of blast holes *should* be taken to a maximum to reduce the possibility of fly rock.
8. Blasting mats / timber boarding or other means *must* be used for larger blasts to reduce safety and noise impacts.
9. Vibrometers *should* adjacent to the water reservoir and the nearest dwelling to record peak particle velocities for each blast.
10. Chemicals used in blasting *must* not be allowed to leach into groundwater.
11. Neighboring communities and relevant authorities *must* be notified by the Contractor 24 hours prior to blasting.
12. Controlled blasting techniques *must* be used during blasting work to minimize any damage to the final profile.
13. Spillage of material from surface excavation, whether by blasting or other means, *must* be limited by the Contractor. All necessary precautions including covering the rock prior with sufficient loos material prior to blasting, if necessary, *should* be used to prevent the blasted material from being thrown.

Processing Areas and Waste Piles

- No processing or waste pile areas are currently required, but should Scribante construction utilise the site for the quarrying and processing of gravel areas as indicated on the map in Appendix 1.
- Quarry operators and labourers are to be accommodated off site.
- No overnighting in the study area will be allowed.
- Field personnel will have sufficient kitchen and sanitary facilities during working hours.
- Toilets will be provided if additional workers are to be on site and must be situated in an area where no negative impact will occur.
- Clean water (drinking quality) must be available to workers.
- Rivers and groundwater must not be impacted negatively upon.
- Natural vegetation must not be disturbed unnecessarily in and around the quarry site.
- The mine area and surrounds will be kept neat and tidy at all times.
- Processing areas and waste piles shall be established within a clearly demarcated area.
- This area will include the footprint where commercial stockpiles will be positioned during the daily operation of the quarry. Monitoring and supervision of the processing area will be controlled by the office, which will be situated adjacent to these workings.

Rehabilitation of Processing and Excavation Areas

- Coarse material and overburden must be removed from stockpiles and dumped into the mining excavations.

- On completion of mining, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised if necessary to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This *shall* be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation, be corrected and the area be seeded with a vegetation seed mix to her or his satisfaction. This *must* be done in conjunction with the ECO.
- Final rehabilitation *must* comply with the requirements mention in the Rehabilitation Plan.

Labour and Affected Parties

14. Where possible, labourers from the nearby communities *should* be appointed.
15. If applicable, suitable accommodation and security *must* be provided during construction and by the contractors for their workers.
16. If applicable, the contractor in conjunction with the client *should* develop policies and procedures with regard to employee accommodation.
17. Management commitments *will* be implemented by the contractor with respect to noise, dust, safety and blasting. The contractor *shall* furthermore ensure that their staff is trained regarding the Safety and Health Environmental (SHE) procedures that are to be followed on site. Penalty clauses for transgressions *will* also be considered in this regard.
18. The contractor *must* ensure that the standard safety measures as stipulated in the Mine, Health and Safety Act are complied with.
19. All employees and contractors *must* be briefed about appropriate road safety measures. Penalties and disciplinary actions will be imposed on employees and contractors for non-compliance with safety, environmental and social measures.
20. Complaints *should* be dealt with timeously. This requires the joint formulation of compliance contract and grievance procedures and project-specific communication mechanisms (eg the keeping of complaints registers).
21. Inadvertent access to dangerous construction areas *must* be prevented. Such areas *must* be strictly controlled using fencing, warning signs and access control.
22. The contractor *must* implement strict access control measures wherever @outsider@ are accommodated in construction camps. Only authorized personnel are allowed at the camp site.
23. Workers may only be housed in surrounding villages if the relevant authorities in the villages are satisfied with this arrangement.

12.1.9 Final Rehabilitation

Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the quarrying activities whilst maximizing the future utilization of the property. The idea, therefore, is to leave the mined out quartzitic sandstone quarry in a conditions that reduces many of the negative impacts associated with a mined out area. Significant aspects to be borne in mind in this regard is visibility of the mining scar, revegetation of the mining footprint and stability and environmental risk in an old mine environment. The depression and

immediate area of the working must also be free of alien vegetation. Alternative land uses such as agriculture, housing, waste disposal or alternative mining applications are unsuitable for a post-mining scenario.

The proposed quarrying and rehabilitation procedures have been formulated to optimise the extraction of raw material while creating stable quarry sides that will not present an unreasonable safety risk once mine closure has been approved. Mining operations will be conducted in stages corresponding to the creation of precision blasted quarry sides and a bench at the base of the working. Each phase will be mined over a five year period and will be audited on an annual basis.

Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant and other items used during the mining period will be removed from the site (section 44 of the MPRDA).
- Waste material of any description, including scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

General plans outlining the mining details indicate the proposed progressive development of the quarry is included in Appendix 1.

Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped separately from the area of each year of mining. The topsoil and subsoil removed from the initial cut will be stockpiled separately and only used in rehabilitation work towards the end of the quarrying operation. This is in contract to the gravel mining operation where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked out areas and used to soften quarry slopes where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water run-off and increase filtration. Latent impacts will be monitored by the Department of Minerals and Energy over a five year period after quarry operations cease before a final mine closure certificate can be granted by the DME.

Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. Whilst *Chloris gayana* and *Themeda triandra* are the preferred species to use for revegetation by the quarry owner, other species that can work in this regard include the following and can either be collected on site (using a mower or by hand) or purchased from a relevant local seed supplier:

Botanical name	Common name
Chloris gayana	Rhodes grass
Chloris virgata	Feather-top Chloris
Cynodon dactylon	Couch grass
Eragrostis curvula	Weeping love grass
Melinis repens	Natal red top
Panicum coloratum	Small Buffalo Grass
Panicum deustum	Broad-leaved Panicum
Stenotaphrum secundatum	Buffalo turf grass
Themeda triandra	Rooigras

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site
- Stabilise disturbed soil and rock faces
- Minimize surface erosion and consequent siltation of natural water course located on site
- Control wind-blown dust problems
- Enhance the physical properties of the soil
- Re-establish nutrient cycling
- Re-establish a stable ecological system

Every effort must be made to avoid unnecessary disturbance of the natural vegetation during quarrying operations.

Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where mining is completed should be rehabilitated immediately.
- Areas to be disturbed in future mining operations will be kept as small as possible (i.e. conducting the quarrying operations in phases), thereby limiting the scale of erosion.
- Quarry slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage run-off with minimum risk of scour (maximum 1:3 gradient).
- Diversion channels will be constructed ahead of the open cuts as well as above emplacement areas and stockpiles to intercept clean run-off and divert it around disturbed areas into the natural drainage system downstream of the quarry.
- Quarrying will be confined to the existing mining footprint as per the existing gravel mining license.
- All existing mined areas will be revegetated to control erosion and sedimentation
- Existing vegetation will be retained as far as possible to minimize erosion problems.

Visual Impacts Amelioration

The overall visual impact of the proposed mining operations will be minimised by the following mitigating measures:

- Confining the mining footprint to an area as small as possible
- Commencing the operations from the west into the mine target area from a low point that is not visible to neighbouring landowners / land users
- Integrating the mines into the existing land slope

- Re-topsoiling and vegetating all disturbed areas
- Use indigenous trees around the perimeter of the mine to mask quarry scars.

12.1.10 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.

To minimise adverse environmental impacts associated with quarrying operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with quarrying activities.

Inspecting and Monitoring

- Regular monitoring of all the environmental management measures and components should be carried out by the holder of the mining permit to ensure that the provisions of this programme are adhered to.
- Ongoing and regular reporting of the progress of implementation of this programme must be done. An environmental audit shall be carried out by an independent consultant on an annual basis. The findings of this audit must be reported back to the Regional Director. This should include visual inspections on erosion and physical pollution.
- A Performance Assessment Report must be submitted to the Regional Director after each audit as per Regulation 55 of the MPRDA.
- Any change to the mining process needs to be documented during the audit process and the necessary changes recorded to facilitate future mining operations and audit investigations.
- Adherence to the impacts associated with the proposed mining operations, as outlined in the Impact Assessment section of this report, must be addressed in the annual audit.
- Inspections and monitoring shall be carried out on both the implementation of the programme and the impact on plant and animal life.
- Adherence to concerns raised by IAP's during the public participation process should receive special attention during the environmental audit and correspondence to the various IAP's should be made on an annual basis in this regard.

Compliance Reporting / Submission of Information

- Layout plans ***must*** be updated on a regular basis and updated copies ***will*** be submitted to the Regional Manager upon the completion of each audit investigation.
- Any emergency or unforeseen impact ***must*** be reported to the Regional Manager within 14 days of such event being noticed.
- An assessment of environmental impacts that were not properly addressed or were unknown when the EMP was compiled, ***shall*** be carried out and added as a corrective action.

12.1.11 Training

The on-site manager is responsible for the training of all staff. Regular training sessions are recommended and ***shall*** include basic environmental awareness. It is important that training registers are kept as proof for auditing purposes. The following environmental training ***should*** be included:

- The importance of conformance with all environmental policies.
- Environmental impacts of the proposed activities (actual or potential).
- Improved personal performance and the environmental benefits thereof.

- Roles and responsibilities of achieving conformance with environmental policy and procedures.
- Associated procedures and emergency preparedness and response requirements.
- Potential consequences of departure from specified operating procedures.
- Mitigation measures required to be implemented when carrying out their work activities.

12.1.12 Environmental Incidents

a) The on-site manager ***must*** maintain a register of all environmental incidents occurring as a result of the associated activities in terms of the contract. The following environmental incidents ***must*** be included:
    - Fires
    - Accidents
    - Hazardous material spills that contaminate soil or water resources
    - Non-compliance with applicable legislation
    - Non-compliance with this EMP.

b) Environmental incidents ***must*** be investigated be the competent person and the environmental incident report ***will*** be forwarded to the permit holder. Incident reports should be presented within five working days of the incident. The environmental incident report ***must*** include:
    - A description of the incident.
    - Actions taken to contain any damage to the environment, personnel or the public.
    - Actions taken to repair / remediate any damage.

c) The prescription of additional measures that may be required to remediate damage that results from the incident as well as prevention of similar incidents occurring in the future.

