

**Impact on soils: Quarries A & B**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b> | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|----------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Site specific                            | 1             | Site specific  | 1             |
| <b>Duration</b>     | Permanent                              | 4             | Long Term                                | 3             | Medium Term    | 2             |
| <b>Intensity</b>    | Low-Moderate                           | 3             | Low                                      | 2             | Very Low       | 1             |
| <b>Probability</b>  | Definite                               | 4             | Likely                                   | 3             | Likely         | 3             |
| <b>Status</b>       | Negative                               |               | Negative                                 |               | Negative       |               |
| <b>Confidence</b>   | High                                   |               | High                                     |               | High           |               |
| <b>Significance</b> | <b>Moderate</b>                        | <b>36</b>     | Low                                      | 18            | Very Low       | 12            |

**Impact on soils: Quarries C & D & Plant area**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b> | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|----------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Site specific                            | 1             | Site specific  | 1             |
| <b>Duration</b>     | Permanent                              | 4             | Long Term                                | 3             | Medium Term    | 2             |
| <b>Intensity</b>    | High                                   | 6             | Moderate                                 | 4             | Low            | 2             |
| <b>Probability</b>  | Definite                               | 4             | Likely                                   | 3             | Likely         | 3             |
| <b>Status</b>       | Negative                               |               | Negative                                 |               | Negative       |               |
| <b>Confidence</b>   | High                                   |               | High                                     |               | High           |               |
| <b>Significance</b> | <b>High</b>                            | <b>48</b>     | <b>Low-Moderate</b>                      | <b>24</b>     | Low            | 15            |

## **Biological Environment**

### **BACKGROUND**

The farm Rietkuil is located within a semi-disturbed area surrounded by residential areas to the west, south and south-west, cultivation areas to the west and golf estate to the south-east. Cape Road is a significant arterial to the south and ribbon development is slowly spreading westward alongside it. To the north the land is reasonably intact and hosts a dissected landscape of valleys and plateau areas.



### **Habitats**

The habitats identified within the study area and surrounds during the site investigations include the following:

#### **Natural Habitat**

- Natural (reasonably undisturbed) habitat is only encountered at Quarry C, portions of the drainage lines, southern and western valley sides of Quarry A and western and southern valley side of Quarry D.



### Disturbed Habitat

- The entire plateau area of Quarry A and 80% of Quarry B & D and most of northern valley side of Quarry B has been disturbed through previous mining.
- Extensive dumping of sawdust, building rubble and other waste has occurred in Quarry B.
- The entire plateau area of Quarry B and the rim of Quarry A as well as portions of the drainage lines has been infested with alien vegetation.
- Dilapidated and abandoned buildings with impacted areas around them occur in the middle of the property in the valley area.
- The north-eastern section of the property has been completely disturbed by the Prima Quarries operation.

### **LAND CAPABILITY**

The study area is zoned agricultural and is also the predominant land-use in the larger area. Carrying capacity of the Fynbos/Renosterveld vegetation on surrounding as well as the intact areas in the study area is very low. Due to this reason large tracts of the abutting land to the west, south and east were cleared to establish artificial pastures. Due to poor soil fertility and depth none of these areas are conducive to crop production. However The areas located away from the valleys and the areas falling outside the sandstone dominated geology reveal an improved arability with specific emphasis on the area west of the study area. To the north the valley area forms an important habitat for riparian vegetation and the fauna associated with this vegetation type.

The study area (only the plateau areas) has been degraded by previous unauthorised mining and the land capability is rather low since certain areas were not rehabilitated whilst other areas has been completely denuded. Phase 3 and the western portion of phase 4 is still intact and hosting Sandstone Fynbos or Renosterveld respectively, both vegetation types are under pressure and the land capability with regards to maintaining important vegetation types are therefore high in these areas. The ephemeral water courses is hosting riparian vegetation that is important as faunal and vegetation corridors as well as for forage and protection.

### **Preliminary impact assessment**

#### *Reduction in cultivation potential*

As pointed out previously the properties of the soils in the study area as well as the topography of the site will preclude cultivation in the area. In addition, most of the soils on the flatter plateau areas were lost during the previous unauthorised mining ventures. This impact is therefore rated negligible, but once the flat, post mining areas have been established and if additional topsoil is imported, these areas might reveal improved cultivation potential.

#### *Reduction in grazing potential*

The property has not been used for stock farming for approximately 30 years and considering the



limited areas still available for grazing as well as the poor quality of grazing found in the area, the reduction in grazing capacity is negligible. Once the hills have been cut to platform areas and provided with a proper soil structure these areas will dispose of much improved grazing units for both domestic and wild fauna and will provide for much easier stock handling. The post closure area will thus represent improved grazing units.

#### Reduction in potential to host natural vegetation covers

The potential to host a proper vegetation cover was eliminated at the plateau areas of Quarries A, B & most of D and the slopes below Quarry B. Only Quarry C, a small portion on the western side of Quarry D and portions of the valleys and valley slopes dispose of a soil horizon that could maintain a proper vegetation stand. Currently approximately 65% of the entire property has been disturbed by mining disposing of no or extremely limited soil to host proper vegetation. The proposed mining will not decrease the availability of topsoil on the property further and with the import of topsoil; it could increase the potential of the area to host natural vegetation, depending on the re-vegetation strategy that is followed. However, it remains doubtful if the natural vegetation will establish fully on the rehabilitated areas and it is therefore anticipated that an additional 15% of the natural will be destroyed. Of importance is that any soil that is removed from the valley slopes must be kept separate from any imported soil and be used only for the rehabilitation of areas in close proximity to areas still hosting natural vegetation. Authorities will have approximately 70 years to determine whether the applicant has successfully rehabilitated portions of Quarry A & B and based on such assessment will be able to decide whether the applicant may continue mining Quarry C, if it indeed disposes of good aggregate. This impact is rated of very low significance but of high cumulative significance.

Since the potential of the property to host natural vegetation has 1) already been destroyed with more than 50% and 2) since there is no legal recourse to ensure the natural rehabilitation of Quarry Areas A, B & C the mentioned cumulative impact can be accepted, provided that the buffer zones in the valleys are maintained and that disturbed areas are fully rehabilitated at closure. The impact can also be positively offset against a) the financial sustainability of the project, b) importance of the quarry for the construction fraternity in Port Elizabeth as well as the fact that it will preclude the disturbance of a greenfields site elsewhere in Port Elizabeth.

#### **Preliminary impact on soils: Quarries A & B**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b>  | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|-----------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Site specific                            | 1             | Site specific   | 1             |
| <b>Duration</b>     | Long Term                              | 3             | Long Term                                | 3             | Long Term       | 3             |
| <b>Intensity</b>    | Low                                    | 3             | Low                                      | 2             | Very Low        | 1             |
| <b>Probability</b>  | Definite                               | 3             | Likely                                   | 3             | Likely          | 3             |
| <b>Status</b>       | Negative                               |               | Negative                                 |               | <b>Positive</b> |               |
| <b>Confidence</b>   | High                                   |               | High                                     |               | High            |               |
| <b>Significance</b> | <b>Low-Moderate</b>                    | <b>24</b>     | Low                                      | 18            | Low             | 15            |



## LAND USE

The immediate areas around the quarry are transformed and mostly used as small stock farming units whilst the flatter areas further west and south reveals increased cultivation activities. Within the study area and to the north-west the Brak River Valley is encountered and constitutes a reasonably intact natural system that constitutes a major corridor and green lung in this area. It is therefore important that this system is maintained, although it most probably comes under severe threat in the KwaNobuhle area. To the south, along Cape Road, St Albans Prison with its associated infrastructure is found, whilst hatcheries and a new golf estate is in progress towards the south-east. To the immediate south-west a landing strip was observed.

The study area has no specific use except for the east-north-eastern corner that is used by the landowner as office and maintenance yard for heavy equipment associated with Van der Touw Plant Hire. This land use will soon not be a consideration anymore since the property is in the process of being transferred to Scribante Holdings. The north-eastern corner of the property is utilised as a hard rock quarry, Prima Quarries t/a SupaCrush Quarries, sister company of Bigwill Enterprises 10 Pty Ltd and subsidiary of Scribante Holdings. To the east, opposite the main access road to Prima Quarries, an old disused vehicle race track was observed.

### Van Der Touw Plant Hire



### Prima Quarries



## Preliminary impact assessment

Considering that the activities of Van Der Touw Plant Hire will come to an end before mining operations will commence, the Bigwill Enterprises 10 mining activities will not impose any impact on the land use of the property concerned. One of the reasons for choosing the study area for further quarry development was, that it is located in sparsely populated rural area. Due to its locality distant to abutting residences, mining activities at Quarry A will also not impose any impact on the land use of abutting properties different than that of the current Prima Quarries, provided that unauthorised access to abutting properties and poaching is prohibited and controlled.

However, 40 years from now, development of Quarry B & C could result in a noise and blasting impact on properties to the south and south-west that could marginally affect the land use of them



since quarry activities will in the last stages be located close to the farm boundaries. These aspects will be addressed in the proposed specialist studies.

Due to the undulating nature of the site, stone outcrops, removed B-horizon and unrehabilitated nature of some areas, the property disposes of limited development potential. If rehabilitated properly, the post closure profiles could result in the study area to dispose of better development potential, from both an agricultural as residential perspective. Currently the applicant is not aware of any developments that will take place on abutting land hence this impact is rated negligible. However, once the mine is approved, mining activities will preclude future development of immediate abutting land, but if the 'first come first serve' rule is applied, this impact should not be a consideration.

#### **Preliminary impact on land use.**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b>  | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|-----------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Local                                    | 2             | Site Specific   | 1             |
| <b>Duration</b>     | Long Term                              | 3             | Long Term                                | 3             | Long Term       | 3             |
| <b>Intensity</b>    | Low-Medium                             | 3             | Low                                      | 2             | Very Low        | 1             |
| <b>Probability</b>  | Likely                                 | 3             | Likely                                   | 3             | Likely          | 3             |
| <b>Status</b>       | Negative                               |               | Negative                                 |               | <b>Positive</b> |               |
| <b>Confidence</b>   | High                                   |               | High                                     |               | High            |               |
| <b>Significance</b> | <b>Low-Moderate</b>                    | <b>24</b>     | Low                                      | 21            | Low             | 15            |

## **Archaeology**

Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and as they are valuable, finite, non-renewable and irreplaceable they must be carefully managed to ensure their survival. Heritage resources also form an important part of the history and beliefs of communities and must be managed in a way that acknowledges the right of affected communities to be consulted and to participate in their management. Heritage resources contribute significantly to research, education and tourism and they must be developed and presented for these purposes in a way that ensures dignity and respect for cultural values.

Areas underlain by quartzitic sandstone bedrock of the Cape Supergroup are not associated with paleontological finds. To date no significant findings were made at any of the hard rock quarries in Port Elizabeth. Since the A & B horizons of Quarries A & B were completely disturbed during previous mining and the A horizon of Quarry D during clearing, no impact is anticipated in these quarry areas. Due to the rocky nature of Quarry C, it is also not anticipated to make any findings there. There is, however a possibility that some findings could be made nearer to the watercourses therefore a phase 1 assessment will be conducted by Dr. Johan Binneman. The watercourse areas will mostly be excluded from mining or mining related activities but should any findings be made these areas will be excluded from the mine areas and/or a phase two assessment will be conducted to determine the value of these findings.



**Preliminary impact on heritage resources.**

|              | OPERATIONAL<br>(no mitigation) | WEIGHT | OPERATIONAL<br>(with mitigation) | WEIGHT | CLOSURE | WEIGHT |
|--------------|--------------------------------|--------|----------------------------------|--------|---------|--------|
| Extent       | Site Specific                  | 1      | Site Specific                    | 1      | None    | 0      |
| Duration     | Long Term                      | 3      | Long Term                        | 1      | None    | 0      |
| Intensity    | Low                            | 2      | Very Low                         | 1      | None    | 0      |
| Probability  | Possible                       | 2      | Unlikely                         | 1      | None    | 0      |
| Status       | Negative                       |        | Slightly Negative                |        | Neutral |        |
| Confidence   | Medium                         |        | High                             |        | High    |        |
| Significance | Very Low                       | 12     | Insignificant                    | 3      | None    | 0      |

**AIR QUALITY****Current status**

The general air quality of the properties surrounding the property concerned is good as it hosts no industries or is located close to major roads or activities generating sources of pollution other than Prima Quarries. Reduction in air quality in this area is mostly intermittent and related to:

1. wood fires of farm labourers and residents of KwaNobuhle, which sometimes for limited periods, due to air inversion patterns, creating layer of smoke hanging at low altitude over the area but the impact is rated of low significance and intermittent.
2. burning of household waste is also regularly taking place but due to the low population density has a limited impact on air quality.
3. farming activities causing very low noise and dust levels.
4. very low emission and noise levels generated by vehicles in the area, especially along Cape Road, Rockland's Road and at Prima Quarries where it will be slightly higher.
5. dust and noise generated by blasting, crushing and transport activities at Prima Quarries, which could be significant depending on climatic conditions, especially wind direction.

In order to assess this impact correctly during the EIA phase, dust and noise baseline studies will be done.

**Impact assessment****Dust**

The study area and surrounds have been zoned as 'Agricultural' and will result in acceptable ambient dust levels to be slightly higher. However, the residents of the area will still have expectations for a healthy and reasonably dust free environment, with an understanding that Prima Quarries have been in operation for the past 25 years and will only on an ad hoc basis generate above average dust levels. Most probably the reason why no objections were directed to the DME in the past 14 years or during the recent public participation phases.

Dust impact caused by a mining activity is determined by the 1) the distance of receptors from the mining activity, 2) the type of material that is extracted (fine or coarse, clay or silt base), 3) mechanical processes involved, 4) traffic volumes, 5) climatic conditions (wind speed and soil moisture content), 6) topographical position of infrastructure and 7) emissions released..

Current legislation determines that dust fallout of between 300 -600 mg/m<sup>2</sup>/day is acceptable, but experience told us differently and that complaints from nearby residents can be expected when dust levels at receptor residences increase to between 200-300mg/m<sup>2</sup>/day and is categorised as a nuisance impact, recognised by environmental legislation. The objective of most dust generating concerns is to maintain dust levels below 300mg/m<sup>2</sup>/day.

### Type of mineral

Rock extraction *per se* normally only generates small amounts of dust due to the coarse nature and low clay/silt content of the blasted material hence the significance of the impact at each quarry area should be reasonably low provided that the quarry floor areas are rehabilitated concurrently with mining and that irrigation system be implemented at Quarry B & C.

At Quarry D the red gravel is similarly coarse but will retain substantially more clay/silt, but since it is not reworked it will generate low amount of dust. The amount of dust generated will further be reduced since the deposit is rather shallow (2m) which will result in an area being worked out and rehabilitated rapidly and material on the quarry floor not being pulverised.

Removing topsoil normally generates substantial dust volumes but considering Quarries A & B not disposing of any, a negligible impact is anticipated. Development of Quarry D disposes of good topsoil resources and will generate dust during windy periods and could impose a rise in dust count of approximately 100mg/m/day at residences to the west and could result in a low-moderate impact. This potential impact can be brought under control by implementing the correct re-vegetation strategies, cover of topsoil stockpiles, windbreaks and if necessary, irrigation. In order to reduce the impact at source, minimum areas should be denuded and height of stockpiles must be kept to the minimum. When reintroduced to disturbed areas topsoil should be irrigated and seeded as soon as possible or such events should coincide with wet periods.

