Draft Environmental Impact Assessment Report for Amendment of Environmental Authorisation

for

COROBRIK (PTY) LTD

HESTERS RUST

REF NUMBER: FS 30/5/1/2/3/2/1 (214) EM

Prepared by:

Bucandi Environmental Solutions

Project Manager: Hélen Prinsloo (*Pr.Sci.Nat.*) Reg. No. 400108/11 (SACNASP)

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1. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

1.1 Contact details

Company name: Bucandi Environmental Solutions

Reg. No: 2009/087537/23

Physical address: 23 Burger Street
Viljoenskroon
9520

Postal address: P. O. Box 317
Viljoenskroon
9520

Project coordinator: Hélen Prinsloo

Telephone number: 076 682 4369

Email address: helen@bucandi.co.za

Qualification: M. Tech (Nature Conservation)

Experience: 13 years

Affiliation: SACNASP *Pri.Sci.Nat* 400108/11

Assistant: Anton Louw

Telephone number: 076 422 3484

Email address: info@bucandi.co.za

1.2 Experience of the EAP

The project coordinator, Ms. Helen Prinsloo, have 13 years' experience conducting Environmental Impact Assessments (EIA's) and other environmental management services in South Africa and the USA.
Please see Appendix J for a copy of her Curriculum Vitae.

2. LOCATION OF PROPOSED ACTIVITY

The study area is located 3km north of Welkom in the Free State Province within the Matjhabeng Local Municipality and Lejweleputswa District Municipality (Appendix A). More specifically it is located on Portion 1 of the farm Hesters Rust 29 at 27º55'28.57"S; 26º44'07.88"E (Appendix A). The R70 between the Odendaalsrus (northwest) and Welkom (south) runs 1km north of the site with a municipal road providing access to the site.

21 digit Surveyor General code	F01800000000002900001

Physical address and farm name	Portion 1 of the farm Hesters Rust 29
GPS coordinates	27º55'28.57"S; 26º44'07.88"E

Please see Appendix A for plans and maps showing the location of the proposed activity as well as the associated structures an infrastructure.

3. SCOPE OF ACTIVITY

3.1 Listed activities triggered

NEMA

The proposed activity triggers the following Listed Activities in terms the National Environmental Management Act, Act 107 of 1998 (NEMA):

Activity 28 of Listing Notice 1 (GNR 983) published in Government Gazette No. 38282 of **4 December 2014** as amended **7 April 2017** (GNR 327).

28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 1 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.

Activity 15 of Listing Notice 2 (GNR 984) published in Government Gazette No. 38282 of **4 December 2014** as amended **7 April 2017** (GNR 325).

15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for the undertaking of a linear activity or maintenance purposes undertaken in accordance with a maintenance management plan.

Activity 17 of Listing Notice 2 (GNR 984) published in Government Gazette No. 38282 of **4 December 2014** as amended **7 April 2017** (GNR 325).

17: Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the MPRDA including (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.

3.2 Description of activity

All raw materials mined from this mining area will be used by the Corobrik Odendaalsrus Factory for the manufacture of brick products. The raw materials will only be mined once a year during the dry winter months over a 3-4 month period. During the annual mining period, May to July, shales will be mined and stockpiled for a year's production of clay face bricks.

Excavators will be used to dig out the shale material from the quarry, which will be loaded onto trucks and transported to a prepared stockpiling area at the Corobrik Odendaalsrus Factory where it will be stockpiled. No public roads traverse the property and no public roads will be used to haul the clay to the factory. Rehabilitation of the worked-out sections of the quarry will be carried out concurrently during the quarrying period by a mining contractor.