12.1.13 List of Fines

CEMP TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	**MIN. FEE**	**MAX. FEE**
Failure to report environmental damage or CEMP transgressions to the ECO or RE.	R1000	R2000
Failure to carry out instructions of the ECO or RE regarding the environment or the CEMP	R2000	R4000
Failure to comply with prescriptions for supervision for loading and off-loading of delivery vehicles	R500	R1000
Failure to comply with prescriptions for securing of loads to ensure safe passage of delivery vehicles	R500	R1000
Failure to comply with prescriptions for the storage of imported materials within a designated contractors yard	R500	R1000
Failure to comply with prescribed administration, storage or handling of hazardous substances	R500	R1000
Failure to comply with fuel storage, refueling, or cleanup prescriptions	R500	R1000
Failure to comply with prescriptions for the use of ablution facilities	R500	R1000
Failure to comply with prescriptions for the use of designated eating areas, heating sources for cooking or presence of fire extinguishers	R500	R1000
Failure to comply with prescriptions regarding water provision	R500	R1000
Failure to comply with prescriptions regarding fire control	R500	R1000
Failure to comply with prescriptions for solid waste management (incl. paint chips, cement and concrete)	R500	R1000
Failure to comply with prescriptions to prevent water pollution	R500	R1000

CEMP TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	MIN. FEE	MAX. FEE
Failure to comply with prescriptions regarding workshop equipment maintenance and storage	R500	R1000
Failure to comply with prescriptions regarding noise levels of construction activities	R500	R1000
Failure to comply with prescriptions regarding working hours	R500	R1000
Failure to comply with prescriptions regarding lighting and aesthetics	R500	R1000
Failure to comply with prescriptions regarding silt, debris and other obstruction removal	R500	R1000
Failure to comply with prescriptions regarding water diversion and drainage	R500	R1000
Failure to comply with prescriptions regarding erosion and scour protection	R500	R1000
Failure to comply with prescriptions traffic accommodation	R500	R1000
Failure to comply with prescriptions regarding tree and vegetation removal/damage	R5000	R20000
Failure to comply with prescriptions regarding method statements	R500	R5000
Failure to comply with prescriptions regarding environmental awareness training	R500	R5000
Failure to comply with prescriptions regarding appointment of an Environmental Officer and monitoring of CEMP compliance	R500	R1000
Failure to comply with prescriptions regarding site demarcation and erection of fences	R500	R5000
Failure to comply with prescriptions regarding control of vehicles and plant on access routes	R500	R1000
Failure to comply with prescriptions regarding information posters	R500	R1000
Failure to comply with prescriptions regarding procedures for emergencies	R1000	R5000
Failure to comply with prescriptions posting of emergency numbers and contacting of the emergency call centre	R500	R5000
Failure to comply with prescriptions regarding information boards or a complaints register	R500	R1000
Failure to comply with prescriptions regarding protection of natural features	R500	R5000
Failure to comply with prescriptions regarding erosion and sedimentation control	R500	R5000
SCHEDULE OF FINES FOR ENVIRONMENTAL DAMAGE OR EMP TRANSGRESSIONS (Based on City of Cape Town: Standard Environmental Specifications – Ver 5 (03/2002)) Note: The maximum fine for any environmental damage will never be less than the cost of applicable environmental rehabilitation.		

For each subsequent similar offence committed by the same individual, the fine shall be doubled in value to a maximum value of R50 000.

12.1.14 Closure objectives and their extent of alignment to the pre-mining environment

Description of measures

When the holder of a mining right intends closing the mining operation, an environmental risk report shall accompany the application for closure. The requirements of such a risk report are contained in Regulation 60 of the MPRDA.

Closure Objectives

The decommissioning phase and closure of the quarry will involve removal of all debris and rehabilitation of areas not rehabilitated during the operational phases of the project. This will comprise the scarification of compacted

areas, reshaping of areas, topsoiling and regenerating all prepared surfaces. The crusher and screening plants will be dissembled and all other infrastructural development such as haulage roads and stock pile areas will be rehabilitated.

Mine closure upon completion of the mining operation needs to be conducted in accordance to the objectives outlined in this report. The recommendations outlined in this report regarding precision blasting of quarry sides, topsoil replacement and re-vegetation all need to be complied with before mine closure can be considered.

The stages for rehabilitation, which need to be adhered to in order to meet the closure objectives, are as follows:

- Over the lifespan of the borrow pit, rehabilitation should commence initially in areas that are no longer being mined.
- If mining is expanded into the proposed extension, rehabilitation is the adjacent quarry should be commenced at least twelve months before commencement of that phase.
- The same strategy will be applied to future mining phases during the quarries lifespan.
- Upon completion of the final mining phase, final quarry rehabilitation (which will involve the rehabilitation of the areas currently being mined out and the storage and processing areas) will be completed within 12 months of operation closure.
- The proposed closure costs will be absorbed throughout the operation life of the quarry, as rehabilitation towards final closure objectives will be conducted continuously during mining operations.

