



the dme

Department:
Minerals and Energy
REPUBLIC OF SOUTH AFRICA

DME 12

Private Bag X6076, Port Elizabeth 6000,
Tel: (041) 396 3900
Fax: (041) 396 3946
Cnr. Diaz and Mount Roads
Mount Croix
Port Elizabeth, 6001

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

Reference:
Date:

(EC)30/5/1/3/3/2/1(0375)EM
16 November 2009

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

ATTENTION: MR. T. LUNGILE

Case ID: 2420

Sir

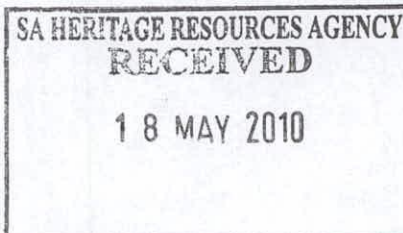
**CONSULTATION IN TERMS OF SECTION 40 OF THE MPRDA OF 2002:
ENVIRONMENTAL MANAGEMENT PLAN IN SUPPORT OF SAND MINING ON
FARMS 1286 AND 1323, DIVISION OF EAST LONDON, EASTERN CAPE**

1. GYV Trade Cc has applied for a mining permit on the above-mentioned area.
2. Attached is the EMP for your comment.
3. Please forward any written comments or requirements your department may have on this application, to this office no later than **09 January 2010**. Failure to do so will lead to the assumption that your Department has no objection(s) or comments with regards to the application.
4. Consultation on this application has been initiated with other relevant State Departments.
5. Kindly quote the relevant file reference number in all correspondence.

Sincerely,

J. G. G. G.

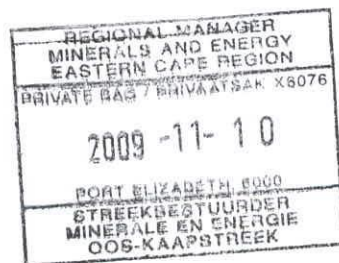
REGIONAL MANAGER
EASTERN CAPE





STELLENRYCK ENVIRONMENTAL SOLUTIONS

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR SAND MINING ON FARMS 1323 & 1286, EAST LONDON



PREPARED FOR:

GYV TRADE CC
P. O. BOX 457
GONUBIE
5256

Tel. & Fax: 041 3672049 · Cell 0824140464/0824140472 · 4 Josephine Avenue LORRAINE 6070
Member: J. A. van As: B.Sc (Botany & Zoology), B.Sc (Hons) (Eco-Physiology), M.Sc (Plant Physiology)

**ENVIRONMENTAL MANAGEMENT PROGRAMME FOR NEW SAND QUARRY ON FARMS
1323 & 1286, EAST LONDON**

INTRODUCTION & MOTIVATION

Sand reserves in the Greater East London area are mostly veneer type of aeolian deposits that have limited depth and therefore are generally mined out very quickly and large areas are required to sustain mining concerns over the short to medium term. This has caused sand resources at commercial concerns to be mostly depleted and a severe shortage is experienced in the city, resulting in vast quantities to be mined from illegal sources. The applicant's own sand quarry at Gonubie has been mined out and is currently struggling to meet its contractual demands for sand. Considering that the applicant is not in a position to buy the quantities required from commercial resources he was forced to identify a sand deposit with reasonable lifespan.

Due to the limited sand resources available in East London, the applicant engaged in a dedicated process to identify a sustainable sand resource, which contrary to the shallow resources around Gonubie will ensure a medium term availability of sand. Available sand deposits close to East London have been mined out and the only other alternative is the area west of Igoda. This lack of sustainable sand resources has been forecasted in a report compiled by the Council for Geosciences many years ago and has now become a reality. However, the area referred to is subject to ribbon development along the coast and causes all potential sand resources to be in conflict with these coastal developments or agricultural activities. These factors cause identification of sand resources to be a cumbersome task. The farm that constitutes the subject of this application was identified and after long deliberations an agreement was reached with the landowner. The area is, however, close to an area that has been earmarked for development and the necessary precautions need to be implemented to ensure that mining affects this development as little as possible. The objective is to first establish a mining area of 1,5ha on the western boundary and should the area prove to be a sustainable resource, apply for a larger area to sustain GVV Trade's sand demand over the short to medium term.

The mining area concerned is currently distant to people and will not pose a major social impact, but this scenario might change in future and the mine should move away as soon as possible from the western boundary. With regards to environmental impacts the site poses limited impacts if the required mitigation measures are imposed, making the site a sustainable option. However, if the mitigation measures are not put in place, wind and water erosion could be a reality and considering it part of the coastal zone, these impacts must not be entertained and the area must be rehabilitated to a proper standard.

TERMS OF REFERENCE

The application to the Department of Minerals and Energy (DME) includes the following:

1. Application for mining permit, which has been provisionally accepted.
2. Compilation of an EIA & EMP for the proposed sand quarry.
3. The EMP would cover all biotic and abiotic components on basic assessment level.
4. A public participation process prescribed in terms of section 27(5) of the MPRDA was conducted and all abutting land owners were consulted. The outcome was submitted to the DME.
5. Impact Assessment was done in terms of information gathered during the site visits and the published environmental information available. Due to the nature of the area concerned and observations made during the site visit, no formal faunal survey was conducted as it was not deemed necessary.
6. The findings of the EMP are based on information/requirements gathered from:
 - EMPs submitted to the DME for quarry operations in the East London area.
 - Amatola State of the Environment Report, STEP Programme, EMPAT, Mucina & Rutherford and SANBI,
 - Quarry sites controlled over the past 13 years that occurred in similar veld type.

APPLICATION DETAILS

Applicant and responsible person

GYV Trade CC
P O Box 457
Gonubie
5256

CK No: 2001/083104/23

Tel no: 043 – 732 1691

Fax No: 043 – 732 1579

Mine Manager

Mr. K.R. Freitag
P O Box 457
Gonubie
5256

ID: 560925 5083 084

Tel no: 043 – 732 1691

Fax No: 043 – 732 1579

Registered Property Owner

Mr. A.K. & Ms. L. Holdstock
P O Box 40
Kidds Beach
5264

Holder of mineral rights

State

Title deed description

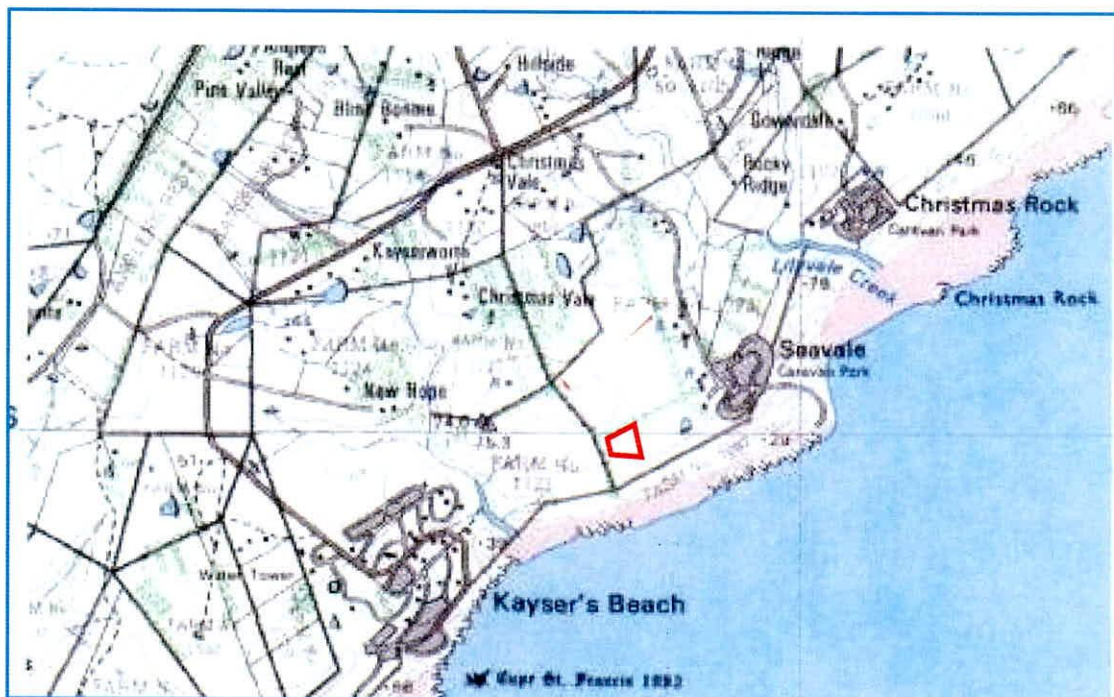
Farm 1323 & 1286, East London

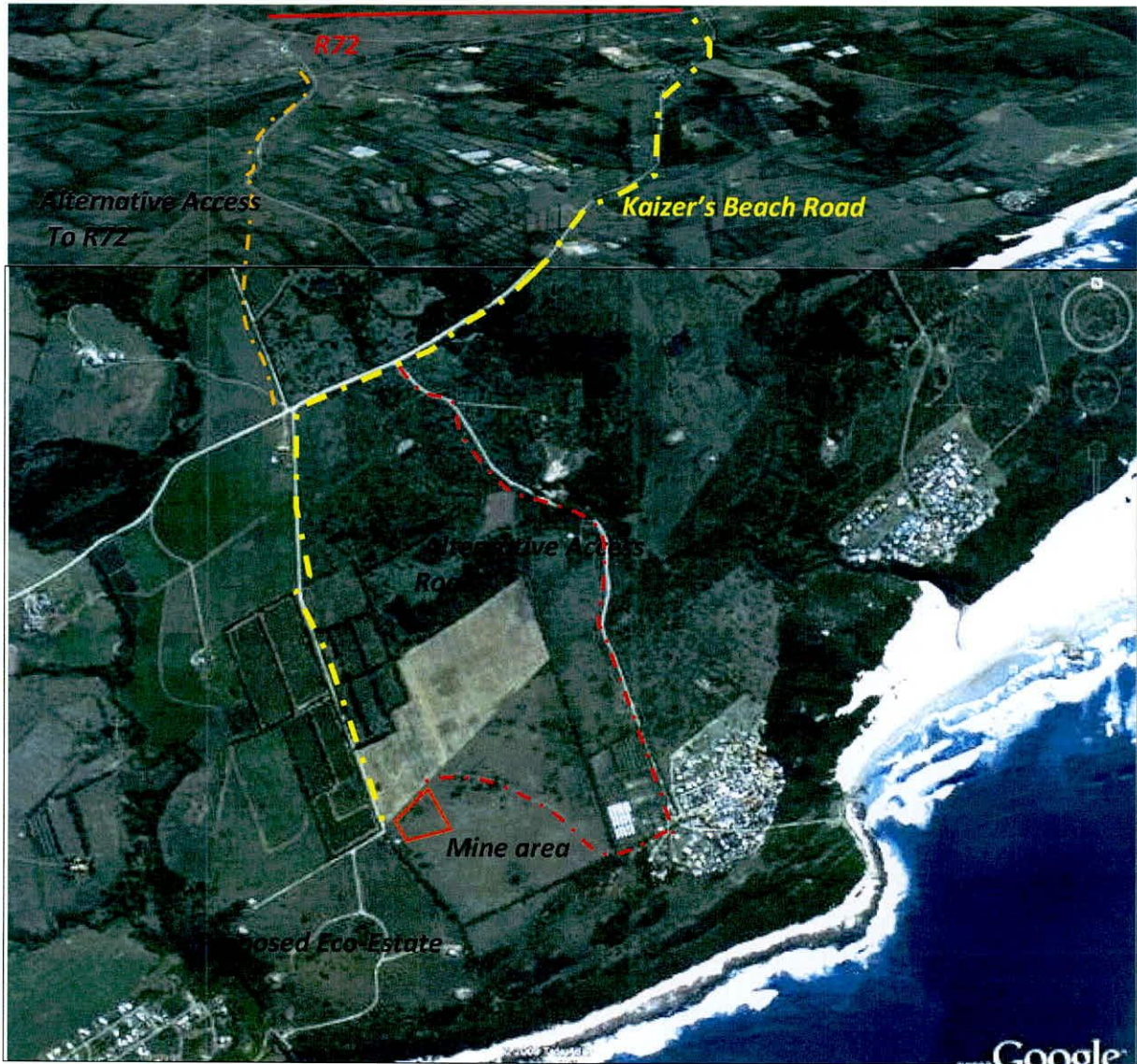
Title Deed No: T382/1990 & T731/1989

REGIONAL SETTING

The proposed quarry is located on Farm 1323 & 1286, Kaizer's Beach, approximately 40km south-west from East London city centre and is under control of the Buffalo City Municipality. The Kaizer's Beach/Lilyvale road lies $\pm 1,4$ km to the north of the proposed mining site and access is from this road, either 1) via the road through the Seavale village to the east of the site (6 km from turnoff on R72), or 2) via the access road to the Game Reserve with the turnoff at the Lilyvale school (7 km from the Kaizer's Beach turnoff on the R72). The site can also be accessed directly from the R72 via a gravel road linking with the Kaizer's Beach road directly opposite the Lilyvale school.

The Seavale village is situated approximately $\pm 0,7$ km to the south-east of the proposed site and Beach View/Kaizer's Beach village is located approximately 1km to the south-west. The property to the immediate south will apparently be developed as a low density eco-estate since the phrasing of this 30 ha section of land as a Game Reserve is not the correct terminology. Pasture land adjoins the site to the north, east and south. The coastline is located approximately 650m to the south.