### Distances from receptors

Prima Quarries is currently approximately 1km from the nearest residence and it is anticipated that dust levels at these properties could be elevated with between 50-75mg/m<sup>2</sup>/day, which is low and acceptable in terms of current legislation. Development of Quarry A will result in the nearest residence to be 700m (south), 800m (south-west), 900m (west) and 1,7km (north-west) from the mining and crushing areas and it is not anticipated that operations will have a significant higher dust impact than the current Prima Quarries. However, the establishment of a brick yard, asphalt plant and batching plant with additional crushed material stockpiles will all generate additional dust volumes



especially as dust will tend to accumulate on the floor of these areas. It is anticipated that dust levels will increase with approximately 75-125 mg/m<sup>2</sup>/day, which is still acceptable but some complaints could be received during extremely windy spells. The impact is rated very low.

Developing Quarry B will bring the mining operation much closer to the residents to the south (360m), south-west (450m) and west (480m) but considering that mine areas *per se* do not generate extensive volumes of dust, the impact is not anticipated to increase much from the quarry A scenario and increase in dust volumes of approximately 125-150 mg/m<sup>2</sup>/day during windy spells is anticipated. Complaints could be expected during moderate wind conditions and the impact is rated of low significance, provided that platform areas are kept as small as possible and that concurrent rehabilitation of the floor area is taking place. If this is not achieved the impact will be of low-moderate significance. Since the crushing plant is stationary, the dust impact imposed by the plant will stay unchanged. This impact will not be experienced within the next 40 years.

Developing Quarry C will bring the mining operation even closer to the residents to the south-west and west (170m) and a much higher dust impact will be experienced and definite mitigation measures would be required. These residences will be approximately the same distance from the quarry area than the residences are from the Lafarge Moregrove Quarry in town, where serious complaints have been received in the past and where dust counts have been increased to between 300 and 500 mg/m<sup>2</sup>/day. The difference is that the Bigwill crushing plant remains stationary in a secluded area hence the dust impact is rated moderate and an increase in dust levels of 150-200 mg/m<sup>2</sup>/day can be anticipated. Some complaints could therefore be anticipated during periods of low wind velocity. This impact will not be experienced within the next 70 years.

Developing Quarry D will not significantly increase dust levels at receptor residences during normal climatic conditions since the distances involved will exceed 500m but under extreme windy conditions an impact of low-moderate significance can be anticipated.

#### Beneficiation/mechanical processes

The natural product contains no silt or clay but crushing and screening will result in low-moderate dust volumes being generated and the impact on receptors will depend on the distances and wind velocity involved. Current crushing at Prima Quarries do generate substantial dust volumes during windy spells and it seems if most of the dust is dispersed towards the west and into the valley areas. The Prima Quarries plant and stockpile areas is located on the highest point in the mine area and is therefore very exposed to wind action. Relocating the plant to the valley area to the west of the current silt dam, will indeed bring the plant 300m closer to the western residences but will be at an altitude 30m lower than the Prima Quarries plant and will therefore be less exposed and generate substantially less dust. It is therefore certain that the dust impact of the Bigwill plant will not be significantly higher than the current Prima Quarries plant. The dust impact will depend on wind direction and wind speed and only the easterly component will result in a dust impact. It is essential that the crusher be equipped with a dust suppression system, which will largely mitigate the mentioned dust impact.



In addition to the crushing impact, dust will build-up over time on the plant and stockpile floor and will be liberated into the atmosphere, causing a cumulative impact. The positioning of aggregate in the stockpile area as well as at the Batching Plant, Asphalt Plant and Brickyard areas will result in a further cumulative impact. It is therefore essential that a dust suppression system be implemented in these areas. If the necessary mitigation measures are implemented the significance of the cumulative dust impact will be of low-moderate significance during normal climatic conditions. In the absence thereof the cumulative impact will increase to moderate-high and dust counts of 200-300 mg/ m<sup>2</sup>/day could be applicable and complaints would be received

Drilling activities associated with blasting would cause dust liberation around the drill, but would not reach any area outside the property boundary. Fitting dust bags to the drill rig will largely eliminate this impact and is rated insignificant considering the distance to abutting residences.

Blasting will cause an extensive dust cloud to hang in the air above the blasting area for approximately 5 minutes as dispersal thereof will depend on the wind conditions on the hill side. It is possible that a substantial once off dust fallout could occur in abutting areas but since this impact will be short-lived and only be imposed on a weekly or fortnight basis, the impact is rated of low significance. The impact of both the crusher activities and blasting would be reduced through dilution when dust is dispersed over 700m-1000m to the nearest residents.

#### Construction activities

Construction activities at the mine will be limited as explained under the construction phase to a cut and fill operation in the new plant area and will be completed within a 30 day period. The dust impact would not exceed the current impact caused by the crushing plant. Establishment of the beneficiating plants will not result in increased dust generation.

#### Traffic volumes

Increased hauling activities during periods of high extraction will definitely increase dust liberation into the air and could as worst case scenario result in a cloud of dust hanging above the road and process area. Dust counts along the road may increase by as much as 400mg/m<sup>2</sup>/day but will abate very quickly further away from the roads. In terms of DEDEA and SABS standards it may not exceed 600mg/m<sup>2</sup>/day. No residences are located along the haul road and this impact is rated of low significance. Considering the length of the haul road dampening it is not an option. Since dust generation is also determined by speed in conjunction with axle number it is imperative, that drivers reduce haul speed to between 40 km and 50km, which will also decrease the safety risk on the road.

Establishment of the beneficiating plants will increase sales and subsequently increase dust generation along the road and it might become necessary to dampen the road. This impact is rated of low significance during low extraction rates but could increase to moderate as traffic volumes increase.



### Climatic conditions

The higher the prevailing winds, the more energy is available to liberate dust particles into the air and the further it will travel. Under normal circumstances the above pm 10 micron particles will be deposited within a few hundred meters from the dust source, which would result in abutting landowners not being affected by dust fallout. Under high wind conditions this scenario changes substantially and abutting landowners will be affected when the eastern component of the wind rose is experienced. The drier the environment and the lower soil moisture regimes becomes, the more dust will be liberated into the atmosphere. High wind conditions will further enhance this impact. It is therefore important that all stockpile areas are provided with a dust allaying system.

### Topographical outlay

The more crushing & beneficiating plants are exposed to wind conditions, the more dust will be generated. The new plant area will be suitably located within the valley at low altitude and will generate substantially less dust. The beneficiating plants on the other hand will be exposed directly to the wind path and dust generated at aggregate stockpiles and working surfaces must be controlled.

### Emissions & odours

Vehicular emissions from a large number of vehicles will be experienced onsite and along the road but due to the rural nature of the area and the low air pollution levels experienced in this area, it will cause this impact to be of low significance. People would not reside on the property, therefore no burning of waste generating harmful smoke or any other form of chemical air pollution is envisaged. However, the Asphalt plant may produce a substantial amount of black smoke which will create a visual impact but also a substantial odour due to the high sulphur and polycyclic aromatic hydrocarbons that are released when bitumen is heated. This impact is rated of low significance during periods when the western components of the wind rose are experienced but moderate when the eastern component is experienced. At this stage the frequency of smoke releases is still unsure and more information will be provided during the EIA stage. It needs to be mentioned that the Environmental Protection Agency in the USA conducted its own independent study of asphalt facilities over six years during the 1990s. NAPA and member companies cooperated closely with EPA throughout the process. As a result of this research, in 2002, the EPA acknowledged that hot mix asphalt facilities are not a major source of emissions and actually removed asphalt plants from its list of major sources of hazardous air pollutants. Experts in the field say that few, if any, industries have been evaluated as thoroughly as the asphalt industry.

No odours will be generated by the mining operation as all bio-degradable waste will be removed from site to an approved waste disposal site on a weekly basis and no burning thereof would be allowed.

The impact of dust on photosynthetic activity and thus growth of plants is still uncertain but such impact would be negligible taking into consideration the condition and conservation status of



vegetation in and around most mine areas. Vegetation in the area was subjected to dust from the access road and the Prima Quarry for many years and shows no visible growth or biomass accumulation deficiency. With any rain, dew, or mist, dust liberated into the air or deposited on vegetation will decline drastically.

At closure, all aggregate and topsoil stockpiles will be removed and disturbed areas will be vegetated with the result that dust generation on site would be almost eliminated.

### Health Impact

The rock of the area reveals a substantial quartzitic component and the crushed mineral will release minute silica dust into the atmosphere (pm -2,5micron) and is rated as a harmful substance that could with large and continuous dosages over extensive periods of time result in discomfort and possibly silicosis if no mitigation measures are put in place. The stockpile and crusher areas over time will be covered by a thick layer of very fine dust, which should be removed on a regular basis and used in the brick manufacturing process. The distance to the abutting residences (dilution) and mitigation measures to be implemented will reduce this impact significantly but according to health specialists even continuous low dosages could over time impose a significant impact. The impact is rated moderate with no mitigation in place or low with adequate dust suppressing systems in place. In terms of the Mine Health and Safety Act, the respirable silica content can be established to determine whether any special precautionary measures are required. Under controlled circumstance respirable counts at quartzitic sandstone quarries should be below the threshold of 1. If the DME requires gravimetric dust sampling, it could be done to establish whether the health of abutting landowners will be adversely affected.

### Impact on air quality: Dust, Emissions & Odours:

|                     | OPERATIONAL<br>(no mitigation) | WEIGHT    | OPERATIONAL<br>(with mitigation) | WEIGHT    | CLOSURE       | WEIGHT |
|---------------------|--------------------------------|-----------|----------------------------------|-----------|---------------|--------|
| <b>Extent</b>       | Local                          | 2         | Local                            | 2         | Site Specific | 1      |
| <b>Duration</b>     | Long Term                      | 3         | Long Term                        | 3         | Short Term    | 1      |
| <b>Intensity</b>    | Medium                         | 4         | Low-Medium                       | 3         | Low           | 2      |
| <b>Probability</b>  | Definite                       | 4         | Likely                           | 3         | Likely        | 3      |
| <b>Status</b>       | Negative                       |           | Negative                         |           | Neutral       |        |
| <b>Confidence</b>   | Medium                         |           | Medium                           |           | High          |        |
| <b>Significance</b> | <b>Moderate</b>                | <b>36</b> | <b>Low-Moderate</b>              | <b>24</b> | Very Low      | 12     |

### Noise

The impact of noise levels generated by mining activities is determined by the time of day, the consistency thereof, distance to people, whether it is a low or high-pitched noise and whether beneficiation is taking place. Noise levels are more intense in the morning and evening than during the rest of the day and are more irritating if it is high pitched. The more continuous the noise is the higher the impact.



In terms of SABS standards noise levels for rural residential areas are 45dB during the day, 40dB in the early evening and 35 at night. Noise levels for residential areas are 40dB at night; 45 dB during early evening/morning and 50dB during the day. Noise impact is rated against the following: 1) The average person will be able to just detect a noise increase of 2dB, 2) An increase in noise levels between 2-5 will result in no or sporadic complaints from communities whilst an increase between 5-10dB will result in widespread complaints, 3) An intruding noise is defined by National Noise Regulations as disturbing if it causes the ambient noise levels at the border of the property from which it emanates to increase with 7-10dB, 4) An average person will perceive such an increase in the ambient noise levels as a doubling of noise levels and very strong response will be expected from communities/residents. The impacts of caused by the mining operation will be evaluated against the following average noise levels (at source) associated with mining activities: Operation bulldozer (80-90 dB – low pitched); Operating loaders (65-75 dB – low pitched); Haul trucks (60-70dB – low pitched); Blasting (110-140 dB), Crushing system (75-85 dB – low pitched); Reverse sirens (60-70 dB – high pitched) and drilling (80-90dB – high pitched).

Noise impact will further be evaluated against a general accepted principle that noise levels abate on average with 3-5dB over 100m and since the nearest residence from Quarry A is approximately 750m it is anticipated that higher noise levels will abate from 80dB to approximately 50 dB during the day and should be acceptable to local inhabitants. However, high pitched noises caused by drilling, reverse hooters and blasting will most probably result in sporadic increased noise levels at these residences and ad hoc complaints can be expected.

#### **Possible response intensity and noise impact for increases over the ambient noise**

| <b>INCREASE<br/>dB</b> | <b>RESPONSE<br/>INTENSITY</b> | <b>REMARKS</b>   | <b>NOISE<br/>IMPACT</b> |
|------------------------|-------------------------------|--|-------------------------|
| 0                      | None                          | Change not discernible by a person   | None                    |
| 3                      | None to little                | Change just discernible  | Very low                |
| 3 ≤ 5                  | Little                        | Change easily discernible  | Low                     |
| 5 ≤ 7                  | Little                        | Sporadic complaints  | Moderate                |
| 7                      | Little                        | Defined by National Noise Regulations as being 'disturbing'                  | Moderate                |
| 7 ≤ 10                 | Little to medium              | Sporadic complaints  | High                    |
| 10 ≤ 15                | Medium                        | Change of 10dB perceived as 'twice as loud' leading to widespread complaints | Very high               |
| 15 ≤ 20                | Strong                        | Threats of community/group action  | Very high               |

#### Preliminary impact assessment

The impact of noise generated by Bigwill Enterprises on abutting landowners will be assessed in terms of the impact on land use, speech communication, annoyance and health

The rural setting of the study area would, under normal circumstances, probably cause the ambient noise levels to be between 40 and 45 during the day but levels will be intermittently elevated to



approximately 55dB close to roads or when using farm equipment or because of ambient environmental noise levels and should be able to accept the above mentioned noise levels. This scenario will change drastically should the area become more build up but it is anticipated that a scenario where encroachment is allowed by the NMBM will not be repeated by allowing any development within a 500m radius of the perimeter of the mining area.

Hauling material to Cape Road during periods of high extraction could cause substantial noise disturbance along the middle section of the road since houses approximately 170m from the road and could experience noise levels of approximately 55 dB. The intermittent nature of the noise will not affect the health of people, nor impair land uses or communication but could result in annoyance. Hauling should not take place early morning and in the evening. Trucks drivers have also to be sensitized on the matter and vehicle speed should be reduced where possible and use of exhaust brakes limited.

Noises generated by the crusher and vehicles/mining equipment will generally be low-pitched if it is maintained to a good standard and noise levels at receptor residences should not increase above ambient levels. There is one exception and that is the reverse sirens which produce a high pitched, irritating noise, especially where a number of vehicles will operate in tandem and could be a source of annoyance to nearest residences, especially when Quarry B & C is developed. Since the fitting of the sirens is a requirement of the Mine Health & Safety Act as well as OHS Act, there is no mitigation possible, except for preventing operations taking place very early in the morning or at night. During periods of high extraction this noise generation will be continuous and levels will most probably be constantly raised by 3but should be acceptable at Quarry A but could lead to sporadic complaints when quarries B & C is developed.