This will entail the separate stripping of topsoil and subsoil (overburden) from the intended mining area, reprofiling (shaping) of worked-out quarry slopes, backfilling of stripped subsoil into the reprofiled areas, spreading of stripped seed-bearing topsoil over reprofiled and backfilled areas (prepared areas) and profiling (smoothing) of placed topsoil. No permanent infrastructure or permanent personnel will be on the quarry site. A mining contractor will carry out the quarrying operation. Quarrying personnel will consist of a team of 8 to 12 people. Quarrying personnel will be transported to and from the site on a daily basis during the quarrying period.

The following activities will take at the proposed development site:

- Use of existing access road.
- Mine site demarcation.
- Clearing of vegetation for the establishment of the borrow pit.
- Separation of topsoil and subsoil storage mounds within the proposed site boundary.
- Establishment of the borrow pit and mining of shales and clay.
- Movement of vehicles for the purpose of dust abatement, transport of fuel and equipment, waste removal, sewage removal and transport of material from site.
- Concurrent site rehabilitation

No staff will be staying on the site.

4. POLICY AND LEGISLATIVE FRAMEWORK

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLIY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
Mineral Petroleum Development Resources Act	Part A1(k) Part B1(e)	An amendment of a mining right in terms of Section 102 of the MPRDA has been applied for.
National Environmental Management Act (EIA Regulations of 2014 as amended)	Part A1(k) Part B1(e)	An application for Amendment of an Environmental Authorisation in terms of Section 31 of the EIA Regulations of 2014 has been submitted.
National Environmental Management: Air Quality Act	Part A1(k) Part B1(e, f, g, h)	No Atmospheric Emissions Licence will be required. Dust monitoring at the site will be necessary and is written into the EMPr
National Environmental Management: Waste Act	Part A1(k) Part B1(e)	No waste licence will be required.
National Water Act	Part A1(k) Part B1(d)	No water licence will be required.

	Part B1(e)	
National Heritage Resources Act	Part A1(k) Part B1(e)	No permits in terms of the NHRA will be required.
National Dust Control Regulations, 2013 (published in GNR 827 in GG 36974 of 1 November 2013),	Part A1(k) Part B1(e,f,g,h)	Dust control and monitoring at the site will continue to follow these regulations.

5. NEED AND DESIRABILITY OF THE PROJECT

This is an addition to an established quarrying operation that has been in operation since the early 1980's, therefore no infrastructure is required. The property on which the proposed expansion site occurs belongs to the applicant.

Corobrik outsource all its mining activities to mining contractors. The shales quarried at the Hester Rust Quarry Extension will be used for the manufacture of brick products at the Corobrik Odendaalsrus Factory.

Opencast mining, excavator and trucks, load and haul operation. Excavators will be used to dig out the shale material from the quarry, which will be loaded onto trucks and transported to a prepared stockpiling area at the Corobrik Odendaalsrus Factory where it will be stockpiled. No public roads traverse the property and no public roads will be used to haul the clay to the factory. No permanent infrastructure or permanent personnel will be on the quarry site. A mining contractor will carry out the quarrying operation. Quarrying personnel will consist of a team of 8 to 12 people. Quarrying personnel will be transported to and from the site on a daily basis during the quarrying period.

6. PROJECT ALTERNATIVES

6.1 Property or location alternatives

The site and activity was chosen due to the estimated reserves of clay at the site. The exploration results have indicated that the clay underlying this property appears to be suitable for clay brick production as the property has enough clay of a desirable quality. No other sites were considered.

The proposed activity will take place on Portion 1 of the farm Hesters Rust 29 JR. This property was chosen for the following reasons:

- The brickmaking shales at this location is suitable for the mining process and suitable for use in the building industry;
- The proposed site is located directly adjacent to the existing quarry;
- Access to the site already exist;
- All necessary infrastructure for exist at the current quarry and factory and no infrastructure will be erected;
- The vegetation at the site is completely transformed by agriculture.

6.2 Activity alternatives

The proposed activity will entail the excavation of shale materials from a quarry adjacent to the existing quarry. This activity was chosen above other methods for the following reasons:

- Opencast mining making use of excavators and trucks for a load and haul operation is the preferred activity since the resource is shallow and excavation will only take place to a maximum of 25m.
- This activity will lessen the possibility of breaching the water table below the resource since blasting is not used and excavation cannot continue through bedrock protecting the water table.