12.2 Appendix B: Detailed Impact Assessment

Impact																														
Topography																														
Erosion																														
Geology																														
Soils																														
Surface Water																														
Groundwater																														
Air quality/Dust																														
Vegetation																														
Fire																														
Alien species																														
Habitat																														
Fauna																														
Land capability/Agriculture																														
Grazing																														
Fences																														
Noise																														
Over/Under Services																														
Visual Impact																														
Waste management																														
Socio-Economic Impacts																														
Archaeology																														
Heritage																														
Palaeontology																														
Buildings																														
OVERALL																														

12.3 Appendix C: Potential Species of Special Concern List for the area

Scientific Name	Family	Conservation Status
Flora		
Barleria obtusa	ACANTHACEAE	CR
Chaetacanthus setiger	ACANTHACEAE	Critically Rare
Crabbea acaulis	ACANTHACEAE	DDD
Crabbea hirsuta	ACANTHACEAE	DDD
Hypoestes aristata var. aristata	ACANTHACEAE	DDT
Justicia bolusii	ACANTHACEAE	DDT
Thunbergia capensis	ACANTHACEAE	DDT
Thunbergia dregeana	ACANTHACEAE	DDT
Aizoon rigidum	AIZOACEAE	Declining
Ceratiosicyos laevis	ACHARIACEAE	Declining
Guthriea capensis	ACHARIACEAE	Declining
Kiggelaria africana	ACHARIACEAE	Declining
Tulbaghia acutiloba	ALLIACEAE	Declining
Tulbaghia galpinii	ALLIACEAE	Declining
Obetia tenax	URTICACEAE	NT
Albuca setosa	HYACINTHACEAE	PNCO
Aloe arborescens	ASPHODELACEAE	PNCO
Aloe ecklonis	ASPHODELACEAE	PNCO
Aloe ferox	ASPHODELACEAE	PNCO
Aloe maculata	ASPHODELACEAE	PNCO
Aloe pratensis	ASPHODELACEAE	PNCO
Angraecum sacciferum	ORCHIDACEAE	PNCO
Aristea abyssinica	IRIDACEAE	PNCO
Aristea anceps	IRIDACEAE	PNCO
Asparagus aethiopicus	ASPARAGACEAE	PNCO
Asparagus concinnus	ASPARAGACEAE	PNCO
Asparagus denudatus	ASPARAGACEAE	PNCO
Asparagus falcatus	ASPARAGACEAE	PNCO
Asparagus ramosissimus	ASPARAGACEAE	PNCO
Asparagus virgatus	ASPARAGACEAE	PNCO
Bergeranthus multiceps	MESEMBRYANTHEMACEAE	PNCO
Boophone disticha	AMARYLLIDACEAE	PNCO
Brownleea coerulea	ORCHIDACEAE	PNCO
Brownleea parviflora	ORCHIDACEAE	PNCO
Brownleea recurvata	ORCHIDACEAE	PNCO
Brunsvigia bosmaniae	AMARYLLIDACEAE	PNCO
Brunsvigia grandiflora	AMARYLLIDACEAE	PNCO
Brunsvigia radulosa	AMARYLLIDACEAE	PNCO
Bulbine abyssinica	ASPHODELACEAE	PNCO
Bulbine asphodeloides	ASPHODELACEAE	PNCO
Bulbine favosa	ASPHODELACEAE	PNCO
Bulbine narcissifolia	ASPHODELACEAE	PNCO
Crocosmia masoniorum	IRIDACEAE	PNCO