The initial use of the bulldozer during the cutting of the new plant and stockpile area as well as the establishment of the first bench will generate noise in excess of 80 dB but the distance to abutting residences will abate noise to approximately 50dB at these residences. Drilling rigs will produce noise levels up to 90dB at source and around 55 at nearest residences and inhabitants of the area might find it very annoying, especially at Quarry A & B. However, this noise will be produced for approximately 14 days per month and will therefore be intermittent.

Blasting will cause a severe noise impact of 120-140dB once a week or fortnight, depending on the extraction rate and the position of the quarry on the hillside may increase this impact further and noise may be amplified along the valley area. People will therefore experience a minimum noise level of 85dB. It would be essential that the necessary information on blasting schedules be submitted to abutting landowners during liaison meetings for them to have some warning when blasts will occur. This would be crucial when development of Quarry B & C is taking place due to the reduced distance between production faces and receptor residences.

The nature and magnitude of the response to noise from blasting operations will depend critically on the blasting regime chosen, the nature of the rock to be blasted, the size and depth of the charge, the



type of explosive, the local topography, and the detonation sequencing. There are at present no reliable national or international guidelines to accurately predict human response to blast noise.

Neither the air blast nor the ground vibration are likely, in the author's experience, to have any damaging effect on humans or buildings in the vicinity, if they are designed and carried out with due regard to normal good blasting practice and with the desire to obtain cost effective results in operational terms. However, both air blast and ground vibration can give rise to secondary noise in a building, such as the rattling of windows and other loose objects in a state of neutral equilibrium, and this is often interpreted as a far more serious occurrence than it really is. An additional complication is that the blast will in general contain frequencies below those which can be heard by the human ear i.e. below 20Hz. These low frequencies also contain sufficient energy to give rise to secondary noise, just as with ground vibration, making it characteristically difficult to differentiate between airborne blast and ground borne vibration, and the secondary effects of both.

Humans are extremely sensitive to vibration and can detect levels of ground vibration of less than 0.1 mm/s, which is less than 1/100<sup>th</sup> of the levels which could cause even minor cosmetic damage to a building. Complaints and annoyance regarding ground vibration are therefore much more likely to be determined by human perception than by noticing actual minor structural damage. However, these effects, and the startling effect of sudden impulses of both sound and vibration are often perceived as intrusion of privacy and could be a source of considerable annoyance to the abutting landowners, especially if Quarries B&C is developed. Since it is anticipated that noise levels will increase during that stage to approximately 100-105dB. For this reason, and because of the absence of information on either the likely community response to blast noise or the likely levels of blast overpressure or audible noise, the noise impact should be considered moderate to high. However, previous notification of blasting activities at predetermined times on stated days, and careful design of the blasting regime to reduce the levels of both airborne blast noise and ground borne vibration will contribute significantly to the minimization of the overall impact of blasting on the surrounding community.

### **Effect Of Vibration On Surrounding Structures.**

There is wide agreement in the industry that the Peak Particle Velocity (PPV) is the parameter which best correlates with observed damage caused by vibration, and is widely applied in assessments. The first observable damage to structures, the forming of hairline cracks in plaster, begins at a PPV of about 25mm/s. The US Bureau of Mines recommends twice this value, 50mm/s, as the limit for residential property. Minor structural damage can occur to traditional masonry structures at values in excess of 100mm/s, and serious damage occurs at values in excess of 200mm/s, according to a range of authors. Effects on temporary structures are likely to occur at values which are lower than for masonry structures, though the high variability in the type and construction quality of such structures renders reliable prediction of these values impossible. Although levels of 25mm/s is commonly use as



a safe PPV level, this might be the case for single blasts. Experience has taught that continuous blast over years at that level will have negative impacts on structures, even at levels as low as 12 PPV, not perhaps because of the blasts themselves but due to a changing geological substructure. This assessment seems correct since no blaster will acknowledged in writing that continuous blast will not impact on structures over the long term. For Quarry A, there should not be any detrimental impact but this scenario could change at Quarry B & C especially if these properties are developed and more information in this regard is required.

To curb the impact of blasting, the following mitigation measures can be considered:

1. Calculating the charge size to keep air blast and ground vibration levels below predetermined acceptable values.
2. Designing the blast regime and timing to optimise rock fragmentation and movement, and minimize airblast effects and explosive use.
3. Correct stemming of blastholes, i.e. the filling of a suitable length of blasthole above the explosive charge with material of the correct type to minimize airblast, prevent the formation of flyrock and maximize the rock fragmentation.
4. Monitoring blast, ground vibration and human response to ensure accepted levels are in fact acceptable and are being adhered to, and to modify the blasting regime as appropriate.
5. Pre-notification of affected persons of the intention to blast and the time of blast, preferably at the same time of day and day of the week to remove the element of surprise.

Since the time span of the impact is very short and the occurrence once a week, this impact will be acceptable but could increase the annoyance of abutting landowners. It should be noted that blasting at Prima Quarries to date has not in the author's opinion lead to complaints by abutting landowners.

For the remainder of the time operations at the quarry will therefore be restricted to the ad hoc loading of products from the stockpiles stored onsite and from the brickyard and will pose a very low impact. Brick making will mostly cause noises generated by people and the odd delivery of sand and cement and such noises will abate entirely over the 1000m buffer zone.

Maintenance of equipment where steel on steel action would be applicable should be avoided early morning or late afternoon. Mining or crushing at night-time is not contemplated. If the applicant falls behind schedule with crushing and requires additional operational time, the impact of such operations should be determined first and the outcome submitted to the Department of Minerals and Energy for consideration. The above impact would especially be applicable to the relocation of the crusher and the beneficiation plants on the eastern side of the Quarry A. Once established, it is not anticipated that these plants will cause a cumulative noise impact in the immediate area.

No workers will be housed on the mine therefore no noise generation at night would be applicable.



Management of this impact during the day could be achieved via an environmental awareness programme. In addition, staff and contractors would be sensitized not to engage in unnecessary hooting, shouting, flapping of tailgates and use of exhaust brakes during operational hours. Maintaining speeds below 50km/h would assist in curbing noise impact along the road. To date no complaints have been received regarding the Prima Quarries operation thus the same impact is anticipated for the Bigwill Enterprise mining operation.

### Noise Impact

|              | OPERATIONAL<br>(no mitigation) | WEIGHT | OPERATIONAL<br>(with mitigation) | WEIGHT | CLOSURE | WEIGHT |
|--------------|--------------------------------|--------|----------------------------------|--------|---------|--------|
| Extent       | Local                          | 2      | Local                            | 2      | N/A     | 0      |
| Duration     | Long Term                      | 3      | Long Term                        | 3      | N/A     | 0      |
| Intensity    | Medium-High                    | 5      | Low-Medium                       | 3      | N/A     | 0      |
| Probability  | Definite                       | 4      | Likely                           | 3      | N/A     | 0      |
| Status       | Negative                       |        | Negative                         |        | N/A     | 0      |
| Confidence   | Medium                         |        | Medium                           |        | N/A     | 0      |
| Significance | Moderate                       | 40     | Low-Moderate                     | 24     | N/A     | 0      |

### WASTE

There is currently no formal waste facility within the mining area, except within the maintenance yard of Van Der Touw Plant Hire. This area will be cleaned up once the transfer of the property has been concluded. Large quantities of sawdust and lime were dumped by Mr. Van der Touw within the Quarry B area and will be removed once the transfer of the property has taken place as part of the rehabilitation process. This waste has a negligible impact on the environment. An existing waste facility is available at the Prima Quarries premises and is managed in terms of an approved EMP and current environmental legislation. Most waste produced within the proposed mine area will be transported in appropriate receptacles to this waste facility for storage and relocation to an approved Municipal waste facility.

### Preliminary impact assessment

#### Mining and Crushing: Industrial.

Mining and crushing will not result in any industrial waste be generated onsite since all equipment will be serviced and maintained at the Prima Quarries facilities and the impact is rated insignificant. This assessment is supported by the current impact recorded at Prima Quarries. Establishment of the Batching plant, Asphalt plant and brickyard will generate very little of this waste type since equipment will mostly be serviced and the existing facilities of Prima Quarries. However, some stationary equipment might generate limited quantities of this waste but in order to address this matter, maintenance will be carried out over large drip pans and the required storage facilities will be established, if needed. This impact is rated of low significance.



### Mine & crushing plant residue.

The cut and fill strategy to be implemented at the new plant and stockpile area will not generate any waste as all material will be used to establish the required platform areas. Limited cement and brick residue could be produced during the establishment of the plant but would be easily containable and will be disposed at the nearest general waste facility or mixed in with aggregate products. Aggregate waste will build up over time on the floor and could cause substantial movement of silt to the watercourse with a significant impact on aquatic integrity of the river system downstream. Cut-off berms and siltation ponds will mostly rule out this impact and is rated of low significance. The same impact will be applicable to mining areas and the cumulative impact is rated low-moderate.

Mining of Quarry areas A & B will generate spoil material consisting of low grade sandstone which will initially be used for filling in the valley at the new plant area and later on sold as filling material. No waste stockpiles will therefore be generated and this assumption is supported by scenario at Prima Quarries. This impact is therefore rated as negligible. Mining of Quarry D will result in the removal of topsoil stockpiles followed by the removal of red gravel, where after the topsoil will be reinstated. No waste will be generated and the same scenario would apply to Quarry C, except for the generation of sub-ordinate sandstone that will be utilized.

### Beneficiating plant residue.

Both the Bathing plant and Brick yard will cause material to accumulate within these areas but such material could be scooped up and reintroduced to material mixes. Waste brick will be sent through a hammer mill and the crushed material will be reintroduced to the brick making process. Only a very limited waste pile will be established within the Brickyard area but with no specific environmental impact since mostly dust and cement waste water will be generated, which if it infiltrates the rock sub-surface will pose a negligible groundwater impact. The Brickyard as well as Batching plant area will dispose of cut-off berms around the site to channel all material and waste water to appropriate sumps. Waste production at these plants will be limited and the environmental impact is rated insignificant.

The Asphalt plant could produce bitumen or tar coated aggregate spillages during loading or transport of these products but considering the flat surface of the plant area it could be scooped up effectively and re-used. Bitumen is a natural sticky and highly viscous carbon product and requires substantial amount of heat before it will flow therefore considering the distance of these waste piles to water courses and plant communities the impact is rated of low significance if the required cut-off berms around the areas with high spill potential are constructed and drip pans are positioned below certain bins & silos. These areas will be provided with a concrete floor and thus also restricting infiltration into the rock and potentially groundwater resources. The waste piles that could be generated are normally restricted to very limited quantities and with mitigation measures in place would only impose a low environmental impact. However, bitumen is a mixture of organic liquids composed primarily of highly condensed polycyclic aromatic hydrocarbons. In tests done in the USA using the TCLP zero head space extraction (ZHE) method, VOCs were tested for in bitumen cement and all results were



BDL. Semivolatile organic compounds were also tested for and results were BDL. PAHs are also a part of the semivolatile organic compounds, but are a concern of their own. All PAHs tested for were BDL except that of naphthalene. Naphthalene was detected at 0.25 µg/L but was still well below the regulatory guideline of 7.5 µg/L.

#### Polycyclic Aromatic Hydrocarbons (PAHs)

| TCLP                     | Parameter Result (ug/L)     | Detection limit (ug/L) |
|--------------------------|-----------------------------|------------------------|
| Naphthalene              | .25                         | .096                   |
| Acenaphthylene           | BDL                         | .194                   |
| Fluorine                 | BDL                         | .023                   |
| Phenanthrene             | BDL                         | .033                   |
| Anthracene               | BDL                         | .015                   |
| Fluoranthene             | BDL                         | .037                   |
| Pyrene                   | BDL                         | .040                   |
| Benz(A)Anthracene        | BDL                         | .048                   |
| Chrysene                 | BDL                         | .017                   |
| Benzo(B)Fluoranthene     | BDL                         | .020                   |
| BDL Benzo(K)Fluoranthene | BDL                         | .022                   |
| Benzo(A)Pyrene           | BDL                         | .023                   |
| Dibenzo(A,H)Anthracene   | BDL                         | .018                   |
| Benzo(G,H,I)Perylene     | BDL                         | .036                   |
| Indeno(1,2,3-CD)Pyrene   | BDL                         | .021                   |
|                          | BDL = Below Detection Limit |                        |

The EPA has also indicated that Asphalt Concrete Manufacturing because of available data indicate that there are no major concentrations of the above compounds released from bitumen cement. Emissions data, along with emission factors, were used to estimate HAP emissions from eleven asphalt concrete manufacturing plants employing various production processes and different fuels. Emissions of total HAP at individual plants range from 1.5 tons per year to 6.4 tpy. In addition, emission factors were used to estimate HAP emissions from a plant with a high annual production of 1.2 million tons of asphalt concrete. It was estimated that total HAP emissions from that plant to be 6.2 tpy. Based on the above information, the EPA has concluded that no asphalt concrete manufacturing facility has the potential to emit HAP approaching major source levels.

Most bitumens also contain sulfur and several heavy metals such as nickel, vanadium, lead, chromium, mercury and also arsenic, selenium, and other toxic elements. With time these components will leach from stockpile area and could cause sub-layers to become toxic, which in turn could impact on perched aquifers and surface water quality over time and thus impact significantly on the ecological integrity of affected water courses. The construction of catchment ponds is therefore essential and plastic liners should also be considered. Under controlled conditions the impact is rated of low-moderate significance.

It should be mentioned that various tests were done in the USA indicating that leaching of heavy metals are not a major consideration at Asphalt plants. The table below provides the necessary support



in this regard.

| TCLP                        | Metals Parameter Result (mg/L) | Detection limit (mg/L) |
|-----------------------------|--------------------------------|------------------------|
| Barium                      | BDL                            | 2                      |
| Cadmium                     | BDL                            | 0,2                    |
| Chromium                    | 0,1                            | 0,01                   |
| Lead                        | BDL                            | 0,2                    |
| Silver                      | BDL                            | 0,04                   |
| Arsenic                     | BDL                            | 0,005                  |
| Selenium                    | BDL                            | 0,005                  |
| Mercury                     | BDL                            | 0,005                  |
| Zinc                        | 0,5                            | 5                      |
| BDL = Below Detection Limit |                                |                        |

0,1mg/L Chromium is 50 times below toxic level and since it is normally not found in Asphalt, it was determined it was coming from slag material used as aggregate.

Since there is no topsoil horizon at Quarry A, the above plants will not impose any soil pollution impact.

#### Domestic waste/Vegetative waste

The current mining area reveals a limited amount of domestic waste scattered throughout Quarry A & B. These areas will be cleaned up once the transfer of the property has been concluded. Since the Prima Quarries site already disposes of an approved waste facility, neither the mining areas, crushing plant & stockpile area nor will the aggregate beneficiation plants will host additional waste sites. These areas will be provided with either bins or skips, depending on the extent of the waste stream and be emptied at the main waste site on a regular basis from where waste will be dispatched to an approved Municipal waste facility. The impact of domestic waste on the environment is rather limited if the correct mitigation measures are implemented and the current management system at Prima Quarries is maintained.

If circumstances dictate that waste collection areas must rather be established at each plant, these areas will be bunded, provided with a concrete floor and fenced in to preclude dispersal of waste through wind action and would not increase the significance of the impact.

Since the property is not used for stock farming and wild life is scarce on the plateau areas, no impact on animal life is anticipated. The impact is rated of very low significance.