PROJECT DESCRIPTION

Surface infrastructure

Surrounding areas

The immediate quarry surrounds are sparsely populated with only a few residences on the various farms. There are farm residences approximately 1km to the west, 800m to the north-west and the landowner's residence 500m to the east. Seavale residential area is located 700m to the east and Kaizers Beach 1km to the west. The proposed Eco-Estate will be located 100m to the west. An Eskom sub-station is located approximately 50m to the west with power lines running alongside the proposed access road. The N2 is located approximately 4,5km to the north of the mine and will be used as main haul road to the relevant markets in and around East London. The Kaizer's Beach Road is located 1,3km to the north. Grazing and cultivation areas are located to the immediate north and north-west.

Mine

There is an existing farm road from the landowner's residence to the quarry, which in turn links up with the road connecting the proposed Eco-Estate with the Kaizers Beach Road. The road servitude providing access to the proposed Eco-Estate is located on the Holdstock's property and the landowner therefore has right of way on this road. All roads to be used will be upgraded with a proper wearing course gravel to be imported from a legal source. Taking into consideration the erratic rainfall of the area, as well as exposure to high winds, the result will be the establishment of a reticulation network for irrigation and dust suppression. A borehole is located near the Holdstock's residence and it is not anticipated that a borehole will be sunk in the mine area. No labour accommodation, fuel tanks or campsite will be established on site.

A chemical toilet will be positioned at the eastern end of the quarry area. Should it be required that the sand be screened, a single stage screen will be erected in the quarry. In such case an onboard generator will be used as power source, but considering that the sand reserves of the area seem to be generally clean, it might not be necessary. Stockpile area of 200m² will be required next to the production face or screen, depending on the nature of the sand reserves.

Servitudes

There are no servitudes registered in the proposed quarry area.

Land tenure and use of immediate adjacent land

- North – Holdstock Property - Transformed grazing land and land affected by alien proliferation
- West – Erf 765 – Kaizers Beach Investment Pty – Semi-intact coastal grassland with some road infrastructure.
- South – Holdstock property – Intact coastal grassland with slope towards the coast with semi-coastal forest and intact coastal forest to extreme south.
- East – Holdstock property with intact coastal grassland.
- North-west – Private farms with almost complete transformed grassland and cultivation areas.

Existing land uses that impact on the environment in/outside the proposed mining area

1. Residences, farm outbuildings and tunnels on farms/smallholdings causing limited visual interference and loss of aesthetic value.
2. Transformation of land through bush and grass clearing and grazing that resulted in extensive loss of ecological integrity.
3. The Kaizer's Beach Road that causes a slight increase in air pollution and noise levels.
4. Limited alien vegetation proliferation on some properties causing deterioration in ecological integrity and aesthetics.
5. Extensive ploughing of lands resulting in change in surface colour, sporadic dust pollution and extensive ecological degradation.
6. Ribbon development has somehow been approved along the coast and numerous small to medium large residential areas have been developed approximately 2-3km from each other and sometimes right into the coastal forest/thicket areas. This approach will result in most of this section of coast line to be transformed over the next 50 years. These developments all pose an extensive visual, ecological and pollution threat to the coast line.

Based on the above, the proposed sand quarry will only pose a short term impact on environmental parameters with the necessary mitigation measures in place and will only marginally affect farming activities in and outside the mine area. In terms of the biodiversity and conservation potential, the land is classified as least threatened. That means the land can accommodate development and/or withstand limited loss of natural areas through disturbances. Notwithstanding this rating, the applicant will ensure that the affected land is properly rehabilitated and restored in such a manner that no post closure impacts are imposed on the natural and social environment.

Name of the river catchment in which the quarry is situated

There are no rivers or dry watercourses in the immediate area. The site falls within the Chalumna River catchment. Water quality of this river will not be affected, due to the extensive distance involved and specific soil properties of the study area.

Zoning

Current zoning is agriculture, but since mining is seen to be a temporary change of land use, no application for change of land use in terms of LUPO is required. In this regard, the repealed Minerals Act 50 of 1991 and the current MPRDA 28 of 2002 have substituted the provisions of the repealed Physical Planning Act.

Mineral Deposit & Mine Product

Aeolian calcareous marine sand.

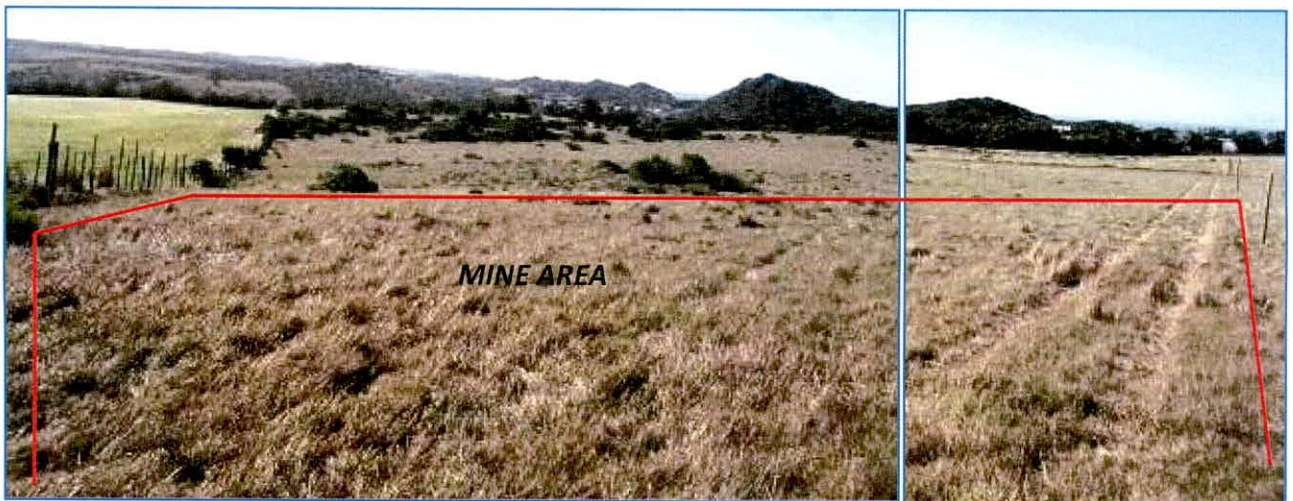
Estimate reserves

Estimated sand reserves are approximately 30 000 cubic meters (tight) which will be mined within the next 12-18 months provided that the current market demand is sustained. Should the economy experience any recovery during 1010, it will be mined out with 12-14 months.

Prospecting/Alternatives

Prospecting

The farm owner is currently in the process of erecting a fence along the eastern border of the proposed permit area and the holes dug for fence poles, revealed a sand reserve of approximately 2m without reaching any clay or calcrete lenses. The holes are depicted in the pictorial record below. Considering the mine area to represent a relic primary dune, it is anticipated that depth of the mineral will exceed four meters. In addition, the high leaching capabilities of the soils are also indicative of the extent of the sand reserves. These field observations are, in conjunction with the geological information obtained, deemed adequate to prove the mining potential of the area, as well as the economic sustainability of the proposed project. The study area hosts the same quality material that was mined to the north-east on the farm Guava Grove, but the mineral will be slightly younger in geological terms. Approximately 60 000 cubic meters (tight) of sand is available on site. Please refer to geological map and write-up for additional information.



Construction phase

The only construction activity involved will be the removal of a limited amount of sandy topsoil and vegetation, which will be stored on the northern and southern borders of each mining phase, along the wind path, and reintroduced once mining has been completed. The existing gravel access road along the western boundary of the Holdstock's farm needs to be upgraded for heavy vehicle traffic and material for this purpose will be obtained from a legal weathered dolerite mining concern. The sourcer drains needs to be replaced with drains that can withstand the weight of loaded trucks.

No Eskom and Telkom service points are required. In order to ensure water availability at the mine area for dust suppression and rehabilitation, a surface PVC pipeline will be installed from the borehole near the farm residence along the fence line to the site.

No weighbridge will be constructed and material will be sold per volume removed to the prospective clients. No hydrocarbon storage facilities will be constructed on the property. Waste disposal will be through depositing waste in strategically positioned containers. A chemical toilet will be established on the eastern side of each mining phase and relocated with the advancing production face.

Limited noise pollution will be applicable to most areas and would be almost similar to noise levels generated on surrounding farms. Noise levels will be somewhat higher to the west once the Eco-Estate has been completed. Dust generation from topsoil stockpiles might become a problem and if indeed the case, this impact will be addressed by establishing vegetation screens and covering topsoil heaps with shade cloth.

Access road to be upgraded



Mining methodology

The total mine area comprises about 1,5 ha and will be mined to an average depth of 2m. Approximately 60 000 cubic meters of sand will be extracted over a period of 22 months with the aid of a front-end loader and if required, an excavator. Extracted material will be hauled to the identified markets with 5-10 cubic meter tip trucks.

Mining will be done in three phases as depicted on the mine plan. Each phase will be mined in slots of approximately 50m x 75m and mining will commence from the west and extend towards the east in order to move away from the western boundary to limit any potential impact on the neighbouring land. On completion of each slot, rehabilitation of this area will coincide with the development of the second slot and will include backfilling, profiling and seeding. The same scenario would apply to phases 2 and 3. The gradient of the quarry floor will be almost similar to the original land profile. Disturbed areas will be rehabilitated back to pasture land.

In each phase the production faces will be profiled through cut & fill method to 1:3 slope, stabilised through limited compaction and vegetation process.

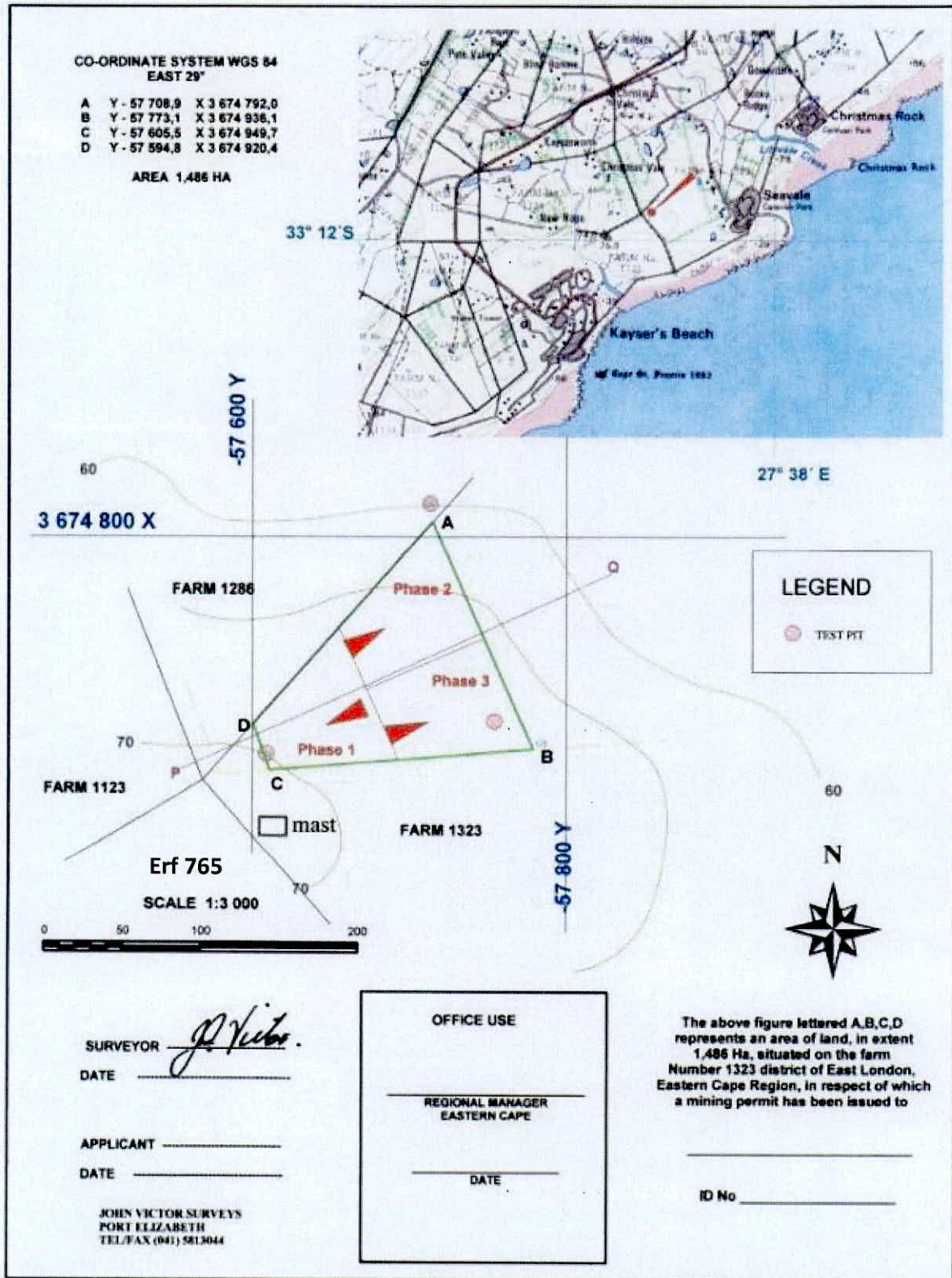
The road to the proposed quarry is an existing access road and links up with the Kaizer's Beach/Lilyvale Road, which in turn links up with the R72. Since the road might be affected by rainfall, it will be upgraded on a regular basis with red gravel obtained from a legal source. Where necessary, it will be protected against erosion by means of cross and mitre drains. Access to the site will be controlled by means of property fences and gates.

Carting of sand on the Seavale Road will not take place due to the potential noise and dust impact on Seavale residents and will only be utilized as an emergency road. Potable water would be provided by the property owner and brought to site daily by workers. The workforce would not reside on the mine, but will commute to work every day. Considering that at most two persons would be on site for short periods, no waste disposal site is required. A container with a lid would be placed within the mining area for the storage of any household waste. The sewage system will comprise one chemical. No additional infrastructure will be erected on site.