Scientific Name	Family	Conservation Status
Cyrtanthus brachyscyphus	AMARYLLIDACEAE	PNCO
Cyrtanthus flanaganii	AMARYLLIDACEAE	PNCO
Cyrtanthus mackenii subsp. cooperi	AMARYLLIDACEAE	PNCO
Cyrtanthus macowanii	AMARYLLIDACEAE	PNCO
Cyrtanthus tuckii var. viridilobus	AMARYLLIDACEAE	PNCO
Delosperma katbergense	MESEMBRYANTHEMACEAE	PNCO
Delosperma mahonii	MESEMBRYANTHEMACEAE	PNCO
Delosperma repens	MESEMBRYANTHEMACEAE	PNCO
Dierama atrum	IRIDACEAE	PNCO
Dierama dissimile	IRIDACEAE	PNCO
Dierama reynoldsii	IRIDACEAE	PNCO
Dierama robustum	IRIDACEAE	PNCO
Dietes iridioides	IRIDACEAE	PNCO
Disa cephalotes subsp. cephalotes	ORCHIDACEAE	PNCO
Disa oreophila subsp. oreophila	ORCHIDACEAE	PNCO
Disa patula var. transvaalensis	ORCHIDACEAE	PNCO
Disa stachyoides	ORCHIDACEAE	PNCO
Disa versicolor	ORCHIDACEAE	PNCO
Disperis cardiophora	ORCHIDACEAE	PNCO
Disperis fanniniae	ORCHIDACEAE	PNCO
Disperis lindleyana	ORCHIDACEAE	PNCO
Disperis oxyglossa	ORCHIDACEAE	PNCO
Disperis renibractea	ORCHIDACEAE	PNCO
Disperis stenoplectron	ORCHIDACEAE	PNCO
Disperis wealei	ORCHIDACEAE	PNCO
Drimia macrocentra	HYACINTHACEAE	PNCO
Erica caespitosa	ERICACEAE	PNCO
Erica caffra var. auricularis	ERICACEAE	PNCO
Erica caffrorum var. caffrorum	ERICACEAE	PNCO
Erica cooperi var. missionis	ERICACEAE	PNCO
Erica leucopelta var. leucopelta	ERICACEAE	PNCO
Erica leucopelta var. pubescens	ERICACEAE	PNCO
Erica natalitia var. natalitia	ERICACEAE	PNCO
Erica reenensis	ERICACEAE	PNCO
Erica schlechteri	ERICACEAE	PNCO
Erica woodii var. woodii	ERICACEAE	PNCO
Eulophia foliosa	ORCHIDACEAE	PNCO
Freesia laxa subsp. laxa	IRIDACEAE	PNCO
Galtonia candicans	HYACINTHACEAE	PNCO
Gasteria excelsa	ASPHODELACEAE	PNCO
Gladiolus crassifolius	IRIDACEAE	PNCO
Gladiolus inandensis	IRIDACEAE	PNCO
Gladiolus longicollis subsp. longicollis	IRIDACEAE	PNCO
Gladiolus mortonius	IRIDACEAE	PNCO
Gladiolus wilsonii	IRIDACEAE	PNCO

Scientific Name	Family	Conservation Status
Habenaria arenaria	ORCHIDACEAE	PNCO
Habenaria clavata	ORCHIDACEAE	PNCO
Habenaria tridens	ORCHIDACEAE	PNCO
Haemanthus humilis subsp. humilis	AMARYLLIDACEAE	PNCO
Hesperantha baurii subsp. baurii	IRIDACEAE	PNCO
Hesperantha coccinea	IRIDACEAE	PNCO
Hesperantha grandiflora	IRIDACEAE	PNCO
Hesperantha radiata	IRIDACEAE	PNCO
Holothrix scopularia	ORCHIDACEAE	PNCO
Hypoxis acuminata	HYPOXIDACEAE	PNCO
Hypoxis angustifolia var. buchananii	HYPOXIDACEAE	PNCO
Hypoxis argentea var. argentea	HYPOXIDACEAE	PNCO
Hypoxis iridifolia	HYPOXIDACEAE	PNCO
Hypoxis multiceps	HYPOXIDACEAE	PNCO
Hypoxis rigidula var. pilosissima	HYPOXIDACEAE	PNCO
Kniphofia baurii	ASPHODELACEAE	PNCO
Kniphofia parviflora	ASPHODELACEAE	PNCO
Kniphofia uvaria	ASPHODELACEAE	PNCO
Ledebouria cooperi	HYACINTHACEAE	PNCO
Ledebouria ovatifolia	HYACINTHACEAE	PNCO
Ledebouria revoluta	HYACINTHACEAE	PNCO
Massonia jasminiflora	HYACINTHACEAE	PNCO
Mimusops obovata	SAPOTACEAE	PNCO
Moraea albicuspa	IRIDACEAE	PNCO
Moraea inclinata	IRIDACEAE	PNCO
Moraea pallida	IRIDACEAE	PNCO
Neobolusia tysonii	ORCHIDACEAE	PNCO
Nerine appendiculata	AMARYLLIDACEAE	PNCO
Nerine bowdenii	AMARYLLIDACEAE	PNCO
Nerine gibsonii	AMARYLLIDACEAE	PNCO
Nerine undulata	AMARYLLIDACEAE	PNCO
Ornithogalum conicum subsp. conicum	HYACINTHACEAE	PNCO
Ornithogalum fimbrimarginatum	HYACINTHACEAE	PNCO
Ornithogalum graminifolium	HYACINTHACEAE	PNCO
Ornithogalum longibracteatum	HYACINTHACEAE	PNCO
Ornithogalum tenuifolium subsp. tenuifolium	HYACINTHACEAE	PNCO
Pittosporum viridiflorum	PITTOSPORACEAE	PNCO
Podocarpus falcatus	PODOCARPACEAE	PNCO
Podocarpus latifolius	PODOCARPACEAE	PNCO
Protea caffra subsp. caffra	PROTEACEAE	PNCO
Protea roupelliae subsp. hamiltonii	PROTEACEAE	PNCO
Protea roupelliae subsp. roupelliae	PROTEACEAE	PNCO
Protea simplex	PROTEACEAE	PNCO
Protea subvestita	PROTEACEAE	PNCO
Pterygodium hastatum	ORCHIDACEAE	PNCO