6.3 Design of layout alternatives

There will be no infrastructure on site. The proposed site layout consist only of a quarry and stacking of topsoil.

6.4 Technology alternatives

The proposed mining will take place through excavation of a quarry. The additional quarry will be 57.9495ha to bring the total borrow area to approximately 169.5933 ha in extent. Vegetation will be cleared from the site. Any seed and plant material will be mulched into the topsoil. Topsoil will be stripped to a depth of 200mm and stockpiled separately from other soil layers in piles not exceeding 1.8m in height. The borrow pit will be excavated by means of an excavator and loaded directly onto haul trucks. The material will be transported directly to areas for construction where it will be used. The borrow pit will be mined to a maximum depth of 25m (measured from ground level to terrace level) in order to prevent any possible damage to geology and interference with underground water. This operational procedure was chosen for the following reasons:

- Enough room exist on site for top soil to be safely stacked and reused for rehabilitation;
- All the excavated shale will be removed from the premises therefore no waste is generated on the site;
- The quarry will be excavated to a maximum of 25m in depth to prevent breaching the water table.

6.5 Operational alternatives

The duration of the project will be 45 to 50 years. During this time general activities will include refuse removal from the site, movement of vehicles and heavy equipment and servicing of vehicles and equipment. The operation of the project can be divided into the following phases:

- Site establishment (Pre-construction Phase) – The boundaries of the proposed mining site will be clearly demarcated and fenced to establish a safe working environment.
- Excavation – (Construction / Operational Phase) – Vegetation and topsoil will be removed to a depth of 200mm and stockpiled at the site in piles no higher than 1.8m. This will be done ongoing as mining continues and not once-off to prevent erosion and excessive dust. Material will be loosened using a ripper if necessary and an excavator will be used to remove the material. Markers will be used continuously to

indicate the vertical and horizontal mining limits. A vertical slope of 1v:3h of unmined soil will be maintained along the edge of the borrow pit at all times. Topsoil will be stockpiled only in designated areas. Backfilling of the borrow pit with any unused material will occur simultaneously with mining in order to prevent erosion and excessive dust.

- Rehabilitation (Decommissioning Phase) – During the final rehabilitation the backfilled material will be graded and topsoil will be ameliorated and spread evenly. The site will be left in a state that is compatible with the proposed land use, providing land that is suitable for agriculture or secondary construction. The rehabilitation activities can be summarised as follow:
    - Unused material and subsoil will be replaced into the borrow pit as mining progresses during the excavation phase. During rehabilitation the remaining subsoil and material will be placed in what remains of the borrow pit and the soil will be levelled and graded to a state that is compatible with the end land use.
    - The remainder of the property that will not be used for the mining and the subsequent development will undergo clearing of alien vegetation and an ongoing alien eradication programme will be established.
    - Monitoring of the site after rehabilitation will continue until the site has been establishment to the satisfaction of the ECO.

6.6 The "no-go" activity alternative

If the proposed activity is not implemented, the site will continue to be used for agriculture. This will have a minimal environmental impact, but will have less of an economic advantage to the owner.

7. PUBLIC PARTICIPATION PROCESS

7.1 Details of public participation process

A notice was placed in the Volksblad on 28 March 2018. Registered letters and/or emails were sent to all the neighbours as well as I&APs that registered during the application for the existing license on 28 March 2018. Two site notices were placed at different locations near the site. Initial notifications stated that a Basic Assessment is being conducted. The Public Participation Process was repeated with the correct information starting on 22 October 2018. This included an invitation to a public meeting. The nearby squatter camp was visited by the Environmental Officer of Corobrik Odendaalsrus, but declined signing any receipt of documentation or attending the public meeting. A public meeting was held on 9 November 2018, but none of the identified I&APs attended the public meeting.