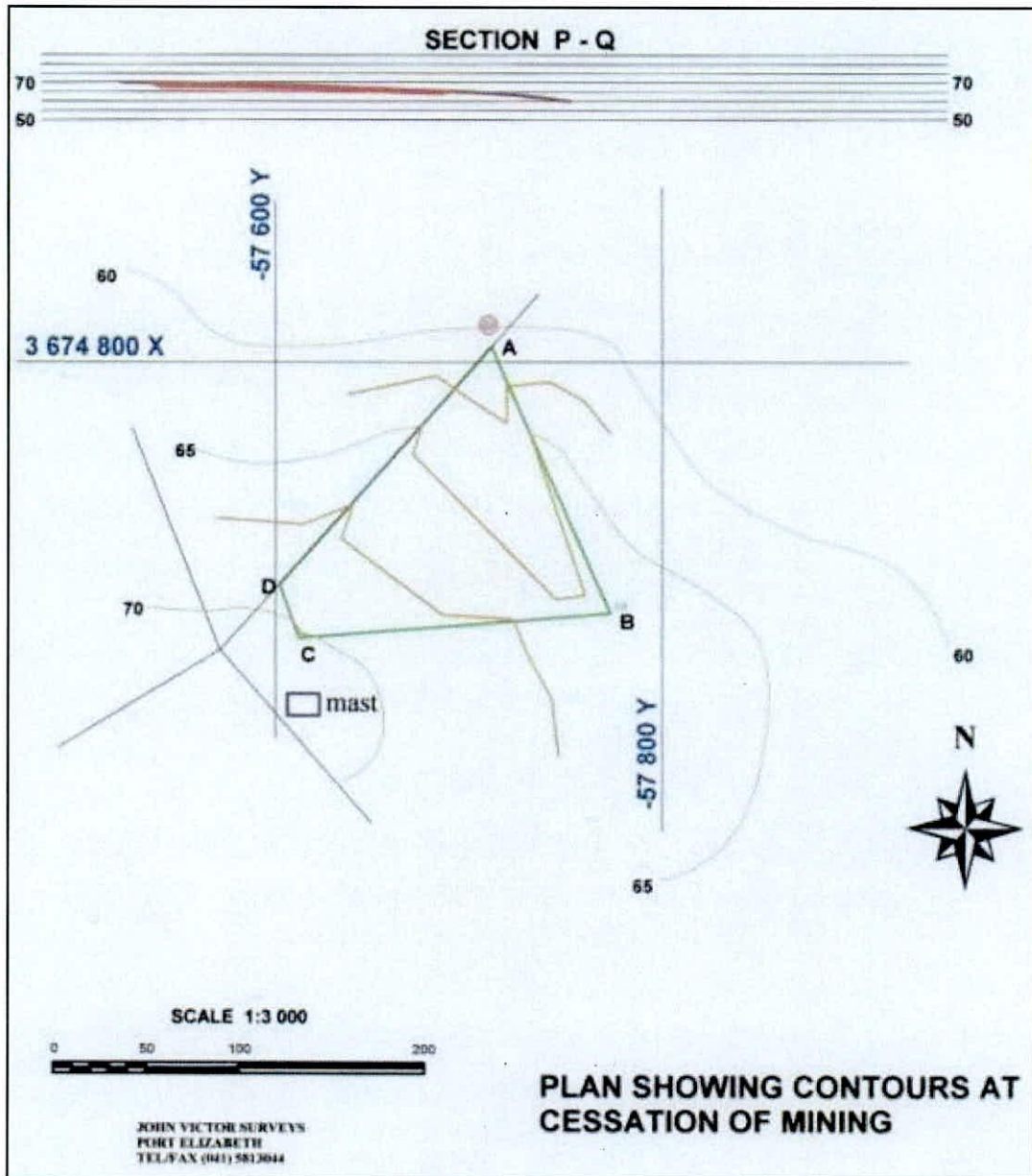
A dust suppression system consisting of a sprinkler system connected to the farm's water reticulation network will be put in place. As a rule sand deposits do not contain large quantities of silt, but windblown sand is a common phenomenon in the area and will require dampening to prevent unnecessary air pollution and sand blasting impact on local residents.

No vehicle maintenance will be conducted on site, but should emergency breakdowns occur, it will be conducted at the facilities of the landowner or over drip pans in the excavation. All other maintenance and servicing will be done at the applicant's workshop in Gonubie. The proposed operation would be conducted from 7.30 am to 5pm five days a week. An average extraction rate of 4000 cubic meters per month will be maintained over a period of approximately 22 months.

Mine plan



Final contours



Planned production rate

Approximately 4000 cubic meters sand will be extracted per month, but dwindling sand reserves at other sand quarries in the East London area and any upswing in the economy could result in a higher extraction rate.

Planned life of mine

At the proposed production rate the lifespan of the quarry is approximately 22 months.

Economic sustainability

East London experiences an extensive shortage of sand and disposes of only a few small registered quarry concerns of which the sand reserves have been mostly depleted. The poor availability of sand therefore guarantees a large market, which in turn will ensure a financial sustainable quarry concern. It has been proved over many years that very few other land uses can generate the same income per hectare of land that mining can generate, without permanently impacting on ecological integrity or farming capacity of most areas. Considering the income that is generated from grazing, mining would provide a substantial better income for landowner and the applicant, with the possibility of reinstating grazing activities within 24 months after rehabilitation of mined areas.

HEALTH & SAFETY MATTERS

The applicant will endeavour to comply with the conditions of the Mine Health & Safety Act, Act 29 of 1996 and as a minimum will ensure the following:

- The 30m buffer zone between the Telkom mast and the excavation will be maintained and protected with an additional fence to restrict inadvertent access to the buffer zone. The depth of the excavation abutting the buffer zone will be restricted to 2m for at least another 10m horizontal distance.
- Hauling will take place along the existing gravel road and access to the Kaizer's Beach Road will be from the approved Game Reserve access.
- No beneficiating equipment will be used and therefore no specific safety considerations in this regard are required.
- There are no residences in close proximity to the mine, therefore no social impact is anticipated. Dust and noise measurements will therefore not be conducted.
- The Principle Inspector of Mines will be informed on the date on which mining commences.
- Any mine or related accidents will immediately be reported to the Principle Inspector of Mines in writing in the applicable format and also be reported to the police in case of fatalities.
- The owner of the mine that is being worked will ensure safety. Should activities at the mine cease sporadically, the holder will take reasonable steps to continuously prevent injuries, ill-health, and loss of life or damage of any kind from occurring at or because of the mine.
- The owner will provide and maintain a working environment that is safe and without risk to the health of employees.
- The owner will identify the relevant hazards and assess the related risks to which persons who are not employees may be exposed; and ensure that persons who are not employees, but who may be directly affected by the activities at the mine, are not exposed to any hazards to their health and safety.
- Applicable risk assessments required by the Principle Inspector of Mines will be submitted.
- The owner will prepare a Health and Safety Policy document.
- The owner will prepare and implement a code of practice on any matter affecting the health or safety of employees and other persons who may be directly affected by activities at the mine if the Chief Inspector of Mines requires it.
- The owner will provide employees with any information, instruction, training or supervision that is necessary to enable them to perform their work safely and without risk to health; and as far as reasonably practicable, the owner will ensure that every employee is properly trained.
- The owner will identify the hazards to health or safety to which employees may be exposed while they are at work; assess the risks to health or safety to which employees may be exposed

to while they are at work; record the significant hazards identified and risks assessed; and make those records available for inspection by employees. The owner will conduct an investigation into every accident that has to be reported in terms of this Act; serious illness; and health-threatening occurrence.

- Considering the shallow nature of the mining operation and the low population density of the area, risk of injury to people will be limited.
- Access to the property will be controlled by means of farm fences and gates.
- Since public roads will be used for carting material it might have an impact on traffic flow and accident rates. Risks associated with the transport of material will be identified and mitigated.
- Vehicle speed on gravel roads will be reduced to 40km/h to lower safety risks.
- Heavy vehicle signage will be posted at all intersections.
- Trucks will not be overloaded.
- All vehicles will come to a dead stop before accessing any road. Operators will be trained to carefully observe whether any traffic is nearing the access and operators will make use of indicator lights when turning onto any road.
- Vehicles will turn their lights on whilst hauling takes place.
- If required, a flagman will be used to improve safety standards at access points.
- Visibility at the access to the property is good in both directions and where applicable, the road reserve will be cleared of vegetation.
- The provisions of the National Transport Act will be observed to reduce the potential risk of accidents occurring.
- Truck drivers will dispose of the required driver licenses and will be trained in safety aspects related to carting of the materials involved. Safety information sessions will regularly be held with truck drivers and machine operators.
- Dust liberation into the air and subsequent impact on workers will pose a limited impact during normal climatic conditions, but a moderate impact during adverse climatic conditions and will require remediation. Dust masks will be provided and when applicable, a sprinkler system will be provided. Water for this purpose will be obtained via the farm's reticulation system.
- Noise levels will be curbed through regular maintenance of the front-end loader and haul trucks, use of required exhaust systems and restricting operational hours to normal working hours. If extended working hours are required, an application will be tabled at the Principle Inspector of Mines.
- Production faces of not more than 2-4m will be developed. Slope gradients of 18 degrees will be maintained and pose a very limited risk to machinery at the mine or to workers on site. Vehicle movement in the pit will be restricted to one haul truck and safe turning circles will be established.
- Due to good internal drainage of the sub-layers, ponding of water will not occur and will in this regard pose a negligible safety risk to people.
- Equipment will be maintained to good standard to reduce the risks of accidents.
- Workers will be provided with ear muffs to protect hearing systems.
- Mr. Freitag will be appointed as mine manager. Considering that he has managed a number of sand quarries in the past, he is definitely adequately qualified to manage the mining operation.
- A risk & safety officer will be appointed if deemed necessary by the Principle Inspector of Mines.
- The necessary health equipment shall be made available in the cabin of the excavator and at the landowner's residence.
- Acceptable sanitation facilities will be provided at the quarry.
- Workers will be medically tested on an annual basis as prescribed by the Health & Safety Act.

GYV Trade CC Sand Quarry

- Workers will be granted the right to refuse working in unsafe areas.
- Post rehabilitation slopes will be stable, vegetated and safe.
- Mine development will be discussed with the landowner.
- The applicant will ensure that all workers involved are conversant with the requirements of the Mine Health and Safety Act 29 of 1996.

Technical competency

Administrative

GYV Trade disposes of an administrative component at its offices in Gonubie and controls all sales, accounts, legal matters, personnel matters and operational procedures from these offices successfully.

Technical

Maintenance

The applicant disposes of a fully functional workshop in Gonubie with a team of mechanics and assistants, under supervision of Mr. Freitag, keeping vehicles and earthmoving equipment in good order.

Equipment

The applicant disposes of a fleet of trucks for hauling of sand, as well as several front-end loaders for mining purposes.

Personnel

The applicant disposes of a good staff component whom has been well trained. Six staff members as per the list included will be seconded to the Kaizer's beach project. Please refer to the personnel list reflecting their years of service.

DETAILS OF SAND MINING QUARRY EMPLOYEES		
Jackson Konde	OPERATOR	± 37 years
Ranisi Gogwana	YARD LOADER OPERATOR	± 10 years
Isaac Nakiwe	LEVELLER	± 14 years
Welcome Simayile	LEVELLER	± 4 years
John Baleni	DRIVER	± 6 years
Vuyisile Sonda	DRIVER	± 6 years

Mining

The applicant and its sister company Tharratt and Freitag Cartage cc have been operating in the local mining sector for approximately 20 years and have been involved in sand mining activities at various quarry sites east of Gonubie, in the Kwelera area, as well as just outside Gonubie itself. Mining operations at these sites were done in a reasonably safe manner and mined out areas were profiled to an acceptable standard. To the author's knowledge no major accidents occurred at any of the applicant's mining sites.

The company disposes of employees that are fully trained and experienced to conduct mining activities in a safe, healthy and environmentally friendly manner.

Surveying

In order to assist the applicant with registration of the mining permit, John Victor Surveys was appointed to perform the required surveying and to submit the updated mine survey plans to the Mine Health & Safety Directorate to ensure that operations onsite comply with all applicable legislation.

Financial Competency

Absa Bank has confirmed that an amount of R200 000 is available for the development/ rehabilitation of the mine.

Cost related to operating the mining concern totals approximately R67,000 per month and gross income will be approximately R120,000 per month, which will provide adequate funds for rehabilitation of the site which has been estimated at approximately R7,000 per month.

Environmental competency

As mentioned previously, the applicant and its employees have been in the mining sector for 20 years and therefore have been involved in extensive rehabilitation activities. To the author's knowledge up to the end of 2008, the applicant has successfully rehabilitated historic mining sites to grassland areas even though these rehabilitation processes were challenging due to water and wind erosion factors. Considering the applicant's experience with mine environmental matters it should be fully equipped to address any environmental impacts. The applicant has appointed Stellenryck Environmental Solutions to perform the EIA and EMP and will assist with implementing remedial measures when required and will also perform the mandatory annual environmental performance assessments.

Environmental consideration

The landowner made a decision that only half of the current available grassland will be made available for mining to ensure a proper sandbank that can assist in re-vegetation of disturbed areas and to protect a section of this vegetation type on the farm. This development approach will also ensure that mining will take place for the minimum period along the western boundary of the proposed eco-estate.

Environmental Undertaking

The applicant undertook in writing to comply with the remedial measures stipulated in this report.

GYV TRADE cc

c/o 18 North Bend Lane, Dorchester Heights, EAST LONDON, 5247
Tel: (043) 726 6103, Fax: (043) 726 6047

29th June 2009

TO WHOM IT MAY CONCERN,

We hereby undertake, when granted a sand mining permit on Farms 1286 and 1323, to conduct such mining operations in conjunction with the approved Environmental Management Programme and in a safe and healthy way.