Scientific Name	Family	Conservation Status
Pterygodium leucanthum	ORCHIDACEAE	PNCO
Pterygodium magnum	ORCHIDACEAE	PNCO
Ruschia putterillii	MESEMBRYANTHEMACEAE	PNCO
Satyrium longicauda var. jacottetianum	ORCHIDACEAE	PNCO
Satyrium longicauda var. longicauda	ORCHIDACEAE	PNCO
Satyrium parviflorum	ORCHIDACEAE	PNCO
Satyrium trinerve	ORCHIDACEAE	PNCO
Scadoxus puniceus	AMARYLLIDACEAE	PNCO
Schizocarphus nervosus	HYACINTHACEAE	PNCO
Schizochilus zeyheri	ORCHIDACEAE	PNCO
Sideroxylon inerme subsp. inerme	SAPOTACEAE	PNCO
Trachyandra affinis	ASPHODELACEAE	PNCO
Tritonia drakensbergensis	IRIDACEAE	PNCO
Tritonia gladiolaris	IRIDACEAE	PNCO
Watsonia confusa	IRIDACEAE	PNCO
Watsonia densiflora	IRIDACEAE	PNCO
Watsonia gladioloides	IRIDACEAE	PNCO
Watsonia pillansii	IRIDACEAE	PNCO
Lantana rugosa	VERBENACEAE	Rare
Lippia javanica	VERBENACEAE	Rare
Valeriana capensis var. capensis	VALERIANACEAE	Rare
Cyphostemma cirrhosum subsp. cirrhosum	VITACEAE	VU
Hybanthus capensis	VIOLACEAE	VU
Rhoicissus revoilii	VITACEAE	VU
Tribulus terrestris	ZYGOPHYLLACEAE	VU
Viscum obscurum	VISCACEAE	VU
Xyris capensis	XYRIDACEAE	VU

Scientific Name	Family	Common name	Status	Endemic
Mammals				
Cercopithecus aethiops subsp. pygerythrus	CERCOPITHECIDAE	Vervet Monkey	LC	
Elephantulus rupestris	MACROSCELIDIDAE	Smith's Rock Elephant Shrew	LC	
Galerella pulverulenta	HERPESTIDAE	Small Grey Mongoose	LC	
Hystrix africaeaustralis	HYSTRICIDAE	Porcupine	LC	
Lepus saxatilis	LEPORIDAE	Scrub / Savannah Hare	LC	
Myotis tricolor	VESPERTILIONIDAE	Temminck's Hairy Bat	Near Threatened	
Papio ursinus	CERCOPITHECIDAE	Chacma Baboon	LC	
Procavia capensis	PROCAVIDAE	Rock Hyrax	LC	
Redunca fulvorufula	BOVIDAE	Mountain Reedbuck	LC	
Rhabdomys pumilio	MURIDAE	Striped Mouse	LC	
Saccostomus campestris	MURIDAE	Pouched Mouse	LC	
Tadarida aegyptiaca	MOLOSSIDAE	Egyptian Free-tailed Bat	LC	
Taurotragus oryx	BOVIDAE	Eland	LC	
Reptiles				
Agama atra	AGAMIDAE	Southern Rock Agama	LC	