See Appendix D1 for a copy of the newspaper advertisements.
See Appendix D2 for a copy of the site notices.
See Appendix D3 for copies and proof of letters send to I&APs.
See Appendix D4 for details regarding the public meeting.
See Appendix D5 for the complete Comments and Responses Report including a list of Registered I&APs.

A comment was received from Mr. Jan Bezuidenhout, raising concern that he was in possession of a Prospecting Right for the property and the Corobrik has refused to engage with him regarding this in the past. He has subsequently sent a map of his property and it is located directly east and west of the property related to this application. His query relates to neighbouring properties and not the property that forms part of this application.

Copies of the Draft Scoping Report (SR) was circulated on 19 October 2018 to form part of the second round of Public Participation.

Feedback on the Draft SR was received from Mr. Bezuidenhout including a map of the properties where he held a Prospecting Right. It was determined that it does not include the property that forms part of this application.

Comments regarding the Draft SR was received from DMR and included before submission of the Final SR on 16/11/2019.

A copy of the Draft Environmental Impact Assessment Report (EIAR) will be circulated to all the I&APs for comment before submission of the Final EIAR to DMR.

7.1.1 Summary of Public Participation Process

Potential I&AP	**Sent 1st letter**	**Sent 2nd (correct) letter and invitation to public meeting**	**Comments received**	**Sent DSR**	**Comments received**
Jan Bezuidenhout	√	√	Yes	√	Yes
Conshara Farms (Pty) Ltd	√	√	No	√	No
Transnet LTD	√	√	No	√	No
Armgold/Harmony	√	√	No	√	No
DWS (Bernard Jase)	√	√	No	√	No
Matjhabeng Local Municipality (Mr. Mothusi Frank Lepheana)	√	√	No	√	No
Lejweleputswa District Municipality (Ms. Palesa Kaota)	√	√	No	√	No
DMR (Ms. Azwihangwisi Nemulodi)				√	Yes
Department of Rural Development and Land Reform (Ms. B. Alec)		√	No	√	No
DESTEA (Ms. Grace Mkhosana)		√	No	√	No

7.2 Summary of issues raised

Interested and Affected Parties		Date comments received	Issues raised	EAPs response to issues as mandated by the applicant	Section of reference in this report
AFFECTED PARTIES					
Landowner/s					
None (land is owned by applicant)					
Lawful occupier/s of the land					
None					
Landowners or lawful occupiers on adjacent properties	**X**				
Mr. Jan Bezuidenhout	X	13/04/2018	Mr. Bezuidenhout may have historically held a Prospecting Right on the property.	A copy of the Draft SR was sent to Mr. Bezuidenhout	Appendix A
		26/10/2018	Mr. Bezuidenhout submitted a map of the property in question.	It is located on a neighbouring property and not on the property related to this application	Appendix A
Conshara Farms (Pty) Ltd	X				
Transnet LTD	X				
Armgold/Harmony	X				
Municipal councillor					
Municipality	**X**				

Interested and Affected Parties		Date comments received	Issues raised	EAPs response to issues as mandated by the applicant	Section of reference in this report
Matjhabeng Local Municipality (Mr. Mothusi Frank Lepheana)	X	None			
Lejweleputswa District Municipality (Ms. Palesa Kaota)	X	None			
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS					
DWS (Mr. Bernard Jase)	X	None			.
Communities					
"Squatter camp"	X	None			
Dept. Land Affairs					
Department of Rural Development and Land Reform (Ms. B. Alec)	X	None			
Traditional Leaders					
None					
Dept. Environmental Affairs	**X**				
DESTEA (Ms. Grace Mkhosana)	X	None			
Other Competent Authorities affected					
DMR (Ms. Azwihangwisi Nemulodi)	X	30/07/2018	**Application submitted 22/08/2016** - Incorrect type of application.	- Application type was changed to not	- Amended