Yours Faithfully,



K.R. FREITAG
GYV TRADE cc

MEMBERS: B.E. Freitag, K.R. Freitag, A.M. Freitag, L. De Klerk

"No go" option

The "no go" option would prevent the landowner to engage in mining and generate additional income from his land. Currently the farmer experiences difficulty in maintaining a financially sustainable farming concern, due to drought and increased agricultural input. The land concerned is generally not suitable for high income crop production due to the highly leached, sandy soils that is found in the area and can only be used for lower income grazing activities. The royalty to be received will be utilized to supplement available finances for agriculture and to develop more productive arable land in the northern half of the property.

The “no go” option will affect sand availability negatively in East London since GYV Trade CC is one of the larger sand distributors in east London and will most definitely result in the mining of less ecologically sustainable sites which increases illegal mining. Due to the extensive development in the Eastern Cape and particularly in the BCM, critical shortages of sand is a given and from an economic growth point of view cannot be supported at this point in time. This option will also cause GYV Trade to close down, which will severely affect the building industry and will cause approximately 20 people to lose their jobs.

Embarking on this option would maintain the current low traffic volumes on the Eco-Estate road and dust generated by vehicles will remain low. It would also maintain the current low noise levels in the area, but would not significantly benefit any landowner except possibly the owners of residences that still have to build their houses in the Eco-Estate. The benefit that stems from this option is therefore directed to future residence owners on the western boundary, which from an economic perspective is an unfair scenario. Considering this scenario there is very little to be gained by following the “no go” option.

EXISTING MINING AUTHORIZATIONS HELD BY THE APPLICANT

None.

JOB CREATION

The proposed mining concern will at least maintain twenty jobs without including downstream employment in terms of hauling of sand and construction activities. Casual labour opportunities will be created during the re-vegetation stages, which will benefit the farm labourers. The current unemployment rates for the BCM have plummeted to all time low levels due to the economic recession and it is therefore vitally important to save jobs.

REGIONAL CLIMATE

Climatic conditions such as temperature, rainfall and wind velocity for example influence plant growth, erosion levels of disturbed areas, dust generation and air pollution levels as well as social impact in terms of quality of life. Climatic conditions can therefore influence the significance of impacts caused by developments such as mines. It is therefore important to understand the role thereof when determining the impacts of a specific development and the remedial measures that need to be implemented.

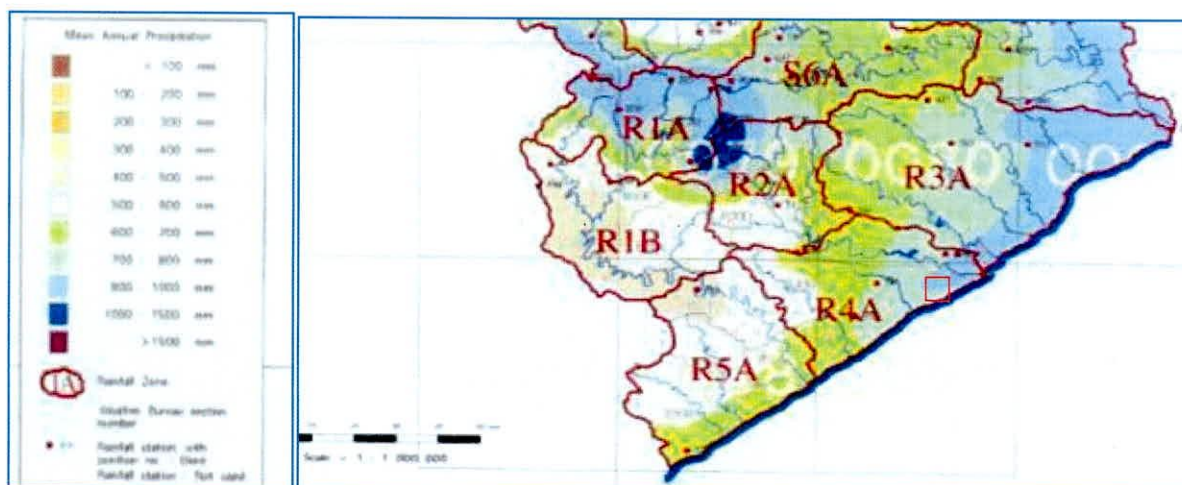
Climatic data was obtained from Schultz and Kopke, as well as from the institute of Soil Climate and Water. The study site falls within the Southern Temperate Climatic Zone and can therefore be considered to experience mild with strong winds and occasional periods of high humidity during the high summer months.

Rainfall

The Eastern Cape Province experiences a bimodal rainfall pattern with pronounced wet seasons coinciding with spring and autumn. Spring rains may also be associated with the passage of cold fronts drifting in from the west. Thunderstorm activity is common along the coast in late summer and autumn and results in intense cycles of rain and wind. This is illustrated by the fact that the maximum rainfall

recorded in a 24h period for any month is almost double the monthly average. Dry periods are coinciding with midsummer and mid winter. The average annual rainfall for the Province is approximately 873mm.

The area falls within rainfall area R4A and receives between 700 and 800mm per annum, which will stimulate plant growth and reduce dust generation to some extent. However, it will increase erosion on disturbed and uncovered mine areas and the necessary storm water control measures need to be implemented. Seeding must therefore coincide with early spring and early autumn to ensure a successful re-vegetation phase. Hail, frost or snow is not a common phenomena in this area and will not affect the re-vegetation process.



East London: Nahoon Dam – Average data 1966-1980

Month	Average	Minimum	Maximum
January	40	15	109
February	83	11	180
March	67	4	183
April	51	7	155
May	36	3	160
June	26	2	65
July	33	0	165
August	106	6	671
September	54	3	174
October	71	4	210
November	85	12	184
December	67	19	155
YEAR	719	355	1177

Temperature

The area experiences warm to hot summers with maximum temperatures in February and minimum temperatures in July. Hot north-westerly berg winds may occur in winter and may last for a few days, usually preceding cold fronts. From the statistics it is essential that seeding be restricted to the warmer periods to achieved optimum germination and growth. The annual evaporation of the area totals approximately 1400mm with the highest evaporation rates associated with the summer months.

East London

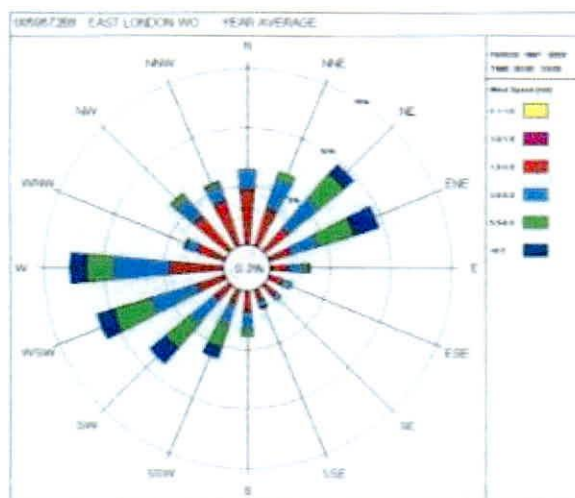
Month	Average	Ave. Max.	Ave. Min.	'S' pan evap.
January	22,0	25,5	18,2	168
February	21,1	25,7	18,4	144
March	21,3	25	17,6	122
April	19,5	23,6	15,1	96
May	17,7	22,7	12,8	81
June	15,9	21	10,4	73
July	15,6	21	10,1	76
August	15,9	21,1	11	91
September	16,7	21,2	12,3	102
October	17,7	21,5	13,9	127
November	19,1	22,8	15,5	146
December	20,7	24,3	16,8	174
YEAR	18,7	22,9	14,4	1400

Wind Regimes

The prevailing wind directions are predominantly west and south-west, but with significant east-north-easterly components. Winds are mostly aligned with the coast during the summer months. The north-easterly winds decreases from April when the south-westerly winds become more pronounced.

Wind direction and speed

Yearly average wind speed 5,03 m/s



GYV Trade CC Sand Quarry

Wintertime and thus the dryer months are dominated by south-westerly and north-westerly winds whilst summer months are dominated by north-easterly winds. Strong winds above 5m/s occur during more than 30% of the year with calms approximately 10% of the year. The calms are mostly restricted to the summer months and then well to night time. The average wind speeds are moderate with 50% of the winds reaching speeds between 1.5-5.5m/s. The calms can for example result in the concentration of dust near ground level at night. Wind erosion is also an environmental parameter that needs to be controlled when sandy soils are predominant, which is the case at the study area concerned.

ENVIRONMENTAL IMPACT ASSESSMENT CRITERIA

The impacts of GVV TRADE Sand Quarry on environmental parameters are assessed in this section in accordance with the criteria of the Minerals and Petroleum Resource Development Act 28 of 2002 and section 21, 22 and 26 of the Environmental Conservation Act. The process will highlight the impacts and emphasized the importance of remedial measures over the short term, as well as during the post mining phase. Impacts were assessed according to the criteria listed below:

Extent

Whether the impact will occur on a scale limited to the immediate site of the proposed activity, local area and immediate communities and settlements, sub-regional (municipal), regional (provincial) or national scale.

Duration

Whether the time span of the impact will be short term (0-5 years), medium term (6-10 years), long term (11-25 years) or permanent where natural processes or mitigation processes cannot eliminate the impacts.

Intensity (Magnitude)

Whether the size of the impact is negligible, very low, low, low- medium, medium, medium-high, high & very high.

Probability

The probability of the impact actually occurring as either unlikely, probable, likely or definite.

These criteria are evaluated in terms of

- 1) Significance (Insignificant-very low, low, low-moderate, moderate-high, high & very high).
- 2) Status (positive-negative-neutral).
- 3) Confidence (based on academic information, specialist knowledge, site evaluations, applicants approach).

The significance of the impact on the parameters of the affected environment is rated as:

Low Significance

The project will not cause any major adverse or beneficial changes to the biophysical, social or economic environment. Impacts experienced will abate almost immediately after cessation of activities and the biophysical, social or economic system should recover and return more or less to the natural state. No expensive mitigating measures will be needed to address any of these impacts. Ecological functions will continue undisturbed and no complaints from Interested and Affected Parties (I&APs) are anticipated. No rare and endangered species or sensitive areas exist in the area.

Moderate Significance

The project will induce moderate short to medium term changes to the biophysical, social or economic environment. The impact would be induced outside the development area and also possibly on a sub-regional level. Over the medium term the impacts could fade away, but the implementation of mitigation measures are normally required to eliminate these impacts. The impacts would be experienced for some time after cessation of activities, but would not affect the biophysical, social or economic environment severely. With mitigation the biophysical, social or economic system should recover, but the return to the natural state would be very slow and in some instances may not be achieved. I&APs might express some concerns and complaints may be received on an *ad hoc* basis. Rare and endangered species or sensitive areas may exist in the area and could be marginally affected.

High Significance

The project will induce extensive long-term changes to the biophysical, social or economic environment. The impact would be induced outside the development area and also possibly on a regional to national level. The possibility of secondary impacts arising from the project is high. Over the long term the impacts could fade away, but the implementation of expensive mitigation measures are normally required to eliminate or mitigate these impacts. These impacts would be experienced after cessation of activities and could affect the biophysical, social or economic environment severely. With mitigation the biophysical, social or economic system could possibly recover, but the return to the natural state would be or normally not be achieved. Ecological functions will be permanently disturbed and major complaints from Interested and Affected Parties (I&APs) could be expected. Rare and endangered species or sensitive areas exist in the area might be critically affected.

Should the impact assessment as a minimum reflect 2-3 impacts of high significance and 2-3 impacts of moderate significance, the project shall be viewed as a potentially flawed and continuation of the project should be seriously reconsidered or special engineering or biophysical/social intervention must be implemented.

Descriptive terms

Spatial extent: None/Insignificant (0), Site (1), Local (2), Sub-Regional (3), Regional (4),
Duration: None/Insignificant (0), Short Term (1), Medium Term (2), Long Term (3), Permanent (4)
Intensity: None/Insignificant (0), Very Low (1), Low (2), Low-Medium (3), Medium (4), Medium-High (5), High (6), Very High (7)
Probability: None (0), Unlikely (1), Probable (2), Likely (3), Definite (4)
Significance: 0-6 = Insignificant; 7-15 = Very Low; 15-22 = Low; 23-31 = Low-Moderate; 32-40 = Moderate; 41-47 = Moderate-High; 48-55 = High; above 55 = Very High

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PRE-MINING ENVIRONMENT, ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT PROGRAMME

TOPOGRAPHY

The study area and surrounds are characterized by the flat coastal platform with occasional deep incisions where watercourses drain the coastal platform. The primary and secondary dunes are located parallel to the coast and display a vegetation cover of indigenous Coastal Thicket, Coastal Grassland and large tracts of transformed land. The sand dunes and partially the inland sand deposits originated from earlier wind action along an ancient coastal platform when sea levels were substantially higher than the present levels. In addition, sand was blown in from the coast to add to these sand deposits. The receding sea levels led to the consolidation of the sand dunes, which later on became vegetated to finally give birth to coastal forest and grassland. The study area lies at altitude of 65m to 70m a.m.s.l.

The proposed mining area comprises the inland portion of the primary dune/coastal platform. Topographically the landform is categorised as strongly undulating irregular land. The area displays a very gentle slope of 2,5% towards the east where undefined watercourses drain the coastal dune system. On the northern side of the study area, the slope increases to approximately 5% in a northerly direction, where after the land flattens out to create almost flat pasture areas. The mining area and immediate surrounds do not display any watercourse and drainage mostly takes place by means of internal drainage because of the high porosity of the soil and sub-soils.

To the west, the coastal zone becomes much more undulating with low mountains and deep incisions giving origin to the Tyolomnqa River. The inland areas are more characterised by almost flat table lands.