A very limited amount of vegetation will be removed from Quarry A & D and will be used during the re-vegetation stage as mulch. Quarry B will generate a substantial amount of alien material and it should be stripped of alien seed, chipped and used during the rehabilitation phase. The generation of vegetative matter poses no impact to the environment if it is used as alien seed-free mulch.



## Sewage

There is currently no sewage system in the mining area except for at the offices of Van der Touw Plant Hire. These facilities will be used for the workforce at the three beneficiating plants. During the construction period of these plants, additional chemical toilets will be positioned within these areas until the plants are fully operational. Additional chemical toilets will also be positioned at each quarry site and at the plant area and will regularly emptied at an approved Municipal sewage plant and serviced by an approved contractor to maintain a healthy environment and prevent soil and eventually water contamination. If the sewage systems are maintained correctly a negligible impact on the environment is anticipated.

## Scrap metal

An existing salvage yard is located on the Prima Quarries premises and will be used for storage and disposal of any scrap metal or dysfunctional equipment generated within the Bigwill Enterprises 10 mining right area. However, to accommodate day to day storage of such material at the three beneficiating plants, a small storage area will be fenced off at each plant and will on a weekly basis be removed to the main salvage yard from where it will be disposed. Considering the neat Prima Quarries area and good management of the sewage yard, the impact of the proposed Bigwill development on the environment is rated of low significance.

### **Preliminary waste impact.**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b> | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|----------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Local                                    | 2             | Local          | 2             |
| <b>Duration</b>     | Long Term                              | 3             | Long Term                                | 3             | Medium Term    | 2             |
| <b>Intensity</b>    | Moderate                               | 4             | Low                                      | 2             | Very Low       | 1             |
| <b>Probability</b>  | Definite                               | 4             | Likely                                   | 3             | Possible       | 2             |
| <b>Status</b>       | Negative                               |               | Negative                                 |               | Negative       |               |
| <b>Confidence</b>   | Medium                                 |               | High                                     |               | High           |               |
| <b>Significance</b> | <b>Moderate</b>                        | <b>36</b>     | Low                                      | 21            | Very Low       | 10            |

## **Hydrology**

### **SURFACE WATER RESOURCES**

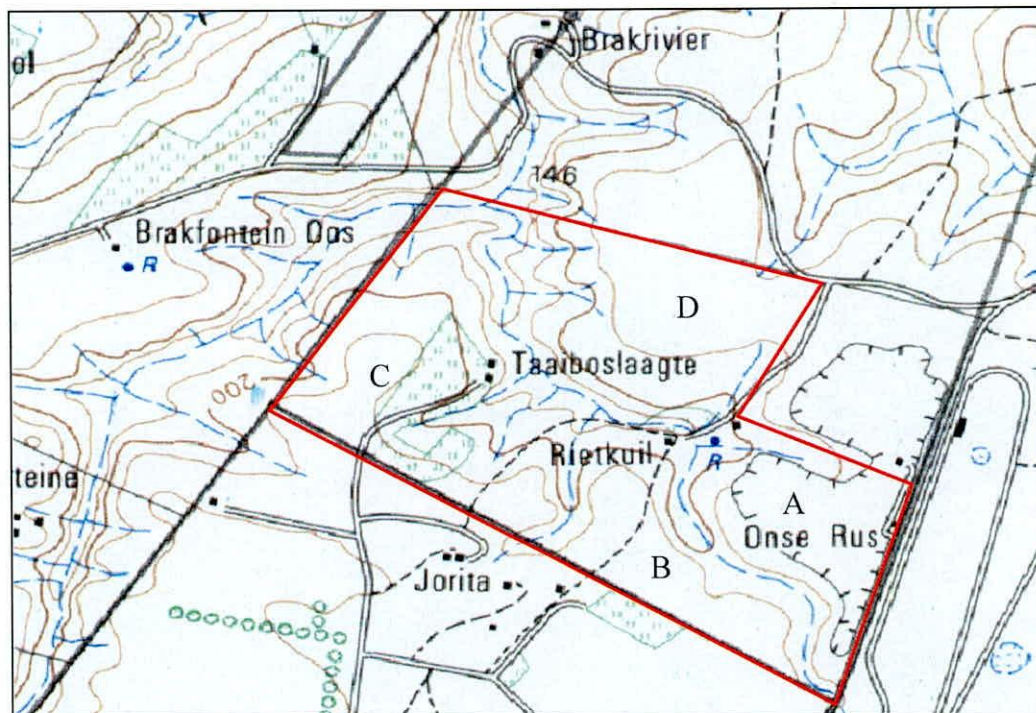
The property lies within the headwaters of the Brak River catchment and is steeply incised by at least four tributaries draining the surface runoff of the property during heavy rainstorms, the only times when these tributaries flow. The streams drain northwards to later on link up with the Swartkops River in the Uitenhage area, approximately 15km north-east of the study area.

No perennial or ephemeral surface water features were noted on the plateau areas but seeps may occur



along the valley side during wetter periods and would create a microclimate for certain plants to establish on the slopes, especially the cooler, southern slopes. The bottom section of the slope areas will not be affected by the proposed mining activities. There are no wetlands within the plateau areas identified for mining. The largest part of the study area lies close to the watershed and generate therefore limited sheet flow towards the cliff faces and watercourses. The underlying sandstone mother material is highly fractured and disposes of a high absorption capacity.

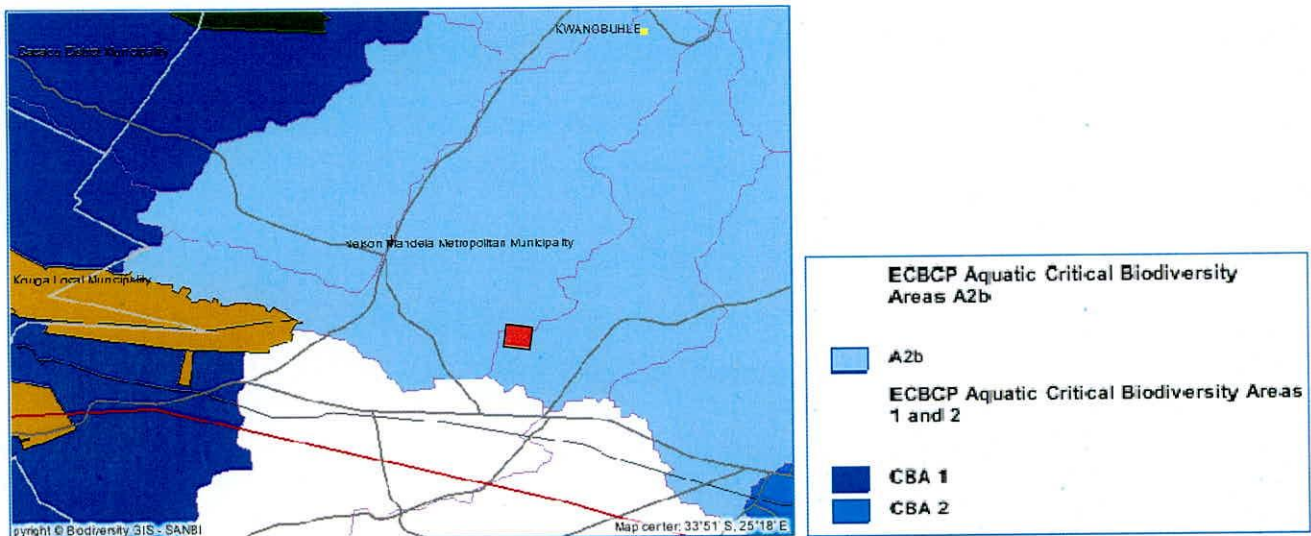
At Quarry B the non-profiled and non-vegetated landscape would definitely changed runoff patterns, runoff volumes and runoff velocity whilst change in topography and limited soil cover at Quarries A & D respectively would have changed runoff patterns and runoff velocity. At these quarry areas but especially Quarry B, water quality will be affected through increase sediment load being deposited uncontrolled in the watercourses on the property.



Surface water quality is unknown since it only occurs on the property during and after heavy precipitation. Nevertheless an investigation will be done regarding surface water quality to establish baseline data and to measure future impacts against. There is no surface water use within the study area and immediate surrounds

In terms of biodiversity rating, the area falls outside the aquatic critical biodiversity areas CBA 1 & 2 but inside an A2B area stipulated in the Eastern Cape Biodiversity Conservation Plan .





### Preliminary impact Assessment

The study, due to the relief of the land concerned, reveals a number of non-perennial watercourses as described earlier but no mining will take place within any watercourse, seep or wetland hence no direct impact will be imposed on these water sources. An intact buffer zone of at least 32m will be retained between the excavations and the watercourses. Three river crossings will be required to link the crushing plant with Quarries A, B & C and will constitute the placement of precast culverts across the stream, of which the design will be discussed within the EIA.

#### Change in runoff patterns, runoff volumes or runoff velocity en sedimentation.

Excavation sites will be large and will increase runoff due to the hard rock surfaces that will be exposed and the steep rock faces that will develop. This runoff will cumulate on the quarry floors and egress at the toe of each quarry area. Due to the blasting and extraction process, large volumes of dust will accumulate on the floor and will be swept away from the quarry towards the drainage lines. This will result in extensive silt deposits in the stream environment and could impose a significant impact on the ecological integrity thereof and could result in the smothering of riparian vegetation and aquatic fauna. In an uncontrolled state this impact is rated moderate-high. It should be noted that the current Prima Quarry has operated as stated above but the impact thereof has never been assessed. To address this impact satisfactory a sump needs to be established at the exit of each quarry to present the first stage of silt deposition. In addition a catchment dam needs to be constructed below the exit to provide the second phase of silt deposition and safe release of runoff to the stream

Development of the new plant and stockpile areas will also result in runoff from the southern aspect of the Prima Quarry hill to traverse this area, transporting massive amounts of crushed material and fines into the stream, which will severely affect the ecological integrity of the stream. In addition, runoff from the current Prima Quarries stockpile area will tend to erode the northern edge of the established crusher platform resulting in the same impact. In order to address this impact, diversion berms has to



be established east and north of the plant area diverting clean water around the plant area as well as cut-off berms directing polluted runoff to a sit dam(s) positioned to the west thereof. In addition, the platform needs to be protected from scour using geo-filter and a rip-rap structure along the edge.

Removing topsoil from excavation areas will result in limited sediment transport from these piles but should they be properly vegetated any remaining silt movement will be curbed by the vegetated buffer zones in place.

Establishment of the aggregate beneficiating plants will not change runoff patterns but will include increased sediment transport. This impact needs to be curbed by means of a series of berms and silt ponds.

If no mitigation measures are implemented, this impact is rated moderate to high.

#### Improvement/enrichment in surface water quality.

The establishment of large platform areas as the quarries are advanced will require that these areas are vegetated. Due to the very sterile environment it would be necessary to apply fertilisers and organic material to recreate a sustainable post closure land use. Runoff from these areas will result in some fertilizers being transported to the drainage channels. However, if the sumps, silt dams and diversion berms are constructed, this impact will largely be mitigated. It would be more acceptable to enrich the stream environment to a minor degree than not vegetating the quarry areas adequately. This impact will only be experienced during periods of heavy precipitation and it is anticipated that any release of fertilizer to surrounds will be quickly neutralized through absorption by nutrient deficient soils and plants within the buffer zone areas. It is also the opinion that human activities on abutting farms areas will contribute more significantly to stream enrichment than the quarry.

If no mitigation measures are implemented, this impact is rated of low significance.

#### Reduction in surface water quality

Incorrectly maintained sanitation facilities or the absence thereof may result in a release of coliforms that could negatively affect water quality and potentially human health if downstream water abstraction is taking place. However, the existing sewage systems at Prima Quarries as well as at Van Der Touw Plant Hire will be utilized. These systems will be supplemented with chemical toilets at the quarry and plant areas and will thus be closed systems. In relation to the impact that residences in the larger area as well as other commercial activities has on surface water quality, the anticipated impact will be negligible.

Since no hydrocarbons will be stored within the crushing plant and quarry areas and since all maintenance and servicing will take place at the Scribante facility, no impact on water quality is anticipated. If any equipment has to be fuelled onsite, it will be done with the specially designed



diesel bowser that eliminates spillages almost completely. The only impact on water quality that may occur in this area is from minor leaks that vehicles might have and will most certainly be mitigated by the silt traps and vegetation buffer areas.

Generation of solid or household waste may negatively impact on surface water quality but since these will be properly controlled and stored at the existing Scribante waste site, no impact is anticipated.

One activity that could result in major degradation of surface water quality and ecological integrity of streams are the transport of bitumen or bitumen runoff to watercourse. As discussed elsewhere there is a possibility that bitumen may contain very toxic substances which could kill off wildlife if it is concentrated in surface water, which will cause the impact to be of high significance. However, the viscosity of bitumen is extremely high and since it will not be located close to any drainage channel will not be able to enter any stream. Of more concern is contaminated runoff from waste products and stockpiles, which could potentially reach the watercourses on the southern and northern flank of Quarry A. This impact is rated of moderate significance if a large bitumen plant is established. To curb this problem, bitumen tanks will be bunded and soil under transfer points will be protected with drip trays, especially in the heated section of the system. In addition a series of berms will be constructed around the plant and stockpile areas directing runoff to sumps.

With mitigation in place the impact is rated of low significance.

#### Change in the flow regime of rivers/streams

Denuded quarry areas as well as plant areas will increase the amount of runoff significantly, which will benefit the riparian environment. The increased runoff will however not be that significant to cause erosion within the stream since it is quite stable and protected by lush vegetation. As rehabilitation progresses at each quarry site, the increased runoff will abate accordingly. No production water will be pumped from the stream. This impact is rated of low significance.

#### **Impact on surface water.**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b>    | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|-------------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Local                                    | 2             | Local             | 2             |
| <b>Duration</b>     | Long Term                              | 3             | Long Term                                | 3             | Medium Term       | 2             |
| <b>Intensity</b>    | High                                   | 6             | Low-Medium                               | 3             | Low               | 2             |
| <b>Probability</b>  | Definite                               | 4             | Likely                                   | 3             | Likely            | 3             |
| <b>Status</b>       | Negative                               |               | Slightly Negative                        |               | Slightly Negative |               |
| <b>Confidence</b>   | High                                   |               | High                                     |               | Medium            |               |
| <b>Significance</b> | <b>Moderate-High</b>                   | <b>44</b>     | <b>Low-Moderate</b>                      | <b>24</b>     | Low               | 18            |



## GROUNDWATER RESOURCES

The quartzitic sandstone bedrock of the Table Mountain group rocks are a well documented source of potable ground water. The permanent water table moves through fractures within the competent bedrock at depth that are controlled slightly by surface topography. Depth to groundwater also fluctuate during wet and dry periods and average at depth of about 50 to 60 meters below surface to the west of Port Elizabeth was recorded and were confirmed by the local DWAF office. Localized clay deposits on the plateau areas may cause the establishment of aquicludes that could result in the development of perched water table conditions. Since the A-horizon was removed at Quarry A & B, these perched aquifers will not be encountered. At a depth of approximately 40m a clay band has been encountered, which could prevent pollutants to reach the main aquifer and would be of importance with reference to the storage of bitumen.