Scientific Name	Family	Common name	Status	Endemic
Aparallactus capensis	ATRACTASPIDIDAE	Black-headed Centipede-eater	LC	
Homoroselaps lacteus	ATRACTASPIDIDAE	Spotted Harlequin Snake	LC	Yes
Bradypodion ventrale	CHAMAELEONIDAE	Eastern Cape Dwarf Chameleon	LC	Yes
Amplorhinus multimaculatus	COLUBRIDAE	Many-spotted Snake	LC	
Boaedon capensis	COLUBRIDAE	Brown House Snake	LC	
Crotaphopeltis hotamboeia	COLUBRIDAE	Red-lipped Snake	LC	
Dasypeltis scabra	COLUBRIDAE	Rhombic Egg-eater	LC	
Duberria lutrix subsp. lutrix	COLUBRIDAE	South African Slug-eater	LC	Yes
Lamprophis aurora	COLUBRIDAE	Aurora House Snake	LC	Yes
Lamprophis guttatus	COLUBRIDAE	Spotted House Snake	LC	
Lycodonomorphus laevissimus	COLUBRIDAE	Dusky-bellied Water Snake	LC	Yes
Lycodonomorphus rufulus	COLUBRIDAE	Brown Water Snake	LC	
Philothamnus semivariegatus	COLUBRIDAE	Spotted Bush Snake	LC	
Psammophis crucifer	COLUBRIDAE	Cross-marked Grass Snake	LC	
Psammophylax rhombeatus subsp. rhombeatus	COLUBRIDAE	Spotted Grass Snake	LC	
Pseudaspis cana	COLUBRIDAE	Mole Snake	LC	
Chamaesaura aenea	CORDYLIDAE	Coppery Grass Lizard	LC	Yes
Cordylus cordylus	CORDYLIDAE	Cape Girdled Lizard	LC	Yes
Pseudocordylus melanotus subsp. subviridis	CORDYLIDAE	Drakensberg Crag Lizard	LC	Yes
Pseudocordylus microlepidotus subsp. fasciatus	CORDYLIDAE	Karoo Crag Lizard	LC	Yes
Pseudocordylus microlepidotus	CORDYLIDAE	Cape Crag Lizard		
Hemachatus haemachatus	ELAPIDAE	Rinkhals	LC	
Naja nivea	ELAPIDAE	Cape Cobra	LC	
Afroedura halli	GEKKONIDAE	Hall's Flat Gecko	LC	Yes
Afroedura tembulica	GEKKONIDAE	Tembu Flat Gecko	LC	Yes
Pachydactylus maculatus	GEKKONIDAE	Spotted Gecko	LC	
Pachydactylus mariquensis	GEKKONIDAE	Marico Gecko	LC	Yes
Pachydactylus oculatus	GEKKONIDAE	Golden Spotted Gecko	LC	Yes
Nucras lalandii	LACERTIDAE	Delalande's Sandveld Lizard	LC	Yes
Pedioplanis burchelli	LACERTIDAE	Burchell's Sand Lizard	LC	Yes
Pedioplanis lineoocellata subsp. lineoocellata	LACERTIDAE	Spotted Sand Lizard	LC	
Pedioplanis lineoocellata subsp. pulchella	LACERTIDAE	Common Sand Lizard	LC	
Pedioplanis namaquensis	LACERTIDAE	Namaqua Sand Lizard	LC	
Leptotyphlops nigricans	LEPTOTYPHLOPIDAE	Black Thread Snake	LC	Yes
Leptotyphlops scutifrons subsp. conjunctus	LEPTOTYPHLOPIDAE	Eastern Thread Snake		
Pelomedusa subrufa	PELOMEDUSIDAE	Marsh Terrapin	LC	
Acontias gracilicauda	SCINCIDAE	Thin-tailed Legless Skink	LC	Yes
Trachylepis capensis	SCINCIDAE	Cape Skink	LC	
Trachylepis homalocephala	SCINCIDAE	Red-sided Skink	LC	Yes
Trachylepis punctatissima	SCINCIDAE	Speckled Rock Skink	LC	
Trachylepis varia	SCINCIDAE	Variable Skink	LC	
Homopus femoralis	TESTUDINIDAE	Greater Padloper	LC	Yes
Stigmochelys pardalis	TESTUDINIDAE	Leopard Tortoise	LC	
Rhinotyphlops lalandei	TYPHLOPIDAE	Delalande's Beaked Blind Snake	LC	
Varanus niloticus	VARANIDAE	Water Monitor	LC	
Bitis arietans subsp. arietans	VIPERIDAE	Puff Adder	LC	
Causus rhombeatus	VIPERIDAE	Rhombic Night Adder	LC	
Amphibians				
Amietophrynus rangeri	BUFONIDAE	Raucous Toad	LC	
Vandijkophrynus gariepensis	BUFONIDAE	Karoo Toad	LC	
Kassina senegalensis	HYPEROLIIDAE	Bubbling Kassina	LC	
Semnodactylus wealii	HYPEROLIIDAE	Rattling Frog	LC	
Phrynobatrachus natalensis	PHRYNOBATRACHIDAE	Snoring Puddle Frog	LC	
Xenopus laevis	PIPIDAE	Common Platanna	LC	
Ptychadena porosissima	PTYCHADENIDAE	Striped Grass Frog	LC	
Amietia angolensis	PYXICEPHALIDAE	Common or Angola River Frog	LC	

Scientific Name	Family	Common name	Status	Endemic
Amietia fuscigula	PYXICEPHALIDAE	Cape River Frog	LC	
Cacosternum boettgeri	PYXICEPHALIDAE	Common Caco	LC	
Cacosternum nanum	PYXICEPHALIDAE	Bronze Caco	LC	
Pyxicephalus adspersus	PYXICEPHALIDAE	Giant Bull Frog	NT	
Strongylopus fasciatus	PYXICEPHALIDAE	Striped Stream Frog	LC	
Strongylopus grayii	PYXICEPHALIDAE	Clicking Stream Frog	LC	
Tomopterna natalensis	PYXICEPHALIDAE	Natal Sand Frog	LC	
Tomopterna tandyi	PYXICEPHALIDAE	Tandy's Sand Frog	LC	
Invertebrates				
Aslauga australis (Butterfly)	LYCAENIDAE	Southern Purple	Data Deficient	Yes
Chrysoritis lyncurium (Butterfly)	LYCAENIDAE	Tsomo River Opal	Vulnerable	Yes
Chrysoritis penningtoni (Butterfly)	LYCAENIDAE	Pennington's Opal	Vulnerable	Yes
Fish				
Clarias gariepinus	CLARIIDAE		NEMBA (NL) [3126]	