The original structural topography of the greater area has not been disturbed significantly, except for in the coastal residential areas. Farming activities have only marginally affected the topographical appearance of the greater area.



Mining of this portion of the coastal platform will not have a major impact on the topography, since the area will on average be lowered by 2-3 meters and will result in the slope on the northern boundary being relocated more southwards along the edge of the grassland section which will remain undeveloped. The change in topography will therefore only be visible on the western and southern perimeters of the mine. During the final phases of development, the mine will be levelled out to the east and north. The newly established landform will blend in with surrounding landscape provided it is vegetated properly with climax species found on site. The quarry area will not be free draining during the development stages, since it could result in down slope erosion, but will remain as a box cut in the landscape and any runoff that might concentrate in the pit will be retained in the eastern part of the excavation.

Changing the topography would not change run-off patterns or cause erosion due to the relatively flat topography of the land in question and because of the good internal drainage of the soil. On cessation of the mining process, the floor area would be relatively flat. Upon rehabilitation of the area, it would entirely blend in with the surrounding area.

Currently the land concerned displays a homogenous fine texture due to the grassland that the area hosts with only small bush clumps to the north-east, but mostly outside the study area and would therefore not absorb disturbance well, although this impact will be remedied significantly when areas are vegetated. There are no prominent features in the immediate surroundings that reveal large-scale erosion that could potentially affect the long-term relief of the site.

The study area is a focal point in the landscape and will therefore tend to enhance the impact brought about by mining. Mining would in the end not change the texture of the proposed mining area significantly, since it would be rehabilitated back to grassland. Since mining is restricted to at most three meter below the original land profile, adequate sponge capacity would be retained to curb large-scale erosion from developing provided that adequate vegetation cover is established as soon as possible.

Since the access roads have already been established, no road construction is required that could influence the topography of the site.

Considering the above, the impact on the topography is rated as permanent, local and of low significance. This minor impact to the topography of the site will be almost invisible after rehabilitation was completed.

Impact on topography

	OPERATIONAL (no mitigation)	WEIGHT	OPERATIONAL (with mitigation)	WEIGHT	CLOSURE	WEIGHT
Extent	Local	2	Site Specific	1	Site Specific	1
Duration	Permanent	4	Permanent	4	Permanent	4
Intensity	Low-Medium	3	Low	2	Very Low	1
Probability	Definite	4	Likely	3	Likely	3
Status	Negative		Negative		Negative	
Confidence	High		High		High	
Significance	Moderate	36	Low	21	Low	18

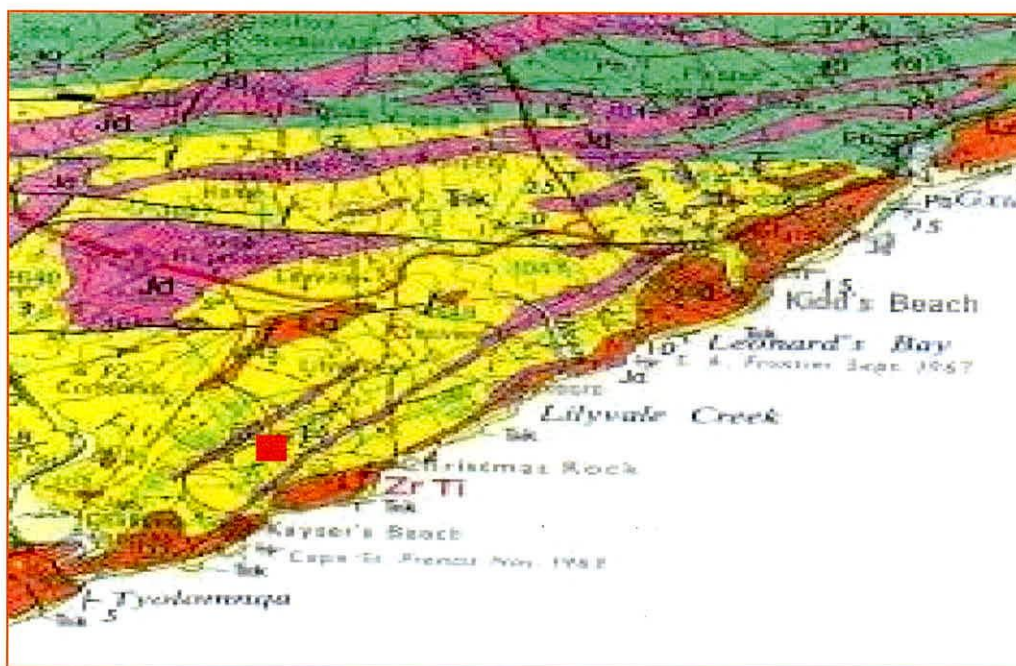
Remedial measures to be implemented are:

- Mining shall not progress beyond the approved mine area.
- The mining area will be divided in three phases to fast track rehabilitation.
- The western and southern slopes to be profiled to a minimum slope of 1:3 in such a way that sharp angles are not formed, but that flowing curves are formed instead which blend with the surrounding landscape. The eastern and northern perimeters will be levelled out to align them with surrounding topography.
- Vegetation around the quarry will not be disturbed to curb erosion processes on site.
- Each phase shall be fully rehabilitated within a 12 month period.
- No areas outside the authorized mine area will be disturbed by mining related activities.
- The internal access road will be maintained with a proper wearing course and protected by properly designed drains. Driving in non-mining areas will be prevented.
- Any erosion in the mine area would immediately be filled in, compacted and vegetated.
- The storm water control measures described under the headings 'Soil & Surface water'" will be strictly implemented.
- The area will be mined to an average depth of 2-3 meter below soil level and will be integrated with the surrounding land.
- Extraction will be done in such a way that the slope of the land will suit the establishment of grassland for future grazing.
- The post rehabilitation topography will result in gentle overland flow with no evident erosion processes that could scar the land and cause post mining changes to the topography.
- At closure the haul roads will be retained as part of farm infrastructure and must be properly maintained by the landowner.
- A photographic record must be kept and complemented annually and must accompany the annual performance assessment report.
- No stockpiles shall remain at closure.
- All infrastructure and waste will be removed at closure.
- The rehabilitation plan will be implemented in accordance with the time frames set.

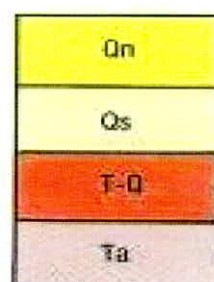
GEOLOGY

The area reflects two rock types, namely the mudstones/sandstones of the Beaufort Group and dolerite intrusions. The Beaufort Group in this area comprises of the Adelaide Subgroup and the Katberg Formation. The Adelaide Sub-Group is represented by Balfour Formation (Pb) (alternating units of grey, moderately to well sorted, fine to very fine-grained ultra-lithofeldspathic sandstone and greenish-grey to grayish-red massive mudstone). Sandstone generally forms 20-30% of the total thickness. The thickness of the Adelaide Subgroup in this area is about 2000m. The sandstone and mudstone litho-units normally form fining-upward cycles, each comprising of sandstone with a sharp, erosive base, which grades upward into the overlying mudstone. These cycles vary from a few meters to a few tens of meters in thickness. The thickness of individual sandstone units ranges from a few meters to 60m. They are sub-tabular to moderately lenticular with extensive lateral extent. Flat bedding, trough cross-bedding and micro-cross-lamination are the most abundant primary structures in the sandstone. The Adelaide Sub-Group appears to have been transported by north-west flowing meandering rivers. The sandstone component through historic scouring will have some influence on the inland sand deposition.

The Katberg Formation (TRk) consists of light brownish-grey, moderately sorted, fine- to medium-grained, lightly pebbly, lithic to lithofeldspathic sandstone with a thickness of approximately 900m. These sandstones are characterized by flat bedding and through and planar cross-bedding. Some beds are superficially massive, but even these are probably not actually structureless whilst deformed cross-bedding is occasionally present. The sandstones are generally course-grained and are indicative of deposition in a braided stream environment. Scouring of the inland sandstone has resulted in the deposition of the target mineral along the coastline and through regression of sea levels and onshore wind action sand was deposited parallel to the coast forming the current primary dune system.



- Calcareous sandstone (aeolian), palaeosols
Kalkige sandsteen (eolies), paleosols
- Calcareous sandstone, conglomerate, coquinite
Kalkige sandsteen, konglomeraat, coquiniet
- Calcareous sandstone (aeolian), sandy limestone
Kalkige sandsteen (eolies), sandige kalksteen
- Conglomerate, calcareous sandstone, coquinite
Konglomeraat, kalkige sandsteen, coquiniet



The sedimentary rocks of the area were intruded by dykes, sills and inclined sheets of dolerite during the Jurassic. Dykes are normally not more than 10m wide and extend for a few kilometers. The dolerite is normally tholeiitic in composition. Dolerites are poorly represented in surface outcrop in the East London area.

The study area is neither a geological site, nor a site hosting a mineral with limited distribution. Mining the sand will result in a minor decrease in the extent of sand deposits in the area and therefore an impact of low significance will be applicable.

Impact on geology

	OPERATIONAL (no mitigation)	WEIGHT	OPERATIONAL (with mitigation)	WEIGHT	CLOSURE	WEIGHT
Extent	Local	2	Site Specific	1	Site Specific	1
Duration	Permanent	4	Long Term	3	Long Term	3
Intensity	Low	2	Negligible	0	Negligible	0
Probability	Definite	4	Definite	4	Definite	3
Status	Negative		Negative		Negative	
Confidence	High		High		High	
Significance	Moderate	32	Low	16	Low	12

Remedial Measures

- The minimum working area for an efficient and effective operation should be utilized and demarcated prior to the start of mining activities and the excavator operator must be informed in this regard.
- No mining will be undertaken in areas where reserves have not been adequately proved in order to avoid unnecessary/wasteful mining.
- No activities will be permitted outside the approved mine area and demarcated phase.
- All stones and calcrete nodules, if any, will be used in profiling the sides of the quarry. In such case these materials will be neatly stacked, covered with sand, compacted, top dressed with topsoil and vegetated.
- Quarry development will take place with final rehabilitation objectives in mind.
- Storm water, if any, shall not drain freely from the excavation down slope, but shall be retained in the excavation to reduce erosion potential until disturbed areas dispose of adequate vegetation cover and only then will profiling of the northern and eastern perimeters take place.
- If necessary, storm water control structures will be constructed once a particular phase has been worked out.
- Topsoil must be removed ahead of the production face and be reinstated as soon as possible once extraction has been completed to limit the erosion potential.
- All embankments must be profiled to 1:3 slopes, seeded and fertilized to prevent head cut erosion along the southern and western slopes.
- Individual phases will be rehabilitated within 12 months after completion of a particular phase.
- All erosion gullies, especially in the faces must immediately be filled in, compacted and vegetated. An erosion-monitoring programme must be implemented as a cradle to grave process.

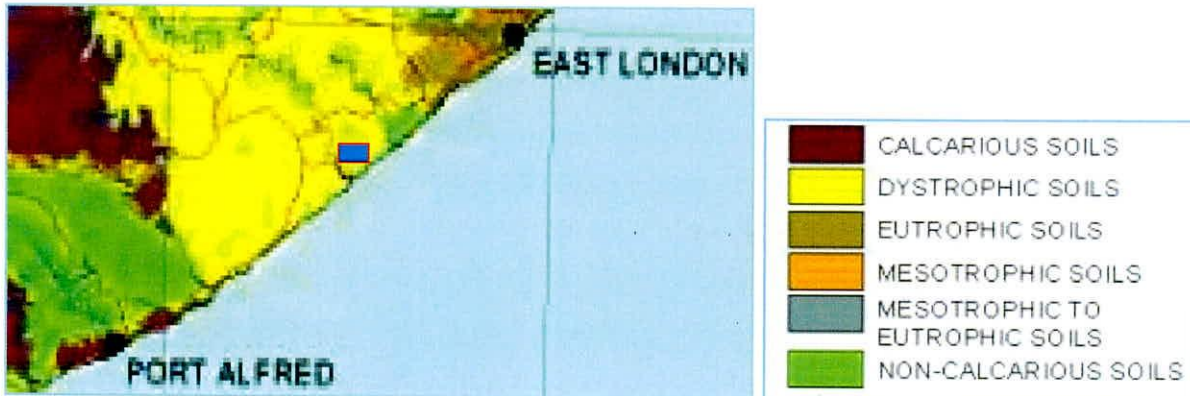
SOILS

Topsoil is a very precious, non-renewable resource with high conservation importance and is necessary for the effective rehabilitation of disturbances caused by development. It is therefore essential that it be preserved and protected and if necessary, obtained from outside sources to effect proper rehabilitation.