There are no boreholes within the study area and groundwater quality is currently unknown but the mining activity would have no impact on its quality. Recharge along the fractured quartzite of the plateau and valley sides will take place at a high rate through water infiltration into the underlying quartzite body through fissures. There is currently no indication that groundwater contributes to surface water bodies.

### **Preliminary impact assessment**

#### Change in the availability of groundwater resources.

Developing the quarry will increase available recharge surface and would bring the quarry floor substantially closer to the vadozone, however, runoff velocity may increase that could hamper infiltration. On the other hand blasting will increase the amount and extend of fissures and it is anticipated that once the quarry areas are rehabilitated, recharge will increase. In addition no additional groundwater abstraction will take place that could affect the availability thereof. Human interventions and more specifically agricultural practices within the larger study area will have a far more pronounce impact on this groundwater parameter.

Since there is only one type of geological strata in the mining area there is no possibility of cross-contamination of various aquifers and drawdown of water tables, which could potentially impact on land use as well as on the livelihood of landowners.

One factor that could impact on water availability on abutting land is long term blasting, especially at Quarry B & C and boreholes on neighbouring properties will have to be tested to provide baseline information. At quarry A blasting impact on abutting land will be significantly reduced due to the locality of the valley in-between the excavation and abutting land and the impact on groundwater availability is rated low. The aforementioned mitigation measure is absent at the other two quarry areas. The distance of only 200m from residences and Quarry C, will cause this impact to be rated moderate and the property needs to be inspected.



Improvement/enrichment in ground water quality.

Nutrients released by exposed soils, hydrocarbons or by applied fertilizers will be limited as stated previously and will have to ingress an extensive distance to reach the main aquifer. As adequate geological buffer zones are in place between exposed, polluted or fertilized surfaces areas and aquifers, no enrichment of groundwater will occur.

Reduction in groundwater quality

Incorrectly maintained sanitation facilities or the absence thereof as well as extensive hydrocarbon spills could infiltrate the soil and rock reserve and potentially negatively affect groundwater quality. Considering that 1) only chemical toilets will be housed in the mine, 2) plant areas will not housed fuel tanks and 3) all maintenance will be done at Prima Quarries, the potential for such spills to occur is limited. Within the bitumen plant area, the potential for hydrocarbon infiltration is higher but due to the extensive geological buffer and the high viscosity of bitumen, the impact is also rated very low. In addition, the clay layer at 40m will tend to restrict any downward movement into the main aquifer.

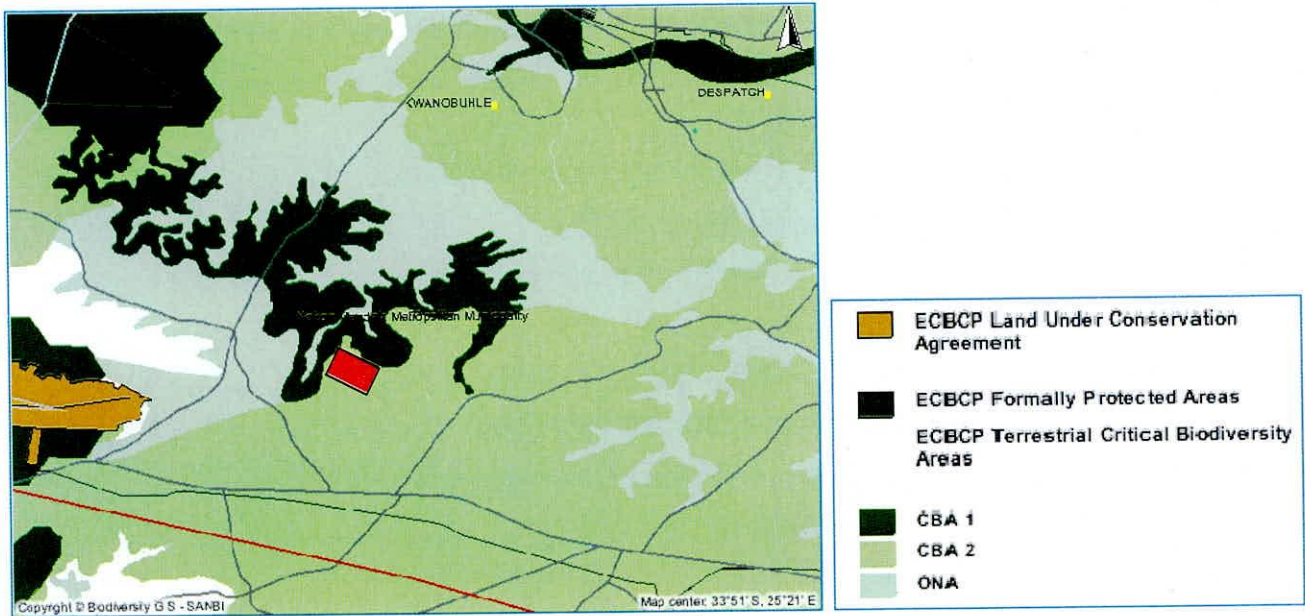
**Preliminary impact on groundwater**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b>    | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|-------------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Local                                    | 2             | Local             | 2             |
| <b>Duration</b>     | Long Term                              | 3             | Long Term                                | 3             | Short Term        | 1             |
| <b>Intensity</b>    | Low-Medium                             | 3             | Low                                      | 2             | Very Low          | 1             |
| <b>Probability</b>  | Likely                                 | 3             | Possible                                 | 2             | Unlikely          | 1             |
| <b>Status</b>       | Negative                               |               | Slightly Negative                        |               | Slightly Negative |               |
| <b>Confidence</b>   | High                                   |               | High                                     |               | High              |               |
| <b>Significance</b> | <b>Low-Moderate</b>                    | <b>24</b>     | Very Low                                 | 14            | Insignificant     | 4             |

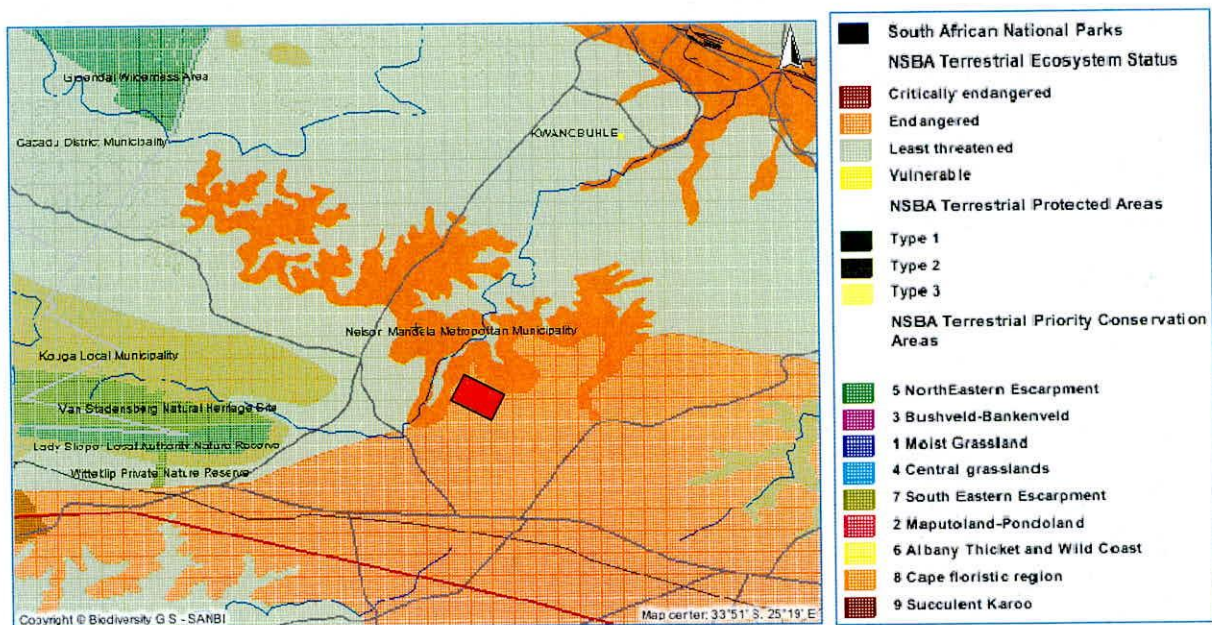
**SENSITIVE/PROTECTED AREAS**

In terms of the Eastern Cape BCP plan the area concerned is not incorporated within an area formally protected or under informal conservation agreement. However, from a terrestrial biodiversity conservation point of view the area lies within a CBA 2 area which means development should be avoided if possible or that the least possible impact is imposed on an already stressed environment.



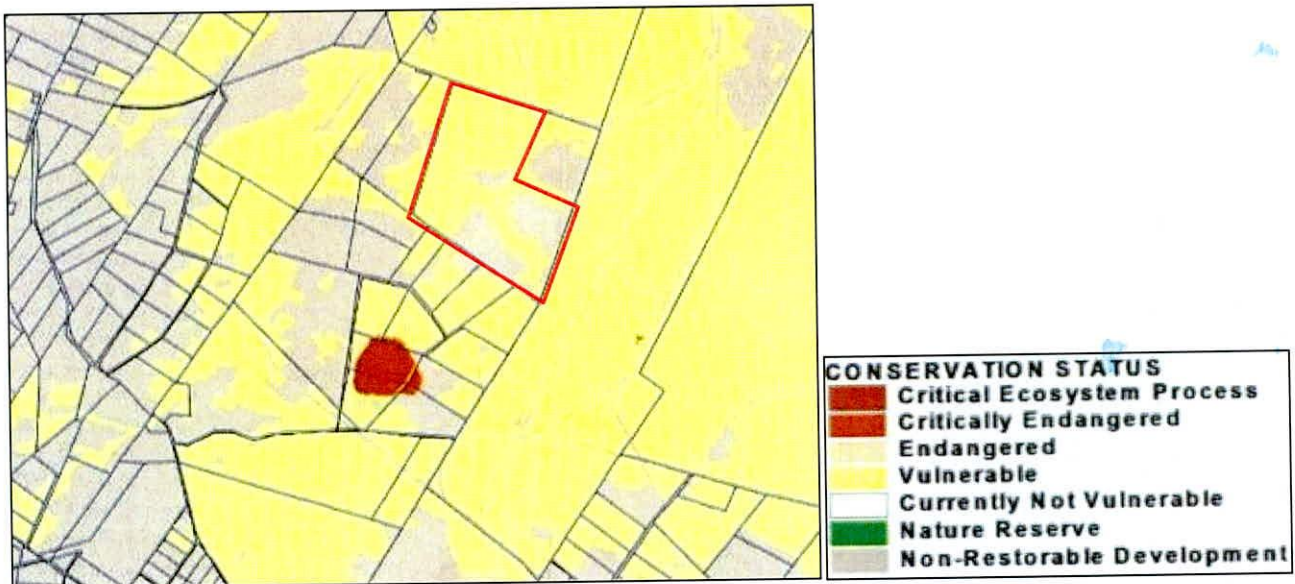


The mining area also lies within the National Cape Floristic Terrestrial Priority Conservation Area hosting Algoa Sandstone Fynbos and Humansdorp Renosterveld, which is poorly protected and carries an ecosystem status of ‘endangered’.



In terms of the NM MOSS the study area carries a conservation status that ranges from ‘non-restorable development’ where previous mining took place to ‘vulnerable’ where environs are still intact.





### Preliminary impact assessment

Considering the degraded status of most of the proposed mining areas, the ECBCP or NSBA rating would not be applicable to Quarry A, B & D but indeed to Quarry C and the undisturbed portions of the valley sides, especially the southern and western valley sides C. The precautionary principle should be applied and these be excluded from the mine area. However, the functionality of these areas should be assessed as well as the result of a 'No-go' approach. Quarry C constitute the south-western quadrant of the property and upper end of the Brak River Valley, which is abutted by disturbed and transformed land on all sides and therefore has a limited ecological function, except for acting as a source of seed. From that perspective the area can be mined but will still be determined through a prospecting phase.

Excluding the valley areas is the ideal option as it will definitely form a corridor between some inland areas, although disturbed and the lower Brak River Valley. Excluding it in total will, on the other hand, reduce the available reserves considerably and will cause four large holes to stand out like pock marks in the landscape and will result in a less rehabilitated area with no proper end use and increased safety risks. Mining half of the valley side will ensure that flat platform areas can be established, which will be conducive to proper rehabilitation and dispose of a functional end use.

The Algoa Sandstone Fynbos have been severely disturbed in Quarry Areas A & B and the Humansdorp Shale Renosterveld in Quarry D with only portions thereof remaining on the valley slopes and the cumulative impact of removing a portion thereof on the valley sides is rated of moderate significance. However, considering the reasoning provided above, the loss of an additional section of the vegetation can be offset against the rehabilitation potential of the proposed mining area and extending the life of the mine considerably, which will in turn prevent new areas within this vegetation type being targeted for mining. Protection of this veld type within the proposed Grootkloof Conservation Area will ensure that a large enough portion of this area will be protected from future development.



Based on the NM MOSS status of the area, the impact on sensitive areas is insignificant as most of the proposed mining area and surrounds have been significantly transformed and the proposed mining activities will therefore not result in a major cumulative impact or drastically change the conservation status of the area. However, the granting of a mining license must be subject to an acceptable rehabilitation programme.

#### Preliminary impact on sensitive areas

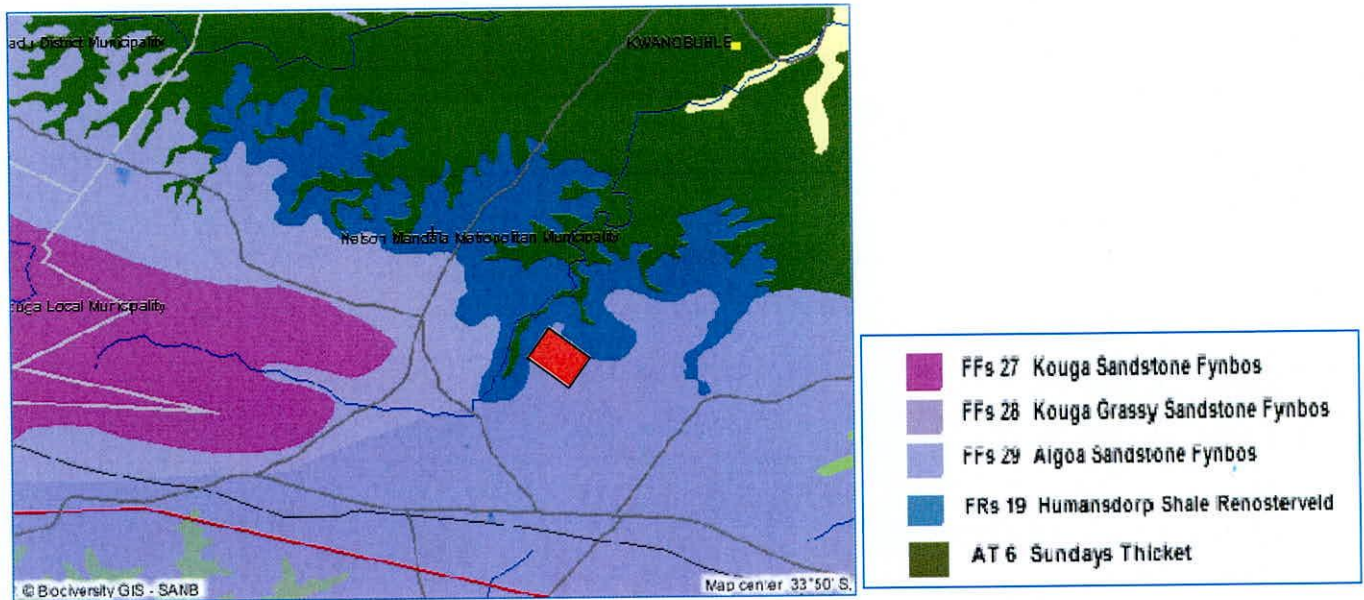
|                     | OPERATIONAL<br>(no mitigation) | WEIGHT    | OPERATIONAL<br>(with mitigation) | WEIGHT    | CLOSURE       | WEIGHT |
|---------------------|--------------------------------|-----------|----------------------------------|-----------|---------------|--------|
| <b>Extent</b>       | Site Specific                  | 1         | Site Specific                    | 1         | Site Specific | 1      |
| <b>Duration</b>     | Permanent                      | 4         | Long-Term                        | 3         | Long Term     | 3      |
| <b>Intensity</b>    | Medium                         | 4         | Low-Medium                       | 3         | Low           | 2      |
| <b>Probability</b>  | Definite                       | 4         | Definite                         | 4         | Likely        | 3      |
| <b>Status</b>       | Negative                       |           | Negative                         |           | Negative      |        |
| <b>Confidence</b>   | High                           |           | High                             |           | High          |        |
| <b>Significance</b> | <b>Moderate</b>                | <b>36</b> | <b>Low-Moderate</b>              | <b>28</b> | Low           | 18     |

#### VEGETATION

Quarry area A, B & C are located within the Fynbos Biome and Eastern Fynbos-Renosterveld Bioregion. The vegetation group is Sandstone Fynbos and the vegetation type Algoa Sandstone Fynbos of which 2,3% is protected and 48% is remaining. The conservation status is endangered.