12.4 Appendix D: References

- Acocks, J. P. H. 1988. Veld Types of South Africa. Memoirs of the Botanical Survey of South Africa, No 57. Botanical Research Institute, Department of Agriculture and Water Supply, South Africa.
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. 2014. Edited by Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander & Marienne S. de Villiers. SANBI, Pretoria.
- Barnes, K. N. (Ed.) 2000. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.
- Batten, H., and Bokelmann, H. 2001. Eastern Cape: South African Wild Flower Guide 11. The Botanical Society of South Africa. pp 306.
- Branch, W. R. (Ed.) 1988. South African Red Data Book - Reptiles and Amphibians. South African National Scientific Programmes Report No 151.
- Brink A. B. A. 1985. Engineering Geology of Southern Africa, Vol. 4. Building Publications, Pretoria.
- Bromilow, C. 2001. Problem Plants of South Africa. A Guide to the Identification and Control of More than 300 Invasive Plants and Other Weeds. Briza Publications. pp 258
- Bruton, M. N., and Gess, F. W. 1988. Towards and Environmental Plan for the Eastern Cape. Conference proceedings from Rhodes University. Grocott and Sherry, Grahamstown.
- Friedmann, Y (Ed.) 2004. Red Data Book of the Mammals of South Africa: A Conservation Assessment. Endangered Wildlife Trust.
- Friedmann, Y. & Daly, B. 2004. Red data book of the mammals of South Africa, a conservation assessment. Johannesburg, Endangered Wildlife Trust.
- Fuggle, R. F. and Rabie, M. A. 2003. Environmental Management in South Africa. Juta & Co, Johannesburg.
- Gledhill, E. 1981. Veldblomme van Oos-Kaapland. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Golding, J. (Ed.) 2002. Southern African Plant Red Data Lists. Southern African Botanical Diversity Network Report No 14.
- Henderson, L. 2001. Alien Weeds and Invasive Plants. Plant Protection Research Institute Handbook No 12. Agricultural Research Council. pp 300.
- Hilton-Taylor, C. 1996. Red Data List of Southern African Plants. National Botanical Institute..
- Köpke, D. 1988. The Climate of the Eastern Cape. In: Bruton, M. N., and Gess, F. W. (Eds). Towards and Environmental Plan for the Eastern Cape. Conference proceedings from Rhodes University. Grocott and Sherry, Grahamstown.
- Lewis, C. 1995. The Geomorphological Evolution of the Area between Grahamstown and the Indian Ocean. Rhodes University, Grahamstown.
- Low, A. B., and Rebelo, A. 1988. Vegetation of South Africa, Lesotho and Swaziland. A Companion to the Vegetation Map of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.
- Maclean, G. L., 1985. Robert's Birds of Southern Africa. Trustees of the John Voelcker Bird Book Fund. Cape Town.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Pienaar, K. 2000. The South African What Flower is That? Struik Publishers (Pty) Ltd. Cape Town.
- Pierce, S. M. 2003. The STEP Handbook. Integrating the natural environment into land use decisions at the municipal level: towards sustainable development. Terrestrial Ecological Research Unit Report No 47. University of Port Elizabeth, South Africa.

- Schulze, B. R. 1947. Classification of Climates of Southern Africa after Koppen and Thornwaite. S. Afr. geog. J. 29:32-42.
- Sinclair, I., and Hockey, P. 1996. Sasol : The Larger Illustrated Guide to Birds of Southern Africa. Struik. Cape Town.
- Smithers, R. H. N., 1986. South African Red Data Book. Terrestrial Mammals. South African National Scientific Programmes Report No. 125 Council for Scientific and Industrial Research. Pretoria.
- Soil Classification Working Group (SCWG), 1991. Soil Classification, A Taxonomic System for South Africa. Memoirs on the Agricultural Natural Resources of South Africa, No 15. Department of Agricultural Development, Pretoria.
- Stirton, C. H. 1987. Plant Invaders : Beautiful, but Dangerous. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Toerien, D. K. and Hill, R. S. 1989. The Geology of the Port Elizabeth Area. Geological Survey explanation of sheet3324 Port Elizabeth
- Van Rensburg, P. W. J. 1970. Planning Open Pit Mines. Proceedings of the symposium on the theoretical background to the planning of open pit mines with special reference to slope stability. The South African Institute of Mining and Metallurgy. A A Balkema, Cape Town.
- Vanderplank, H. J. 1999. Wildflowers of the Port Elizabeth Area. Gamtoos to Swartkops Rivers (The Coastal Bush and Fynbos Region). Bluecliff Publishing. pp 216.
- Viljoen, M. J. and Reimold, W. U. 1999. An Introduction to South Africa's Geological and Mining Heritage. Mintek Publishers, South Africa.
- Vlok, J, H, J., Euston-Brown, D.I.W. 2002. The patterns within, and the ecological processes that sustain, the subtropical thicket vegetation in the planning domain for the Subtropical Thicket Ecosystem Planning (STEP) project. TERU Report 40. University of Port Elizabeth.
- Weather Bureau. 1988. Climate of South Africa - Climate statistics up to 1984 (WB40). Government Printer, Pretoria.
- Weinert H. H., 1980. The Natural Road Construction Materials of Southern Africa. Academica, Cape Town.
- Wohlbier, R. H. 1986. Bulk Handling in Open Pit Mines and Quarries. Trans Tech Publications, Germany.

12.5 Appendix E: Financial Provision and Undertaking Letters

12.6 Appendix F: Borrow Pit Geological Test Results

12.7 Appendix G: Interested and Affected Party Correspondence