Soil properties

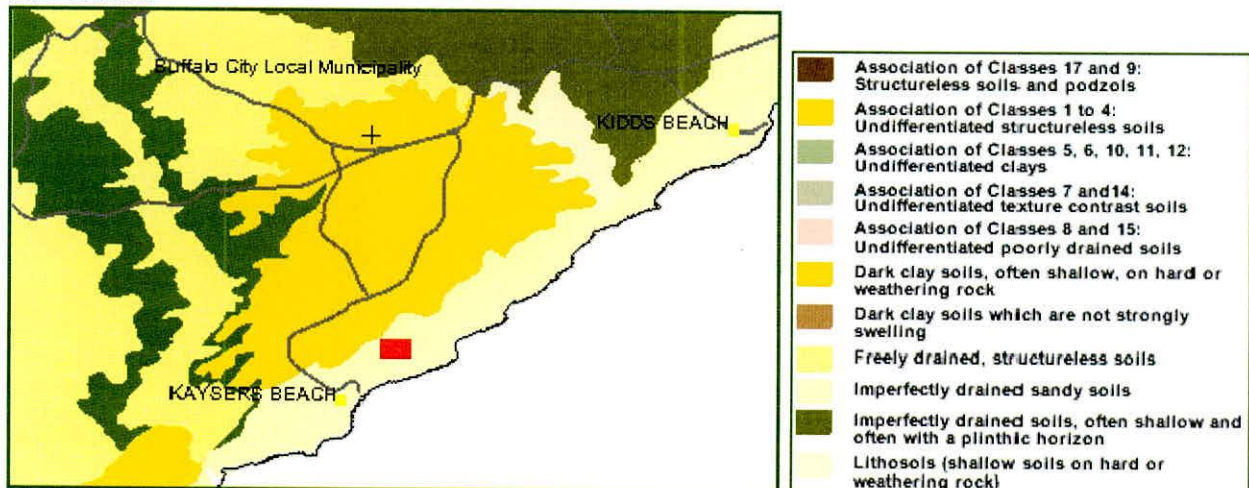
It was mentioned before that the mineral to be mined derived from sandstone and was deposited on land via marine processes hence the soil in this area displays a slightly acidic Orthic A horizon comprising of a very sandy-loam topsoil layer of ±30-40cm thick, underlain by a thick regic sand horizon (E-Horizon) that comprises of the mineral reserve. Soils in the area are generally extensively leached hence low nutritional values can be anticipated.

EMPAT



Soils of the area is characterised as an association of Classes 1-4 and is described as undifferentiated structureless soils, possibly a Fernwood soil type.

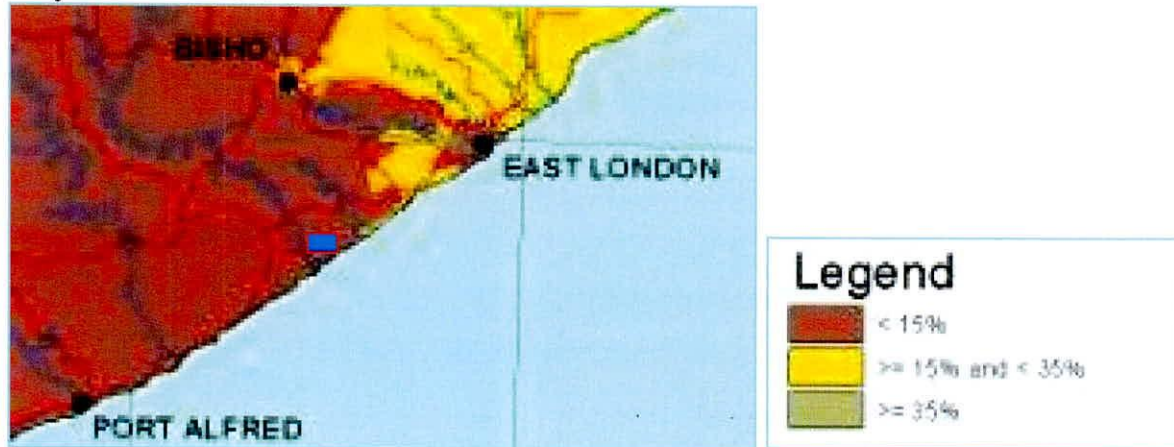
Soil classes



Due to the type of vegetation cover the soils show a low organic component and the percentage of carbon content would be below 2%, but will still be the driving force of vegetation cover on the coastal platform. Due to intermediate microbial activity and higher soil temperature in this area, the organic component will be broken down quickly once the system is disturbed hence topsoil storage time must be restricted to the minimum. Since the organic matter is relatively fine, it will also result in expediting the breakdown of organic matter. Soils need to be used within three months after it was removed. Due to the alteration of the physical, biological and chemical properties of the soil, a moderate reduction in

soil productivity may take place during the storage period. It is anticipated that low nitrogen, phosphate and trace element levels would prevail and hence soils should be upgraded to reinstate and maintain nutrient cycles in the soil. High internal drainage capacity and low adsorption capacity due to the low clay content (less than 15%) will cause that these soils will display low field capacity values during the summer periods, which will have a negative effect on biomass accumulation. This could require irrigation at certain stages, which will be possible from the existing reticulation network on the farm that will be extended to the mine area.

Clay content of soils



These soils will require lime to function optimally, support vegetation and facilitate the use of inorganic fertilizers without the risk of lowering the pH beyond what is required for mineral absorption. Soils of the study area have high leaching capabilities hence the soils will not remain fertile after clearing and prolonged heavy precipitation. It would, therefore also not re-establish its positive nutrient cycles over the short term and re-vegetation process will require the necessary attention and dedication. This requirement was clearly observed at other mining areas within the greater Kidds Beach and Kaizer's Beach areas. Even if used shortly after stripping, inorganic upgrading would be necessary. Once soils are reinstated, quarterly upgrading of soils will be necessary if rainfall permits. The impact on soil properties is rated moderate-high and it should be understood that soil fertility, humus content and the ability to sustain plant life would be affected negatively.

The potential of soils to rehabilitate is defined by its depth, structure, texture, and sequence of soil horizons. Since the *in situ* soils at hand are limited in terms of the above, mining will further impact on these characteristics. Reinstated soils will have poor texture and structural features and will cause re-vegetation to be difficult. It would, from a fertility point of view, be pertinent that soils are upgraded with organic material (manure or grass cuttings) to increase the humus component of reinstated soils. The subsoil (sand deposit) is even less structured, has no texture and limited nutrient levels and would not be able to sustain plant life on its own, as was reflected by other mining areas in this particular coastal region where topsoil was not conserved.

Topsoil removed from mining areas will be temporarily stored on the northern and southern sides of the excavation and will be reinstated as mining progresses eastwards. Incorrect stockpiling thereof will most definitely cause its physical properties to further deteriorate and the soils will become sterile due to compaction, loss of nutrients, texture and structure and decline in biological activity. It is important to fertilize it and irrigate it as soon as possible. Negotiations with the landowner regarding availability of water have already been concluded.

Impact on soil structure & fertility

	OPERATIONAL (no mitigation)	WEIGHT	OPERATIONAL (with mitigation)	WEIGHT	CLOSURE	WEIGHT
Extent	Local	2	Site Specific	1	Site Specific	1
Duration	Long term	3	Medium Term	2	Short Term	1
Intensity	Medium	4	Low-medium	3	Low	2
Probability	Definite	4	Definite	4	Probable	2
Status	Negative		Negative		Negative	
Confidence	High		High		High	
Significance	Moderate	36	Low-Moderate	24	Very Low	8

Soil erosion

Soil properties determine the erodibility of soils and their ability to support vegetation and this needs to be understood in assessing the potential for erosion and the suitability for rehabilitation. The topsoil (A horizon) of the study area is semi-fine textured with less than 5% clay content and can generally be described as a very sandy loam with a low erodibility factor of 17. Under normal circumstances this soil is stable and not readily subject to erosion, due to very good internal drainage capabilities. The E-horizon has similar characteristics than the A-horizon and displays an extensive sponge capacity in this case and has the same low erosion index. The only factor that will increase the erosion index is the occurrence of calcrete/clay lenses at lower levels since it could result in the displacement of topsoil through sheet flow once it is reintroduced to such areas, which would eventually preclude the establishment of vegetation. In such case, the erodibility index will increase to approximately 10, but would not lead to gully erosion. This scenario was not observed in the past at other quarry concerns in this particular area. The immediate surroundings display no erosion.

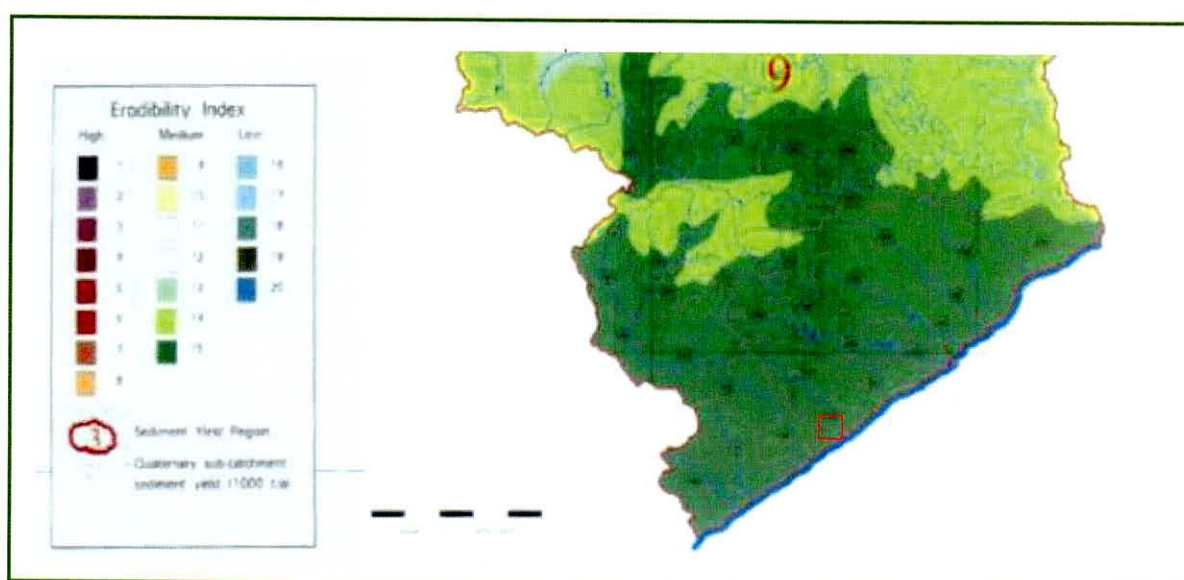
Soils susceptible to water erosion are normally silty, are weakly structured, have low organic contents and have poor internal drainage. Soils in the study area are sandy, have low organic content and have excellent internal drainage, but are poorly structured. This will render the soil not to be highly erodible and this statement is supported by the low erodibility index as reflected by the map included. However, if soils are denuded for long times, the organic content will diminish and erodibility will increase over time. Spreading the topsoil on the slopes of the excavation will also cause it to become more susceptible to erosion. It is therefore imperative to use all available organic matter as mulch on the slope areas to reduce the battering impact of rain or wind erosion and to improve absorption capacity and re-vegetation rate.

Exposed sub-soil (E-horizon to be mined), especially on the slopes will be more prone to erosion and could lead to erosion rills and deep erosion gullies. This will be a temporary impact and could be successfully addressed during the rehabilitation phase. It is important to profile and cover such areas as soon as possible. The floor of the excavation will not experience any erosion if properly vegetated. However, if left unrehabilitated, eastward flow could result in erosion with the worst-case scenario erosion gullies of approximately 0,5m deep and material eroded will be fanned out on eastern end of the excavation, although it would be retrievable. If left unattended, with time gullies on the slope will be partially filled in due to slumping of the slope in an effort to regain the original angle of repose. No impact outside the property is anticipated since vegetation around the quarry will curb any water and sand movement.

The area falls within sediment yield region 9 and quaternary sub-catchment R40A with a very low-intermediate sediment yield of 36000-60000 tonnes per annum, supporting the low-moderate erodibility factor. The C-horizon (solid TMS at depth) will not be affected. Extensive sediment transport in other quarry areas in this particular part of the Province was not observed.

There will be one road leading to the mine area and due to the gentle gradient thereof, erosion would not be a consideration. It will be protected with a proper wearing course and the necessary cross drains to prevent rutting.

To reduce any potential surface flow within the mining area, it is important that the vegetation around the proposed quarry areas are retained and that removal of vegetation ahead of the production faces is limited to the minimum.



As mentioned, the development of the production faces will increase the risk of erosion in a limited way, but the catchment area is limited since the site is located almost on the watershed and the impact of runoff will further be reduced by the high internal drainage of the soils in this area. Since there is very little difference in the erodibility of the top- and subsoil, it does not need to be integrated with each other to ensure a stable soil complex. Due to the nature of *in situ* soil, the relative flat topography cut off berms is not deemed a necessity. However, due to the low fertility of the soils in the study area it is pertinent that soil stability be achieved as soon as possible after mining has been terminated in a particular phase. Once properly vegetated, the slopes and floor of the excavation should be stable and very little erosion is anticipated. Therefore, if the prescribed mitigation measures contained in this report are implemented, the risk of erosion in rehabilitated areas would be low. In the absence thereof, the impact will increase to moderate.

Soils and sub-soils in the study area are highly susceptible to wind erosion as were displayed at other quarry areas in the greater East London area and during adverse weather conditions clouds of dust drifting over the property might be experienced, if no mitigation measures are implemented. Exposed sandy soils will during periods of high winds be stripped of the little bit of binding material and organic matter that it contains, which in turn will result in reduced fertility and structure with loss of vegetative cover. This impact will increase as storage of topsoil is prolonged or if it is done incorrectly and will

be even more pronounced once re-introduced to mined out areas. It is important that the effect of the wind be reduced by establishing windscreens within the mine area, irrigation and re-vegetation of disturbed areas as soon as possible. The application of manure on seeded areas and irrigation will vastly reduce this impact and must be implemented. The impact of erosion on soil stability and the environment in general is rated low with mitigation, but moderate without remedial measures in place.

Impact on soil stability.

	OPERATIONAL (no mitigation)	WEIGHT	OPERATIONAL (with mitigation)	WEIGHT	CLOSURE	WEIGHT
Extent	Local	2	Site Specific	1	Site Specific	1
Duration	Long term	3	Medium Term	2	Short Term	1
Intensity	Low-Medium	3	Low	2	Low	2
Probability	Definite	4	Likely	3	Probable	2
Status	Negative		Negative		Negative	
Confidence	High		High		High	
Significance	Moderate	32	Low	15	Very Low	8

Soil Pollution

Soil pollution can only occur should hydrocarbon spills occur, or when 1) used oils and lubricants are purposefully drained into the soil, 2) storage facilities are destabilized, or 3) if ablation facilities contaminate soils. At the quarry, none of these impacts is anticipated since trucks and earthmoving equipment will be well maintained and servicing of vehicles, fuel storage or establishment of a sewage system will not take place at the proposed quarry area. No other chemicals or hazardous substances will be used at the site.