The north-western quadrant of the property is also located within the Fynbos Biome but in the Eastern Fynbos-Renosterveld Bioregion. The vegetation group is Shale Renosterveld and the vegetation type Humansdorp Shale Renosterveld of which 5,6% is protected and 38% is remaining. The conservation status is endangered. Considering the extensive clearing that has already taken place in Quarry D, very little additional Renosterveld will be removed.





Literature review identified the following plant species that are associated with the Algoa Sandstone Fynbos:

### **Important Taxa**

Tall Shrubs: *Protea eximia*, *P. neriifolia*, *Protea repens*

Low Shrubs: *Agathosma hirta*, *A. ovate*, *Erica zeyheriana*, *Euryops ericifolius*, *Helichrysum appendiculatum*, *H. teretifolium*, *Leucadendron salignum*, *L. spissifolium*, *Leucospermum cuneiforme*, *Protea cynaroides*, *P. foliosa*, *Tephrosia capensis*.

Succulent Herb: *Crassula pellucida*

Graminoides: *Andropogon eucomus*, *Brachiaria serata*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Digitaria eriantha*, *Ehrharta calycina*, *Eustachys paspaloides*, *Ischyrolepis capensis*, *Pentaschistis heptamera*, *P. palliida*, *Thamnochortus cinereus*, *Themeda triandra*, *Tristachya leucotrix*

### **Endemic Taxa**

*Agathosma gonaquensis*, *Erica etheliae*, *Holothrix longicornu*

The following plant species are associated with the Humansdorp Shale Renosterveld:

### **Important taxa**

Succulent Tree: *Aloe africana*.



Tall shrubs: *Cliffortia strobilifera*, *Metalasia densa*, *Morella serrata*.

Low shrubs: *Elytropappus rhinocerotis* (d), *Helichrysum anomalum* (d), *Oedera genistifolia* (d), *Anthospermum galioides* subsp. *galiodes*, *Barleria pungens*, *Chaetacanthus setiger*, *Clusia rubricaulis*, *Euryops munitus*, *Felicia filifolia* subsp. *filifolia*, *Hermannia flammea*, *Indigofera denudata*, *I. heterophylla*, *Lotononis acuminata*, *Metalasia aurea*, *Muraltia alopecuroides*, *Passerina rubra*, *Pelargonium sidoides*, *Tephrosia capensis*.

Herbaceous Climber: *Thunbergia capensis*.

Herbs: *Arctotis acaulis*, *Berkheya heterophylla* var. *radiata*, *Centella asiatica*<sup>W</sup>, *Gazania linearis*, *Gerbera piloselloides*, *Helichrysum nudifolium*, *Hibiscus pusillus*, *Senecio oniniflorus*.

Geophytic Herbs: *Bobartia orientalis*, *Geissorhiza heterostyla*, *Ledebouria cooperi*, *Oxalis punctata*, *O. smithiana*, *Satyrium membranaceum*.

Graminoids: *Eustachys paspaloides*, *Themeda triandra* (d), *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Cymbopogon marginatus*, *Cynodon dactylon*, *Eragrostis capensis*, *E. curvula*, *Ficinia nigrescens*, *F. tristachya*, *Merxmullera disticha*, *Paspalum dilatatum*, *Pentaschistis palida*, *Restio tetragonus*, *Sporobolus africanus*, *Tribolium hispidum*, *Tristachya leucothrix*.

### **Endemic Taxa**

Succulent Shrubs: *Delosperma patersoniae*, *Trichodiadema fourcadei*.

Geophytic Herb: *Cyrtanthus wellandii*

### **Preliminary impact assessment**

#### **Quarry A**

The original vegetation of the plateau area of this hill has been removed and carries a secondary vegetation cover of species of family Aizoaceae. On the rim a number of Acacia trees are found. The area is therefore also totally degraded. The upper section of the valley side dispose of moderately intact Algoa Sandstone Fynbos and interesting species that were found on the slope are *Olea europea* and *Holotrix* species. No endangered plant species were found in this area but will be subject to two additional vegetation surveys. The impact on this vegetation type is rated of low significance.



### Plateau of Quarry A



### Sandstone Fynbos on southern and western slopes of Quarry A



### Quarry B

All the original vegetation was removed from the phase 1 plateau area and down to the middle of the valley side. The area is currently heavily invaded by *Acacia cyclops*, *Acacia mearnsi* and *Acacia saligna*. Basal cover constitute of secondary grass species and family Aizoaceae. The area is therefore completely degraded taking into consideration the impact on soil as discussed earlier in the report. The impact of mining on natural vegetation would therefore be of very low significance as only the section near the toe of the hill still disposes of intact vegetation. No endangered plant species were found in this area.



### Plateau of Quarry B



### Northern valley side of Quarry B



### Quarry C

This area is reasonably intact and host the species of both Fynbos and Renosterveld as is listed in the plant list provided by Mr. Adrian Odgers. The area revealed an extensive grass cover and includes the following species:

*Tristachy hispida*, *Themeda triandra*, *Hyparrhenia hirta*, *Digitaria eriantha*, *Cymbopogan plurinodis*, *Elyonurus argenteus*, *Cynodon hirsatus*, *Cynodon dactylon*, *Eragrostic plana*, *Eragrostic curvula*, *Sporobolus capensi*.



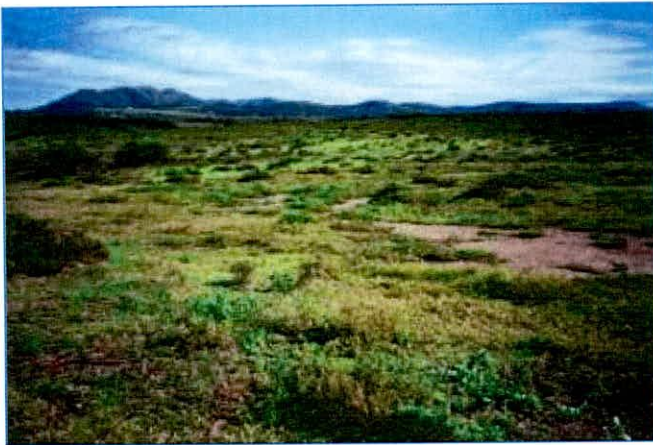
A follow up vegetation survey will be done to ensure that as many plants as possible are identified. No endangered plant species were found in this area. The impact on this area is rated of moderate significance but can be developed as motivated under preceding heading. This area still disposes of its original soil horizons and the possibility of re-establishing some of the vegetation is thus possible. This area also renders itself suitable for the transplant of a number of species that could improve the diversity of reinstated areas. To reduce this impact further it would be advisable to harvest seeds from intact communities and reintroduced them to reinstated soils. The same approach should be applicable to Quarries A, B, & D.



### **Quarry D**

A large portion of the plateau area as well as the upper portion of the southern valley side of Quarry D was cleared for some reason. It carries a low vegetation cover of weeds and species of the family Aizoaceae. The western section of this particular phase hosts a reasonably intact section of Renosterveld. The lower section of the top half of the southern valley slope reveals a large number of geophytes that could not be identified as they were not flowering. On the western slope a number of small bush clumps were found with one hosting a *Sideroxylon inerme* specimen whilst others hosting amongst other *Cussonia spicata* specimens. A few individuals of *Aloe ferox* were also found on the western slope. Considering that a very small section of this vegetation type will be cleared the impact is rated of very low significance.



**Plateau of Quarry D****Renosterveld on western slope of Quarry D**Proliferation of alien vegetation.

The area is prone to severe infestation by alien trees once the soil is disturbed. Mining of Quarry A & B will have no impact in this regard since these areas are already infested. However, infestation of Quarry C & D could be a significant impact and will require a dedicated re-vegetation approach and alien eradication programme. This impact is rated of low-moderate significance if no mitigation measures are implemented.

**Preliminary impact on flora**

|                     | OPERATIONAL<br>(no mitigation) | WEIGHT    | OPERATIONAL<br>(with mitigation) | WEIGHT | CLOSURE           | WEIGHT |
|---------------------|--------------------------------|-----------|----------------------------------|--------|-------------------|--------|
| <b>Extent</b>       | Local                          | 2         | Site Specific                    | 1      | Site Specific     | 1      |
| <b>Duration</b>     | Permanent                      | 4         | Long Term                        | 3      | Medium Term       | 2      |
| <b>Intensity</b>    | Low-Moderate                   | 3         | Low                              | 2      | Low               | 2      |
| <b>Probability</b>  | Definite                       | 4         | Definite                         | 4      | Likely            | 3      |
| <b>Status</b>       | Negative                       |           | Slightly Negative                |        | Slightly Negative |        |
| <b>Confidence</b>   | High                           |           | High                             |        | High              |        |
| <b>Significance</b> | <b>Moderate</b>                | <b>36</b> | Low-Moderate                     | 24     | Low               | 15     |

**FAUNA**

On the day of the site visit very few animals were observed, except for a number of bird species but since the site visit was limited to a few hours, this assessment could be incorrect. Buck and hare droppings were readily found on the slope areas and are indicative thereof that the valley areas provide for ample forage and shelter for wild animals and due to invasive activities in the study area has mostly become nocturnal. The inaccessibility of the valleys causes the faunal assemblages in this area to be much more diverse than on the developed plateau areas and the area will be subject to a faunal assessment by Dr. Branch should he accept the appointment.



For the purpose of the mining application the faunal analysis of the close by Parsonsvelei area will be used as background information and the following species could potentially visit or occur in the area.

### Herpetofauna

The greater area might reveal a diverse herpetofauna of approximately 56 species which could include as much as 13 amphibians (riparian environment) and 43 reptiles (4 chelonian, 17 lizards and 22 snakes). Of the number of species mentioned only 17 of 56 potential species have been confirmed. There is thus a need to safeguard their long-term protection.

Important species that might occur here are listed below:

Chelonians: *Chersina angulata*, *Homopus areolatus*

Lizards: *Mabuya capensis*, *Nucras lalandei*, *Tropidosaura Montana*, *Pseudocordylus microlepidotus*,  
*Pachydactylus maculates*, *Agama atra*, *Cordylus cordylus*

Amphibians: *Strongylopus grayii*, *Rana fuscigula*, *Rana angolensis*, *Cacosternum boettgeri*,  
*Tomopterna delalandii*, *Pyxicephalus adspersus*

Snakes: *Homoroselaps lacteu*, *Psammophylax rhombeatus*

### Mammals

Up to 45 mammal species may possibly occur in the area, including three species listed in the South African Red Data Book for Mammals.

Rare species occurring in this region, and listed in the Red Data Book, include the Spectacled Dormouse (*Graphiurus ocellatus*), African Striped Weasel (*Poecilogale albinucha albinucha*), Serval (*Felis serval serval*), Tree Dassie (*Denrohyrax arboreus arboreus*), and Blue Duiker (*Philantomba monticola monticola*).

Rare refers to taxa with small populations which are not at present endangered or vulnerable, but which are at risk. These taxa are usually localised within restricted geographical areas or habitats, or are thinly scattered over a somewhat more extensive range.

Species listed as vulnerable include the Honey Badger (*Mellivora capensis*), African Wild Cat (*Felis lybica cafra*), and Antbear (*Orycteropus afer afer*).

Vulnerable refers to taxa which are believed to be likely to move into the endangered category if the causal factors continue operating. Included are taxa of which all or most populations are decreasing because of overexploitation, extensive destruction or degradation of their habitat, or other environmental disturbances.



## Birds

The presence of about 95 species of birds is possible of which 18 species are endemic and 5 species, near-endemics to South Africa.

The valley areas with cliff faces in certain areas will most probably host species such as Rock Kestrel, Redwing Starling, Little Swifts and Swallows, Jackal Buzzard, Rock Kestrel, White neck Raven and Black Crow, various pigeons, Diederik Cuckoos, Mouse Birds, Bulbuls, Robins Apalis, Neddicky, Prinias, Flycatchers, Shrikes, Sunbirds and Buntings. Other species that could occur in the area are Peregrine and Lannar Falcons.

In the riverine areas African Sedge Warbler, le Valliant's Cisticola, Cape, Masked Weavers, Yellow-rumped Widow and Red Bishop birds might be present. The grassland areas will hosts Cape, Masked, Sentinel Rock Thrushes, Spectacled Weavers, Greywing and Redwing Francolin, Secretarybird, Stanley's Bustard, Redcapped and Clapper Lark, Common Quail and Black Harrier.

Eighteen species endemic to South Africa and 5 near-endemic species are to be found in the Vander Kempskloof area (McGill in Vander Kempskloof / Bethelsdorp Masterplan, 1995). Red Data Book species that might also occur in the area, include Peregrine falcon, Black harrier and Black-rumped buttonquail.

### Endemic species:

Jackal Buzzard, Spotted Prinia, Black Harrier, Fiscal Flycatcher, Greywing Francolin, Cape Batis, Clapper Lark, Orangethroated Longclaw, Cape Bulbul, Southern Boubou, Cape Rock Thrush, Southern Tehagra, Sentinel Rock Thrush, Greater Doublecollared Sunbird, Karoo Robin, Cape White-eye, Grassbird, Cape Weaver

### Near endemic species

Greater Striped Swallow, Cape Penduline Tit, Greybacked Cisticola, Bokmakierie, Cape Sparrow

### Vulnerable species:

Vulnerable species that could occur in the study area include the Martial Eagle (*Polemaetus bellicosus*), African Marsh Harrier (*Circus ranivorus*), Lesser Kestrel (*Falco naumanni*), Blue Crane (*Anthropoides paradiseus*), Stanley's Bustard (*Neotis denhami*), and Knysna Warbler (*Bradypterus Warbler*). These species are deemed vulnerable as available scientific evidence indicates that they are facing a high risk of extinction in the wild.