The slope of the land involved, the high penetration capabilities and low adsorption capacity of the sandy soil could cause any pollution plumes to be experienced at depth.

Hydrocarbons

Storage of all oils and lubricants, as well servicing of vehicles, will be restricted to the offsite workshop of the applicant. If emergency repairs are required, it will be done over drip trays at the workshop of the landowner hence no impact on soils is anticipated. Bulk diesel fuel will be stored at the offsite workshop of the applicant. If a sand screen is to be used, the onboard generator will be mounted within a steel tray.

Due to the limited amount of vehicles that will be used at the site, the worst case scenario would lead to small hydrocarbon spills that will penetrate the soil immediately and will percolate to lower levels over time. Sandy soils will result in a more extensive, but less concentrated plume and with the higher oxygen levels (less compacted and more air space) characteristic to these soils, will result in accelerated bio-degradation of hydrocarbons. Use of fertilizers could assist in breaking down limited spills in short space of time. Destabilizing the diesel tank of the generator and spilling the entire contents will result in low adverse impact, especially during dryer periods. It will severely affect soil fertility through impaired nutrient imbalances and pH values, as well as reduced water retention capacity and will affect soils and vegetation over longer periods and needs to be bio-remedied. For this purpose, a specialist will be called in, or the sand affected will be scooped up immediately and disposed of at an approved hazardous waste site.

The impact is rated low under worst-case scenario and very low under normal circumstances, due to the limited spills anticipated in the quarry area.

Sewage

A chemical toilet will be provided at the quarry area. Due to the limited number of people (2-3) that will be onsite, limited soil pollution will therefore take place and a similar impact on the coliforms count in the soil is anticipated. The system must be maintained according to specifications stipulated by Municipal by-laws. Due to the absence of ablution facilities, no effluent will be generated that could affect soils and groundwater sources inside or outside the study area. The limited risk involved with the chemical toilet is further reduced due to the high penetrability of the sand deposit and since the soils in the study areas will probably not be used for residential purposes in the very near future. There are already residences on the various farms around the site and the proposed quarry concern will impose a much lower impact. The anticipated soil pollution risk is rated very low.

Waste

Very little domestic waste will be produced at the quarry sites and the waste streams (tins, paper, wood, food) will also be rather limited (0,1m³ per month) and will be removed to the nearest approved waste facility at Keizer's Beach or Kidds Beach. Even in limited amounts, uncontrolled storage of waste could lead to littering of the surrounds through wind dispersal action, which could affect livestock and visuals. Therefore, provision for waste receptacles with scavenger proof lids must be made. Handling of waste should be included in an environmental awareness programme to be developed for workers.

Waste production will be limited at the quarry sites and the impact on soils and surrounds is rated very low with no mitigation measures in place.

Impact of pollution on soils

	OPERATIONAL (no mitigation)	WEIGHT	OPERATIONAL (with mitigation)	WEIGHT	CLOSURE	WEIGHT
Extent	Local	2	Site Specific	1	Site Specific	1
Duration	Short Term	1	Short Term	1	Short Term	1
Intensity	Low	2	Very Low	1	Negligible	0
Probability	Likely	2	Unlikely	1	Unlikely	1
Status	Negative		Negative		Negative	
Confidence	High		Medium		High	
Significance	Very Low	10	Insignificant	3	Insignificant	2

Remedial measures to be implemented are:

Conservation of in situ and removed soil.

- All in situ soils will be removed and conserved during future development stages and will not be sold. It will be stored along the southern and northern perimeter of each phase and it will be piled to a maximum height of 1,5m. Once removed it will be seeded with the specified seed mixture, upgraded with inorganic fertilizer and irrigated, if needed.
- When needed, topsoil stockpiles will be protected from wind action by covering it with shade cloth or Hessian.

- Mining will be restricted to the approved mine area and particular phase that is developed. The amount of soil removed ahead of the production face will be reduced to the minimum required for optimal development.
- Mining will take place progressively from west to east and removal of topsoil will be done in similar manner.
- Only the existing haul roads to the quarry area as depicted on the plan will be used and vehicles would not deviate from it and cross virgin land. Movement of vehicles in the quarry will be limited to reduce potential impact on areas outside mine boundary.
- Any spoilt material will be placed inside the quarry and not on surrounding vegetated areas.
- Restrict sand stockpiles to the inside of the quarry.
- Disturbance of the soil and vegetation zones around the quarry will be prohibited.
- Removed topsoil will not be mixed with sub-soils.
- If topsoil from other development areas is sourced, it must come from areas with zero alien plant infestation.
- Topsoil stockpiles will be protected from water erosion and will not be placed within close proximity of any secondary drainage channel.

Protection of unstable soils

- Haul roads will be protected with a proper wearing course of at least 30cm or as much as is required to raise the road above the abutting landscape. This will provide for construction of cross drains every 30m (30cm wide and 20cm high and slope 5 degrees) with spill areas within the vegetated areas alongside the road.
- The mining area will be developed and rehabilitated in 3 phases as proposed in the development plan to reduce the extent of the disturbed area and prevent erosion of non-vegetated areas. To reduce the impact of wind, each phase will be developed in slots not wider than 20m to facilitate quick return of topsoil.
- Once the topsoil in a particular phase or sub-phase has been reinstated, the area will be protected from wind erosion by erecting shade cloth windscreens (1,8m high) across the wind path, every 15 meters until such area has been adequately vegetated. Shade cloth will be properly attached to 2,5m (1m sub-surface) wooden poles and must reach to the ground surface.
- If wind erosion proves to be significant on soil stability, slots across the wind path must be mined alternatively, leaving an unmined section between two mined out slots. These slots can be mined once the mined out areas have been vegetated properly.
- The minimum soil will be removed ahead of the production face.
- Each such phase will be profiled and vegetated immediately after extraction was completed and 60% cover will be established within a 12 month period. Soils must be irrigated using water obtained from the property owner in order to stimulate plant growth during the drier periods.
- Vehicles will not drive over rehabilitated areas to prevent compaction and dieback of established vegetation.
- If needed, limited soil erosion on flat floor areas could be controlled by developing small cross drains on the quarry floor, but may not spill on the ones down slope. The small berms must be properly stabilized and seeded. Once an area has been properly vegetated, the berms can be flattened to allow for normal surface flow, if any.
- Storm water control structures, if any, will be retained and maintained until closure is granted. If needed, a soil conservation officer or expert will be employed to assist in constructing storm water control structures.

- The quarry will be developed in such a manner that slopes are smooth to prevent concentration of surface water on them that could stimulate erosion.
- The quarry will be developed as a box cut to retain all runoff in the quarry. Integration of the eastern and northern slope with the surrounds will only take place once the mine area disposes of a proper vegetation cover.
- Should erosion of the slopes or quarry floor persist, the following remedial measures will be implemented:
 1. Any erosion rills or gullies that develop will be filled in with subsoil, compacted but upper layer to be scarified to bind with topsoil, top dressed with soil, fertilized and seeded.
 2. Such areas will be provided with a mulch/manure layer of at least 3-5cm thick.
 3. Trunks/branches of trees removed (non seed-bearing alien trees) from northern portion of the property will be placed in rows along the faces and pegged to the ground to reduce water speed and curb erosion.
 4. In worst case scenario, Soil Saver (natural organic sheet material with seeds) will be pegged onto the slopes after spreading of topsoil and seeding was effected. A soil conservation officer or expert will be appointed to oversee the process.
 5. If production faces are at least 3m high, it will be cut in half to establish a bench of at least 8m wide to reduce energy of surface flow.

Upgrading of soils

- Topsoil will be reintroduced to disturbed areas, keyed-in slightly with lower horizons by ripping it lightly along the contour and fertilized as follow:
- Initially at a rate of 200kg 2:3:2 (22) Zn and 150kg 4:1:1 per hectare before seeding.
- Once the grass seedlings have reached a 15cm height, applications of super phosphate at a rate of 150kg per hectare twice per annum (March & September) will be effected. Seeding will coincide with the rain season or when soil moisture regimes are good. The application of manganese and boron will also be investigated if re-vegetation does not progress satisfactorily.
- Lime will be introduced at a rate of 2 tons per hectare.
- All natural vegetation removed from the mine area will be stockpiled, protected against wind erosion and re-introduced as mulch to seeded areas.
- In the event that the removed vegetative material is deficient, the applicant undertakes to obtain all available manure/chipped vegetative matter (without alien seed) and introduce it to profiled areas to improve the fertility and micro-climate of the soil, which in turn would facilitate improved germination and percentage soil cover.
- Upgrading of soils and re-vegetation of disturbed areas will be done concurrently with mining.
- If needed, soils will be analysed by a competent laboratory and the nutrient requirements determined.

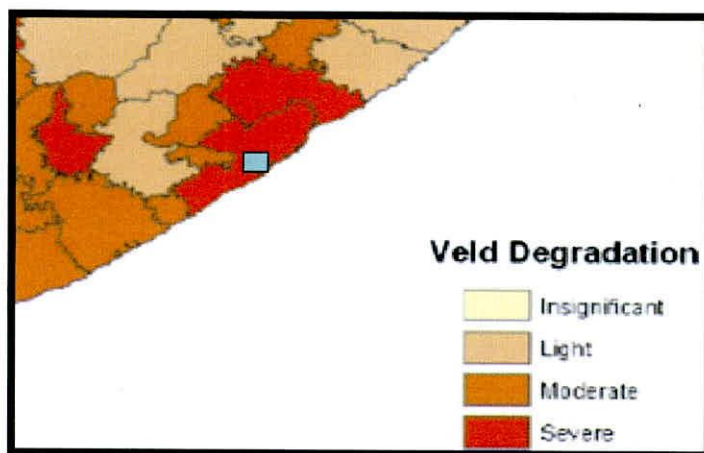
Contamination of soils

- No oil and lubricants will be stored onsite.
- In case of emergencies services/repairs, used oils and lubricants will be siphoned in receptacles with proper lids and be disposed of at a registered recycling facility on the same day. If it needs to be stored temporarily on the property, it must be stored in an enclosed area preferably in the workshop of the landowner.

- Within the above-mentioned area, a receptacle will be provided for used filters and oil contaminated vehicle parts and will be respectively disposed of at a registered waste facility and scrap yard located in East London.
- All vehicle maintenance will be done at the offsite workshop of the applicant and emergency repairs will be done over drip pans.
- The generator of the sand screen, if required, will be leak-free and the generator will be placed inside a steel tray that provides for 110% capacity of volume of fuel stored.
- Hydrocarbons shall not be drained into the soils nor shall used filters and hydrocarbon-contaminated parts be buried in the soil, but will be removed to an approved waste site or recycling facility.
- Making use of bio-remediation facilitated by a specialist company will negate larger spills, whilst smaller spills could be treated with fertilizer to break down spilled hydrocarbons or be scooped up by front-end loader and disposed of at the nearest approved waste site.
- Spills will be prevented by properly maintaining vehicles and restrict servicing of vehicles to the offsite workshop.
- No other hazardous chemicals will be used on site without authorisation granted by the DME and other regulating authorities.
- No chemicals will be stored on the property for mixing with the sand to increase building specifications.
- Waste will be removed from the mine area on a continuous basis to the Kids Beach or Kaizer's Beach waste facility with specific emphasis on household waste, plastics, and unusable scrap metal and tire casings.
- All quarry/plant debris must be removed before topsoil is re-introduced to disturbed areas.
- The chemical toilet will be maintained according to Municipal bylaws or specifications issued by a local Health Inspector.
- The handling of oils should be included in an environmental awareness programme.

LAND USE & LAND CAPABILITY

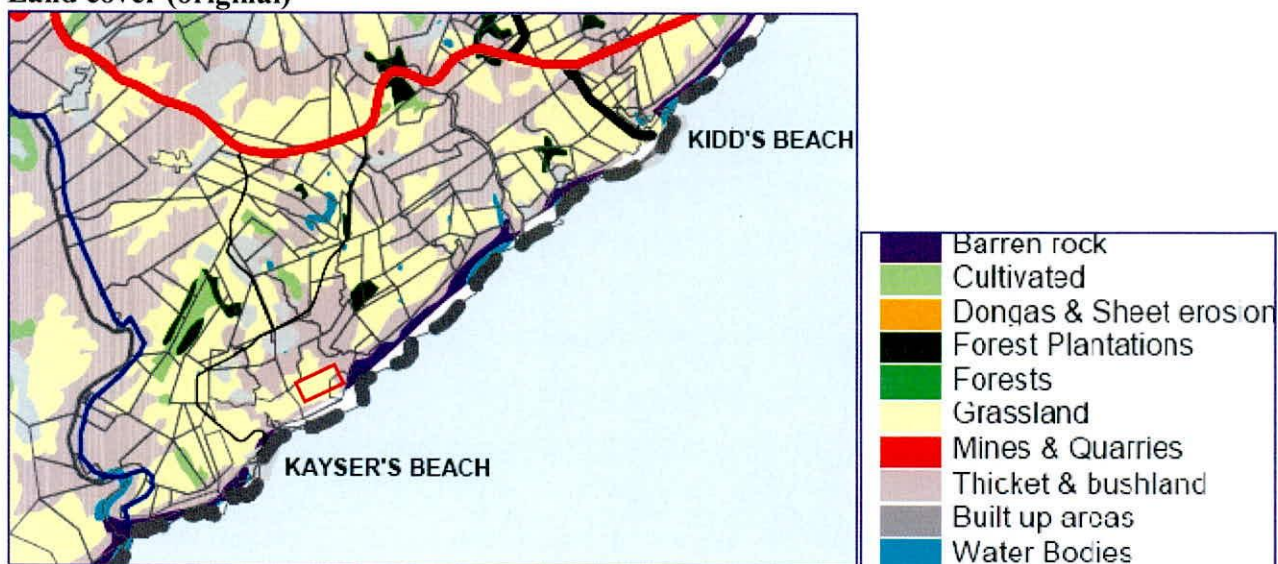
The land is zoned agricultural and was used for grazing for many years. In the process, the land was ploughed a number of times, but has recovered well since then. Land to the north was totally transformed by establishing pastures. The same scenario applies to most of abutting land. If the amount of disturbance is taken into account, the property reflects a moderate degree of transformation.