Near threatened species, whose ranges occur in the study area, include the Black Stork (*Ciconia nigra*), Secretary Bird (*Sagittarius serpentarius*), Crowned Eagle (*Stephanoaetus coronatus*), Blackwinged Plover (*Vanellus melanopterus*), Halfcollared Kingfisher (*Alcedo semitorquata*), Knysna Woodpecker (*Campethera notata*), and Melodious Lark (*Mirafraga cheniana*).



Near threatened species are species that are close to becoming vulnerable in the near future if the prevailing factors remain unchanged.

### Preliminary impact assessment

#### Loss of habitat

Previous loss of habitat and therefore forage and protection at Quarries A, B, D is extensive and future mining will thus result in a negligible impact on faunal assemblages due to the absence of a natural vegetation cover. The limited areas to be affected on the slopes below the platform areas will result in an impact of low significance if the correct remedial measures are implemented of which the most important is that no vegetation clearing or transport may take place between the final quarry perimeter and the drainage lines. No excavation sites will be positioned in any areas that could potentially host any faunal species or are used as dedicated forage and nesting area. The specialist assessment will provide more clarity on this matter.

Wetland areas are important habitats insofar as species diversity, production of food and availability of water is concerned. The mining programme however does not make provision for any mining within any wetland or watercourse area. Transport of silt and hydrocarbons could however induce a significant impact on faunal diversity in the riparian zone hence the proposed mitigation measures to control the spill and transport of these substances stipulated under separate headings must be implemented.

The establishment of the new plant and stockpile area will result in a portion of a minor valley located below the existing Prima Quarries stockpile area to be severely affected by infill activities. This area will be cleared of faunal species prior to any activities and since no surface water occur here in the upper reaches, the impact is rated of low significance, especially since the Prima Quarries operation has resulted in the out migration of species in this area

Once individual quarry areas have been rehabilitated to a combination of grassland and shrub land, faunal diversity will increase over time and an improved ecological status should be achieved comparing to the status of current disturbed areas.

#### Hunting/Poaching

During the Prima Quarries operations no incident of animal poaching was recorded and it is anticipated that the status quo will be maintained during the Bigwill Enterprise quarry operations. The same management team will exercise control over the work force and will ensure that the same strict work conditions are maintained. The mining crew will not reside on the mining area and that no hunting will be allowed, which will largely eliminate this impact. However, the site is located relatively close to vacant land and informal settlement and dog hunting occur on a frequent basis in all the valley areas. This impact cannot be eliminated.

#### Loss of Red Data faunal species

Due to the extensive disturbance of the proposed mining areas, hunting and poaching in the greater area as well as the transformation of the plateau areas, these areas display a very low concentration of wild animals and no important species were noticed and a negligible impact is anticipated. Important species will be found in the drainage lines and valley areas due to increase cover, forage, water and protection but these areas will not be affected by mining. If a decision is reached to proceed with a



mining right, a formal survey will be done to determine the importance of the area, especially the drainage lines as a habitat for wild animals.

#### *In and out migration of faunal species*

Human activities and noise generated by the mining activities will result in small and large resident species that may occur within the mining area to temporarily vacate the site. Avian species will simply avoid visiting such sites but most animals will return to the site after hours and once disturbed areas have been rehabilitated. It should be borne in mind that the anticipated impact is already imposed by the Prima Quarry operations and no cumulative impact is anticipated. The occurrence of illegal hunting, organized hunting and clearing of the abutting land have had a much more pronounced affect on animal out migration as to what mining would have. It is however extremely important that the riparian areas remain intact as it an important corridor area for animal migration constitutes.

#### **Preliminary impact on fauna.**

|                     | OPERATIONAL<br>(no mitigation) | WEIGHT | OPERATIONAL<br>(with mitigation) | WEIGHT | CLOSURE         | WEIGHT |
|---------------------|--------------------------------|--------|----------------------------------|--------|-----------------|--------|
| <b>Extent</b>       | Local                          | 2      | Site Specific                    | 1      | Site Specific   | 1      |
| <b>Duration</b>     | Long Term                      | 3      | Long Term                        | 3      | Permanent       | 4      |
| <b>Intensity</b>    | Low                            | 2      | Very Low                         | 1      | Very Low        | 1      |
| <b>Probability</b>  | Likely                         | 3      | Likely                           | 3      | Probably        | 2      |
| <b>Status</b>       | Negative                       |        | Slightly Negative                |        | <b>Positive</b> |        |
| <b>Confidence</b>   | High                           |        | High                             |        | High            |        |
| <b>Significance</b> | Low                            | 21     | Very Low                         | 15     | Very Low        | 12     |

#### **VISUAL IMPACT**

The quarry setting as described earlier constitutes large undulating hills with gentle to steep slopes and flattish, table top areas and further to the north an increasingly dissected landscape hosting Valley Thicket and Algoa Sandstone Fynbos. Therefore to the north the surrounding area reflects a high visual quality but to the immediate east the land is flat and vegetation has been semi-transformed and the visual quality is rated of medium quality. To the west and south natural vegetation has been largely transformed to pasture land and display a number of structures causing visual quality to be of low-medium quality. Despite the transformation of immediate surrounding land the landscape can be described as moderately attractive.

On the other hand the visuals of the plateau areas of the property concerned has been extensively impaired by mining activities of Prima Quarries, infrastructure of Van Der Touw Plant Hire maintenance yard and previous unauthorised mining at Quarry A, B & C. Most of Quarry B is still without a proper vegetation cover or host dense stands of alien vegetation whilst Quarries A & D hosts secondary, homogenous surface cover consisting of Mesem species and weeds representing a very low visual quality. The only portions of the property that still poses good visual quality are the watercourse areas and valley slopes (except Quarry B). On average the property dispose of a low visual quality.



### Impact assessment

Mining the proposed quarry areas will remove the upper half of vegetation on the valley slopes and will therefore increase the extent of disturbed and bare areas. Initially this impact will not be noticeable since elevation levels at the first production face will be approximately 30m lower than the abutting land. As the production faces advances into the hill this impact will increase and would be noticeable from land to the west and the Rocklands Road. The distance to the residences involved will be approximately 800m and will reduce the impact to some extent. Currently there are approximately 2-3 residences in direct line of site of the upper section of the quarry areas, rendering the impact to be low significance if rehabilitation is affected and moderate if rehabilitation does not take place. Production faces of Quarry B & C will have a lesser visual impact as quarry faces will not be in direct line of sight but since they will be located substantially nearer to abutting residences the impact will remain the same as for Quarry A. Crushing and additional aggregate beneficiation plants on the eastern side of Quarry A on the other hand could result in a dust cloud/smoke to hang in the valley and over surrounding land, especially to the west if the crusher and working areas are not equipped with dust suppression systems. Due to the limited number of people that will be affected and the distance involved, the impact is rated of low-moderate significance with the necessary mitigation measures in place.

The study area and immediate surrounds do not constitute a major tourist destination and the development of the quarry will not affect tourism in any way. The mine is not visible from any public vantage point. The current Prima Quarries mine is only visible from sections of the Rockland's-Uitenhage road but due to the distance involved the impact is rated of low significance hence the same impact for the Bigwill Enterprises Quarry is anticipated. As the site constitutes a definite focal point in the landscape being positioned at the head of the Brak River valley, the significance of the visual impact will increase moderately. It is therefore of critical importance that a concurrent rehabilitation approach be implemented with regards to the quarry floor and production faces. Development of Quarry B & C will result in a less direct visual impact to landowners to the west. With regards to the development of Quarry D, activities would become more noticeable but due to the elevation of this hill in relation to the elevation of areas to the west, the quarry void will not be visible.

Since the concern is located in an area displaying a heterogeneous surface cover as well as topographical outlay, disturbances will be absorbed and camouflage to some extent if rehabilitation is affected properly. It is therefore possible that post closure landscape could fit into the surrounding landscape. The fact that mining will change the texture (vegetated to bare) and colour (green to whitish-bluish) of the area will increase visibility moderately during operations and necessitates that the Prima Quarries area as well as future platform be profiled and re-vegetated concurrently with extraction activities. However, since the current soil status of the area does not lend itself towards effective rehabilitation of the area, additional soil must be imported to ensure that visual quality of the landscape is improved to an acceptable standard.



No permanent infrastructure will be erected in the mining. Currently stockpile areas at Prima Quarries are large and visible from the east but if they are relocated to the valley area, the visual impact will decrease and the impact is rated of low significance. Establishment of the Brickyard, Asphalt & Batching plants will definite increase the visual impact of the operation. The impact to the west is rated low due to the distance involved. From the access road the visibility would be high but considering that virtually no people other than quarry workforce use this road the impact is also rated of low significance.

No additional haul roads will be constructed that could possibly increase the visual impacts. However, during high extraction periods and because of increased vehicle traffic related to the additional infrastructure established within the mining area, dust plumes above the road could marginally increase. Similarly it will increase the visibility of the operation and subsequently lower the aesthetics of the area in general, especially during adverse weather conditions. This impact can be significantly reduced by wetting the road but it is doubtful whether this would be achievable due to the water shortage in the area. Installing mist sprays along the road is not an option as it will be stolen. The extraction operation *per se* will liberate insignificant dust volumes into the air but blasting will cause a highly visible plume to hang over a large area. This impact would, however be short-lived as wind movement will disperse it quickly (within 5-10 minutes) and will only occur only once or twice per month.

Currently mining has resulted in a low-moderate visual impact therefore if the prescribed mitigation measures are implemented, visibility from the air will only marginally increase and the cumulative impact is rated of moderate significance. In the absence of these measures the impact would be high. Since the site is relative distant to the Port Elizabeth Air Port, flight heights will be around 1000m and the visual impact will be masked by the highly transformed land of Uitenhage and Port Elizabeth residential areas. It is nevertheless important that rehabilitation of the site must be pursue with due diligence.

Based on the above assessment, but more especially the low population density in the area, the visual impact during mining is rated of low-moderate significance if the prescribed mitigation measures are implemented. In the absence thereof the impact will increase to high. Post closure impact (5 years after cessation of mining) is rated of low significance provided that the DMR follow the correct closure procedures.



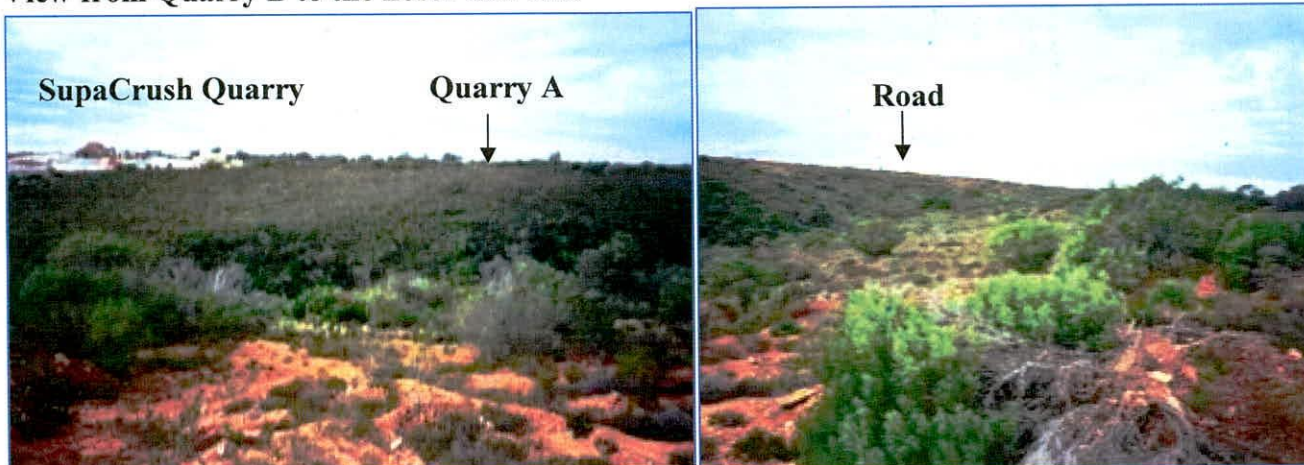
**View from Quarry D northwards**



**View from Quarry D westwards (note difference in elevation and abutting residence)**

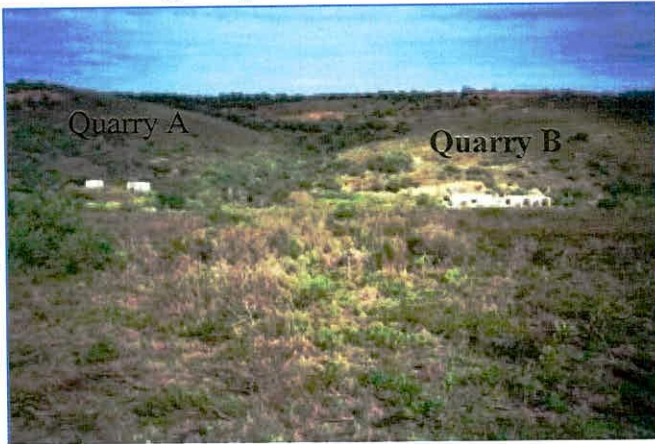


**View from Quarry B to the north and east**





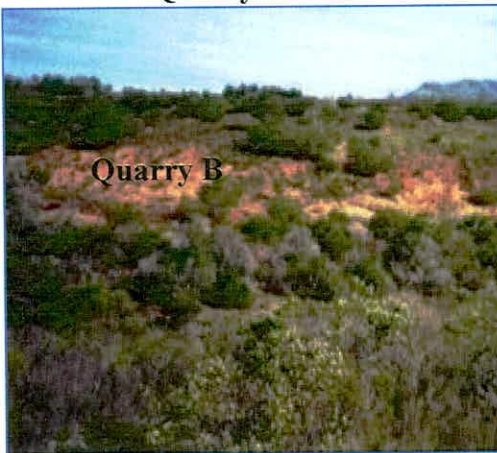
**View from Quarry D southwards**



**View from Quarry B northwards**



**View from Quarry A southwards**



**View from Quarry B southwards**





**Visual/Aesthetic impact**

|                     | <b>OPERATIONAL<br/>(no mitigation)</b> | <b>WEIGHT</b> | <b>OPERATIONAL<br/>(with mitigation)</b> | <b>WEIGHT</b> | <b>CLOSURE</b>    | <b>WEIGHT</b> |
|---------------------|--|---------------|--|---------------|-------------------|---------------|
| <b>Extent</b>       | Local                                  | 2             | Local                                    | 2             | Local             | 2             |
| <b>Duration</b>     | Long Term                              | 3             | Long Term                                | 3             | Long Term         | 3             |
| <b>Intensity</b>    | Medium-High                            | 5             | Medium                                   | 4             | Low               | 2             |
| <b>Probability</b>  | Definite                               | 4             | Likely                                   | 3             | Likely            | 3             |
| <b>Status</b>       | Negative                               |               | Slightly Negative                        |               | Slightly Negative |               |
| <b>Confidence</b>   | Medium                                 |               | Medium                                   |               | Medium            |               |
| <b>Significance</b> | <b>Moderate</b>                        | <b>40</b>     | <b>Low-Moderate</b>                      | <b>27</b>     | Low               | 21            |

**TRANSPORT IMPACT**

The site is favourably positioned in relation to existing gravel access roads. Access from Cape Road will be via the first few hundred meters of the old Bloemendal Road (R368) and then via the Brak River/KwaNobuhle Road. The latter is mostly maintained by SupaCrush Quarries and is in good condition and no road improvements are required at this stage. Access to Cape Road is via an existing approved gravel Bell-Mouth and designated stop street.

Preliminary impact assessment.

Access to the Bigwill Quarry will be via the same gravel road that is used to access the Prima Quarries site. The road is wide and constantly maintained by Prima Quarries to a good standard and should not pose any significant safety impact if courteous driving is upheld by truck drivers and speeding is prohibited. If these mitigation measures are not followed a moderate safety risk could be imposed, especially since dust generation will increase significantly with increased hauling. Dust generation will limit visibility but the length of the road will preclude the dampening thereof and providing a surfaced road rest solely with the District Roads Engineer. Old Cape Road has been constructed to carry heavy loads and is the main access to a large number of farm and light industries located to the west of Port Elizabeth. The contribution of heavy vehicles from the proposed quarry to the traffic count of Cape Road will not exceed 5% and the impact on road safety and structural integrity is rated of low significance. The District Roads Engineer will be consulted on the establishment of the Bigwill quarry.

The access road to the current Prima Quarries operation is partially used by a small number of farm residents as well as some of the workforce of St. Alban's Prison. To date the community has shared the road with Prima Quarries under both high and low extraction scenarios but no complaints have been lodged with authorities in this regard. Therefore, the same low impact is anticipated for the Bigwill mining operation.



**Preliminary transport impact**

|              | OPERATIONAL<br>(no mitigation) | WEIGHT | OPERATIONAL<br>(with mitigation) | WEIGHT | CLOSURE     | WEIGHT |
|--------------|--------------------------------|--------|----------------------------------|--------|-------------|--------|
| Extent       | Local                          | 2      | Local                            | 2      | Local       | 2      |
| Duration     | Long Term                      | 3      | Long Term                        | 3      | Medium Term | 2      |
| Intensity    | Low-Medium                     | 3      | Low                              | 2      | Very Low    | 1      |
| Probability  | Likely                         | 3      | Likely                           | 3      | Probable    | 2      |
| Status       | Negative                       |        | Negative                         |        | Negative    |        |
| Confidence   | Medium                         |        | High                             |        | High        | 10     |
| Significance | Low-Moderate                   | 24     | Low                              | 21     | Very Low    | 10     |

**SOCIAL IMPACT**

There are only a limited number of farm/small holding residences in the area with only six residences in the immediate surrounds of the quarry and are located to the south, west and north-west. None of these residents will be significantly affected by mining activities during the first 30-40 years, but this scenario will change slightly when developing Quarry B & C A. The main impacts to be imposed by the quarry have been previously discussed under separate headings and will thus only be briefly discussed. Considering that the license will be valid for 30 years and because population density and land use in the area may change significantly during that specific period, it will be pertinent that, as a minimum, the EIA & EMP be reviewed during an application to renew the mining license.

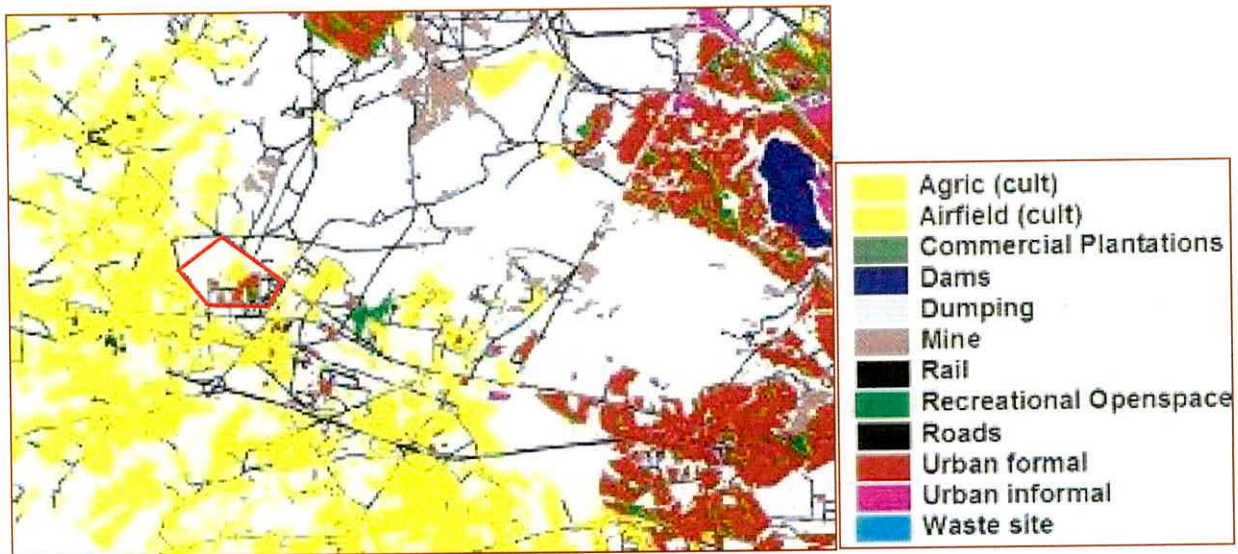
Preliminary impact assessment

Development of the quarry will impose dust and noise impacts slightly higher than the current Prima Quarries operation due to increased associated processes that will be established in the mining area. These impacts can be successfully mitigated if the required measures are implemented. The mentioned impacts will increase with the development of Quarry B & C, but should still fall within an acceptable range, except perhaps for noise generated by blasting. The limited period for which the impact will prevail as well as the low frequency of blasting will cause it to be tolerable. It is however important that the situation be investigated further to determine the correct blasting protocol, for example using the correct burden & spacing, stemming and size of each blast. The combined impact is rated low-moderate with the correct mitigation measures in place.

Development of Quarry B & C will preclude potential future development of abutting land along the boundary fences due to the impacts mentioned above. The area west of Rowallen Park is currently regarded as a future growth area for the Metro and certain developments are already taking place in the area or are in the planning phase. However, the study area has not yet been included in any spatial development plan and the NM MOSS recognizes the area to be a non-restorable mining area. It is therefore assumed that development around the quarry will be properly controlled to avoid similar social problems that were imposed for example by Moregrove Quarry in town. In addition, since abutting landowners has not raised the matter during the consultation processes, this impact is rated of low significance. The principle of 'first come first served' would be applicable in this case since



development of abutting properties would have ruled out the establishment of Quarry B & C from the mine area.



Stock theft and veld fires are other potential impacts that could be imposed by quarry operations. To date there were no complaints to Prima Quarries' management regarding stock theft and it is anticipated that the same scenario will be applicable during the Bigwill Enterprise operations. The fact that the mining operation is separated from the abutting farm land by deep drainage channels and the fact that no people reside in the mining area, may contribute to maintaining the current zero impact.

Veld fires can only be generated by human negligence, electric cable malfunction and blasting. Since all blasting and crushing areas are cleared from vegetative matter, the possibility of starting veld fires area extremely low. The workforce will not be allowed to make fires within or outside the quarry and plant areas but will be restricted to the Prima Quarries premises, where the outbreak of a fire is zero. In addition the quarry and plant area are cut off from farms to the north and east by gravel roads and from farms to the west by drainage lines hosting mostly fire resistant vegetation. It is only the farms located to the south that could be affected but this impact is also limited by the fact that red gravel has been mined out up to the boundary fence causing an elevation difference of two meters and an almost bare soil surface. Over the past 14 years the Prima Quarries operation did not cause any fires on the property or on abutting properties hence an insignificant impact is anticipated. The matters of stock theft and veld fires will be included in the environmental awareness programme.

Currently the cumulative impact of the Prima Quarries operation and the disturbance of the vegetation and soil surfaces of Quarries A, B & D impose a moderate to high impact on the aesthetic value of the property. Mining the Bigwill Enterprise area will cause this impact to increase to very high if no mitigation is implemented since the quarry faces will be opened up to the west and south. With the rehabilitation of the Prima Quarries site and a concurrent rehabilitation approach at the Bigwill Quarry areas, the impact should not increase significantly, especially taking the transformed state of abutting land into consideration.



To ensure that the impacts that the quarry operation impose on abutting landowners is understood correctly and that mitigation measures are adequate, a liaison forum should be established to facilitate open communication channels between land owners and quarry management.

### Preliminary social impact

|              | OPERATIONAL<br>(no mitigation) | WEIGHT | OPERATIONAL<br>(with mitigation) | WEIGHT | CLOSURE   | WEIGHT |
|--------------|--------------------------------|--------|----------------------------------|--------|-----------|--------|
| Extent       | Local                          | 2      | Local                            | 2      | Local     | 2      |
| Duration     | Long Term                      | 3      | Long Term                        | 3      | Long Term | 3      |
| Intensity    | High                           | 6      | Medium                           | 4      | Low       | 2      |
| Probability  | Definite                       | 4      | Likely                           | 3      | Likely    | 3      |
| Status       | Negative                       |        | Negative                         |        | Negative  |        |
| Confidence   | High                           |        | Medium                           |        | Medium    |        |
| Significance | Moderate-High                  | 44     | Low-Moderate                     | 27     | Low       | 21     |

## 11 Additional Specialist Studies

The provisional assessment of impacts associated with the Bigwill Enterprises 10 mining process show a number of impacts that should be mitigated to (a) reduce/ eliminate negative impacts and to (b) enhance positive impacts. Issues that require further investigation for inclusion in the EMP submission include the following:

- As pointed out in the EIA, 80% of the proposed mining area has already been severely affected in terms of surface cover destruction and these areas do not need a formal floristic assessment. However, the new plant and stockpile area as well as phase 3 will require a formal survey. An initial survey has been conducted and will be followed up by additional surveys in January and April 2010 and the impact assessment on vegetation of these areas will be amended according, if new species of concern is identified. Although mining might not have a direct impact on the riverine vegetation, uncontrolled sediment flow could impact on vegetation within the stream environment hence these vegetation will also be surveyed. The survey will be conducted by Adrian Odgers.
- Although the land has been severely affected by previous illegal mining, it is deemed essential that a limited faunal survey is conducted on the property with emphasis on the drainage channels and phase 3. Dr. Bill Branch will be appointed to perform the survey.
- Blasting could impact on boreholes on the abutting properties to the west and south-west, especially when mining phase 2 & 3 and a limited geo-hydrological survey will be conducted.
- Blasting could impact on structures on the abutting properties to the west and south-west and an assessment by a specialist blaster will be obtained to obtain baseline information to measure future impacts, if any, against.
- Blasting and crushing could impact on noise and dust levels on the abutting properties to the west and south-west and a formal survey will be done in this regard to obtain baseline information to measure future impacts, if any, against.



- Considering it compulsory in terms of current SAHARA legislation, a phase 1 Archaeological survey will be conducted by Dr. J. Binneman to determine whether any areas should be excluded from the mine area.
- If any surface water is present in the watercourses, it will be analysed to obtain baseline information to measure future impacts, if any, against

These issues will need to be elaborated upon and incorporated into the EMP so that the recommended mitigating measures could become conditions of Mining Right authorisation.

## 12 Provisional Mine Closure

The proposed mining operation will result in the landscape being lowered within the proposed mining footprint. The lowering of the landscape will continue until the Mining Right for Bigwill Enterprises 10 has expired and adequate measures have been implemented to facilitate mine closure authorisation from the DMR in terms of the MPRDA. It needs to be emphasized that in terms of current legislation, irrespective if the mine closes down prematurely, the applicant will remain responsible for mining until a closure certificate is issued. Directors of the company will be jointly and severally liable for any unacceptable negative environmental impact.

Post-mining rehabilitation will be an ongoing process throughout the lifespan of the mining operation. Mining will proceed as per the recommendations of the EMP, which is to be submitted to the DMR in February 2010.

The post-mining environment will result in flat platform areas with terraced and benched production faces as per the requirements of the DMR. Indigenous vegetation (dominated by local grass species) will be replaced in these areas to ensure that the reworked (lowered) topographical surface is secure and residual impacts such as slope failure, soil erosion, dust generation and water pollution processes are eliminated.

The applicant intends to adhere to the principles of mine closure as per Regulation 56 of the MPRDA, whereby closure is required to be an ongoing process from the start of the mining operation (i.e. registration of the Mining Right currently underway), continuing throughout the life of the mine. Details in this regard and requisite adherence strategies, which will be subjected to annual environmental audits, will form part of the closure strategies and post-rehabilitation landscape.

### ***Latent Impacts***

Latent impacts associated with the proposed Bigwill Enterprises 10 mining operation may include the following:



- Collapse of benched sidewalls due to earth movement or fractured layers (slip layers) could affect slope stability which could impact on vegetation of rehabilitated areas, visuals, soil stability and water quality of watercourses.
- Although individual blasts may not impact on the hydrology of an area, continuous blast over many years could result in minor changes within the geological strata and could impact on production capacity of boreholes over time.
- Although individual blasts may not impact on the structural integrity of nearby infrastructure, continuous blast over many years could result in minor movement of geological strata and resultant impact on the stability and integrity of infrastructure within a radius of 500m.
- Amount of topsoil available might be inadequate to facilitate proper rehabilitation which might lead to less attractive visuals, poor surface cover, water pollution and soil erosion.
- Storm water control structures might collapse under extreme precipitation events and could result in major silt deposition within the stream environment that could affect in-stream ecology

Additional residual / latent impacts may become apparent during more detailed EIA studies during specialist investigations. These issues and associated mitigating measures will be addressed in full during the EIA process and included in the EMP report.

The above latent impacts could also be applicable to the post closure phase and it would be required that a post closure maintenance programme, which is supported by the necessary funds, be adopted.

## 13 Conclusion

The Scoping Report has provided a provisional overview of the biophysical and socio-economic issues associated with the proposed future mining activities at the Bigwill Quarry. This quantitative evaluation and analysis of both the prevailing and proposed conditions in the study area is based on the current state of the environment and the predicted impacts that bedrock mining may have on this environment.

The results of this Scoping Report will be used as basis for more detailed investigation, which will be incorporated into the EIA document, which in turn will form part of the EMP submission to the DMR. The inevitable negative impacts associated with current mining at Prima Quarries will continue to be experienced in the study area and surrounds. However, the historical mining activities in the area have reduced the aesthetics of the immediate area in the long term and the land has already been significantly transformed by previous mining activities, both authorised as well as unauthorised.

It is important under the MPRDA as well as NEMA legislation, therefore, to ensure that the Bigwill Enterprises mining operation is undertaken within acceptable environmental limits as prescribed by the mining and environmental legislation.



The findings of the specialist studies, including recommendations and mitigating measures to be included in the EMP will in all likelihood become conditions of mining authorisation. These recommendations will be incorporated into the EMP, which is to be submitted to the DMR early February 2010.

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