In terms of the Eastern Cape State of the Environment Report, the study area falls within a zone having a severe veld degradation rating.

The original land capability was maintaining Coastal Grassland together with the fauna associated with this specific habitat. This particular veld type is hosted on vast tracts of land to the west and smaller sections to the east with the forest component located in a narrow strip along the coast and are formally conserved by DWAF.

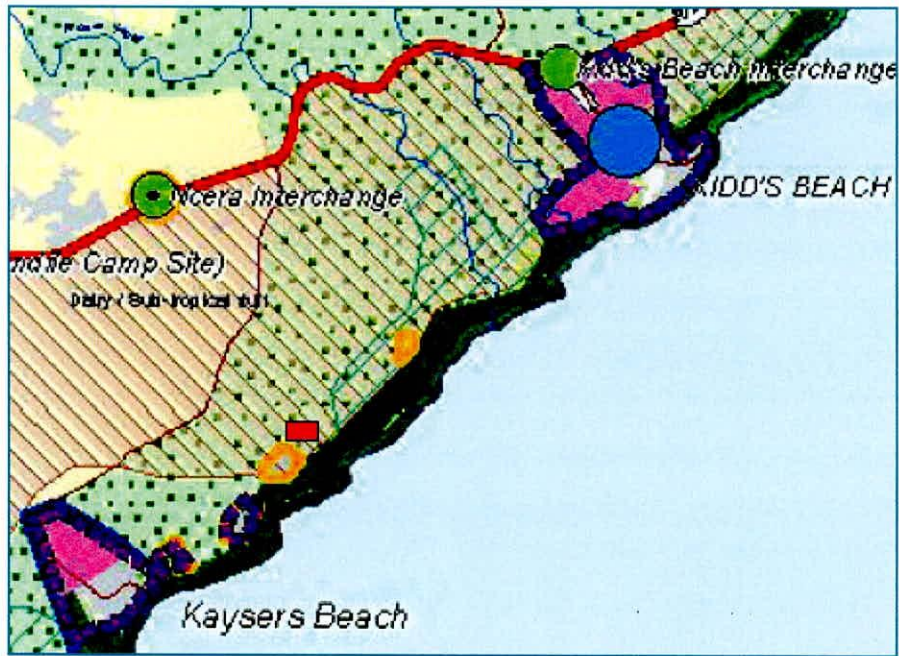
Land cover (original)



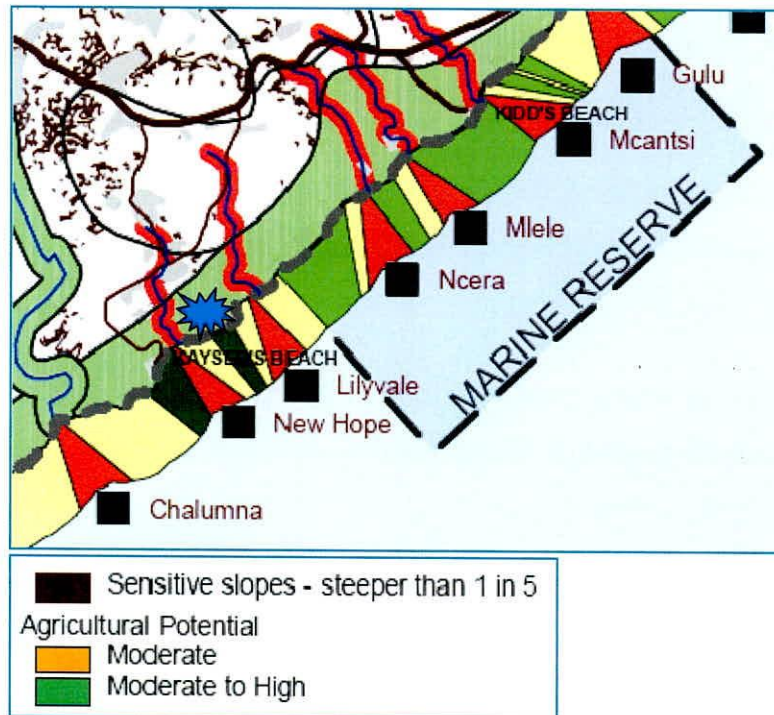
In terms of the STEP programme and the Amatola State of the Environment Report, the land concerned is classified as STEP Corridor and can withstand minimum loss of intact land through development and dedicated efforts must be directed towards environmental benefits for such disturbed areas such as proper re-vegetation measures and prevention of erosion. Considering the status of the coastal grassland, a decision was made that only half of the available area will eventually be made available for mining, but for the mining permit application only 1,5ha will be utilised. It is further the intention to restore all disturbed land to an acceptable degree in line with the current vegetation type occurring in the study area. A 50% surface cover must be established within the first 12 months of completing a particular phase and 80% cover within a two year period. Maintaining biodiversity over the medium term should be the objective and can be achieved by proper removal, storage and reintroduction of topsoil and vegetation of the area with the assistance of irrigation as soon as possible. The 'Corridor Status' of the area will therefore be marginally affected over the short term and will most probably only attain 80% functionality after rehabilitation. However, if erosion can be fully controlled and vegetation of disturbed areas can be expedited, full recovery of the grassland can be achieved.

No infrastructure will be required but should it be necessary, a mobile screening plant will be positioned in the quarry and limited impact is anticipated in this regard.

In terms of the Buffalo City development plan, the proposed area is not earmarked for future infrastructure development, residential development, rural development areas or nature conservation areas. The study area is also not rated as an important agricultural area, due to the poor soils found in the coastal zone.



The potential end use of an area disturbed by development, is mostly determined by the capability of the land before development, which in turn is defined by the soil types, climate and topography in that particular area. Agricultural potential of the soil in the study area is low and mining will reduce this potential over the short term, due to lower soil fertility (impaired nutrient cycles) and reduced organic content; therefore all topsoil must be conserved. Biological activity in the soils would be affected slightly and thus also the nutrient cycle, which could result in a less prompt re-vegetation process. Considering the short period for which the topsoil will be stored, most of the biological processes within the soil will be maintained and proposed upgrading thereof will further assist in attaining original soil fertility.



Mining of the area will result in a decrease in available grazing, but considering the small area involved, the impact on the economic or ecological value of the property concerned will be negligible. It is our view that this particular development can be integrated with the surrounding land uses, which are currently cash crop production and grazing, without endangering sensitive natural and cultural resources or affecting abutting land uses. The royalties to be received for sand extraction will enable the landowner to improve cultivation areas on the farm and increase agricultural output. Since the road to the proposed eco-estate will be shared by quarry vehicles, courteous and safe driving is required not to impact on abutting landowners and the necessary liaison with the landowner on the matter must take place prior to commencement of activities.

Once the area is rehabilitated, the agricultural potential and normal drainage patterns will mostly be restored. In terms of the topography, the development will result in similar flat areas for grazing purposes and lowering of the ground levels will result in the land in question to show shallower water table, due to a decrease in the natural sponge capacity of the soil and a subsequent improvement of grass cover during the dryer periods. Although the underlying soil layers may display increase clay percentages, it will still reveal high porosity and absorption capacity will be adequate to ensure a sustainable post mining grazing and corridor area. An increase in runoff is, however, anticipated and

increased sediment transport and subsequent loss of topsoil can be expected thus it is essential that the disturbed areas be vegetated as soon as possible and that the proposed development strategy is implemented.

Destruction of nesting and feeding grounds for especially avian fauna is a consideration, but considering the small area involved and the proposed concurrent rehabilitation process, the impact would be minimal. Development of the quarry would also not compromise the needs and the well being of future generations, but will improve the agricultural output of the farm in terms of crop production. Since this habitat is not sensitive, it is from an economical and ecological point of view the correct strategy to develop it instead of areas carrying high conservation value.

The proposed mining will not have any impact on the land capability or land use of abutting properties. Anticipated minor increases in dust levels will not affect vegetation on abutting land due to decreasing photosynthetic rates, since it was not a consideration during mining activities at other quarry areas in this particular part of the Province. In addition, no soil on abutting properties will be affected by erosion due to the buffer zone of at least 50m between the western perimeter and the boundary fence. The establishment of the proposed eco-estate will be able to continue and the area applied for will be mined out prior to completion of the eco-estate hence the impact would be limited. Since there is no crop production in the immediate vicinity of the quarry, no real threat to the livelihood of landowners is anticipated. The proposed site is, except for the residences still to be built on the abutting land, located distant to any farms residences and formal residential areas and will therefore not largely affect the ambiance that residents of the area enjoy in this almost rural area.

Considering the small areas to be mined relative to the surrounding land, the impacts on land use and land capability are rated as very low during the operational stage.

Impact on land use and land capability

	OPERATIONAL (no mitigation)	WEIGHT	OPERATIONAL (with mitigation)	WEIGHT	CLOSURE	WEIGHT
Extent	Local	2	Local	2	Site Specific	1
Duration	Long Term	3	Short Term	1	Short Term	1
Intensity	Low-Moderate	3	Low	2	Very Low	1
Probability	Likely	3	Probable	2	Unlikely	1
Status	Negative		Negative		Negative	
Confidence	Medium		Medium		High	
Significance	Low-Moderate	24	Very Low	10	Insignificant	3

Remedial measures to be implemented are:

- Mining will be restricted to the approved mine area.
- All *in situ* topsoil removed shall be conserved.
- Topsoil would be re-introduced to disturbed areas and upgraded by the application of fertilizers and organic material as indicated previously to ensure that a stable grassland cover is established.
- The quarry area will be seeded with the prescribed seed mixture to ensure a proper surface cover and head start biomass accumulation.
- Alien plant infestation will be prevented through an aggressive alien eradication programme.
- Rehabilitation will be done concurrently with mining and in phases as proposed by the mine plan, as soon as the floor has been lowered by the proposed 2-3 meters. Progress will be

monitored and audited against proposed rehabilitation schedules to improve land use options and land capability.

- The impact on the topography of worked out areas will be remedied by means of profiling and stabilizing production faces.
- Vehicles would only make use of existing haul roads to ensure that neither rehabilitated areas nor natural/agricultural environments are adversely affected.
- If required, the necessary storm water structures and wind erosion measures as prescribed, would be put in place to reduce wind and water erosion and be maintained to ensure soil stability.
- Production areas/faces will be made stable/safe and quarry slopes shall be profiled to such an extent that the area poses no threat to humans and people.
- No fires would be allowed on the property to safeguard the land use of the property, as well as those of abutting properties.
- Rehabilitated areas will not be grazed by any domestic animals within the two years after establishing a vegetation cover. The area will be fenced off.
- Reduce visual impact through proper re-vegetation strategies.
- At closure, all waste will be removed from site.
- Dust generation will be minimised through wetting of disturbed area and an expedited re-vegetation process.
- The access road will be maintained to its current standard to preclude an impact on residents of the proposed eco-estate.
- The mobile screen, if used, will be removed from the property.

FLORA

Vegetation plays an important role in maintaining ecosystems, stabilizing soils, maintaining the aesthetics of an area in providing income for landowners. When development is anticipated the vegetation structure needs to be analyzed, rare or endangered plant species need to be identified and economic value of plant cover must be determined. Vegetation structure is mostly determined by the geology and climatic factors and the Eastern Cape coastline represents a climatic transition between the temperate rainfall region to the south and west and subtropical rainfall region to the east and a variable geology. This results in a diverse range of plant communities, characteristic of Cape Flora and subtropical flora.

Classification and conservation status of study area

In terms of the STEP programme, the land is categorized as 'Least Threatened'. This means the ecosystems cover most of their original extent and which are mostly intact, healthy and functioning and can withstand loss of natural area through development. However, the site falls within the proposed STEP Corridor, which will require that natural areas remain more or less undeveloped to facilitate migration of species. In order to accommodate this objective, only a portion of the available dune area will be developed and mined out areas will be rehabilitated back to grassland. Vast tracts of this veld type still occur in the greater area, but more specifically to the west and development of the area applied for, will not detrimentally impact on the extent of this vegetation type. It is the opinion that the proposed development will also not detrimentally affect the functioning of the identified corridor, provided that proper rehabilitation measures are implemented. It needs to be mentioned that the

proposed corridor has almost been completely interrupted by residential developments immediately west and east of the proposed site and the value of this section of the corridor is debatable.

Refer to the included tables for additional information on the classification status of the study area. The study area is not located in close proximity to any formal conservation area, but is within 1km from the Christmas Vale Forest Reserve, a small strip of indigenous thicket/forest along the coast administered by DWAF. This conservation area will not be affected.

STEP



According to the Eastern Cape Biodiversity Conservation Plan, the study area falls with Critical Biodiversity Area 1 and should therefore receive protection. In terms of this rating, disturbances of intact ecosystems should be minimal and proper rehabilitation of disturbed areas should take place. However, this rating might not be applicable to the larger area, since most of it has been transformed. In addition, it seems as if this rating has no impact on formal residential developments in this particular zone and ribbon development is clearly noticeable along the coast line. Nevertheless, remaining sections of this land therefore become even more important and authorities must ensure that the proposed mining area is successfully rehabilitated. To ensure this objective and to facilitate self regulation six-monthly progress reports should be mandatory. No area on the farm or abutting farms is protected under cover of Land Conservation Agreement.