Interested and Affected Parties		Date comments received	Issues raised	EAPs response to issues as mandated by the applicant	Section of reference in this report
				include a Waste Licence Application	application
			- Incorrect item description.	- Item description changed to reflect the Amendment of an Environmental Authorisation.	- Amended application
			- Incorrect activity description.	- Activity description rectified.	- Amended application
			- Details required on planned public engagement.	- Details provided in point 6.1.2	- Amended application
			- Declaration under oath was not completed.	- Included declaration under oath	- Amended application
			- Department of Land Affairs should be included in PPP	- A notification letter and copy of Draft SR was circulated to the Department of Rural Development and Land Reform	- Section 7 and Appendix D
			Amended application and Draft Scoping Report submitted 09/10/2018		
			- Requirements for PPP were given and a Public Meeting has to be held.	- PPP was conducted according to the requirements and a Public Meeting was held on 9 November 2018.	- Section 7 and Appendix D
			- People of the “squatter camp” should be consulted and invited to the meeting.	- A representative of the mine visited the “squatter camp” on 3 separate occasions, but they declined to sign any documentation, submit concerns or attend the meeting.	- Section 7 and Appendix D
			- Specific specialist studies should be included.	- A Terrestrial Ecology Assessment, Baseline Wetland Study and Heritage Impact Assessment was conducted.	- Sections 8, 9 and 11 and Appendix E

Interested and Affected Parties		Date comments received	Issues raised	EAPs response to issues as mandated by the applicant	Section of reference in this report
			- The Scoping Report should be circulated to all the relevant Organs of State, including Land Affairs. **Final Scoping Report** - Some maps required a legend. - Specialist studies should be conducted. - All the relevant state departments should have time to comments. - The camp should be consulted and provided with a copy of the Draft EIAr. - Notice boards and a newspaper ad should state that the EIAr is available for comment. - The Department of Land Affairs should be consulted.	- The SR was circulated to all the Organs of State listed in 7.1.1. - A legend has been included in all maps. - The Specialist Studies are included in the Draft EIAr. - The Draft EIAr will be circulated to all the Organs of State listed in 7.1.1 as well as DAFF and SAHRA. - A copy of the Draft EIAr will be given to the camp and proof will be attached. - Proof of this will be included in the Final EIAr. - The Department of Rural Development and Land Reform was consulted to ensure that no land claims exist on the property.	- Section 7 - Appendix A - Sections 8, 9 and 11 and Appendix E - Section 7 - Section 7 - Section 7 - Section 7
OTHER AFFECTED PARTIES					
INTERESTED PARTIES					
None					

8. ENVIRONMENTAL ISSUES AND POSSIBLE IMPACTS

8.1 Bio-physical environment

* See 9.2 for methodology of calculating significance.

8.1.1 Climate

The site falls within climate zone 580S. Odendaalsrus normally receives about 403mm of rain per year, with most rainfall occurring mainly during summer with January being the wettest month (average 73mm) and June the driest (average 0mm). Maximum temperature ranges from lowest average in June (17°C) to highest average in January (30°C). Minimum temperature is at its lowest average in July (0ºC). Mean annual evaporation is between 1 600 and 1 800mm. The main wind direction is from the North East and the average wind speed is 1.96m/s. The relative humidity of the study area at 14:00 fluctuates between 33% in July and 48% in February.

The activity will have no impact on climate.

8.1.2 Landtype (soils and geology)

The study area consists of landtypes Dc9, Bd20 and Ae40.

Dc9

The landtype covers 3.78ha in the northern corner of the site. Geology for this landtype consists of Ecca sandstone, mudstone and shale with occasional dolerite sills. Sporadic occurrences of calcrete occur in bottomlands while Aeolian sand overlies uplands between pans where they occur (there are no pans on the study area). Soils for this landtype belong to the following soil series or land classes: Killarney Ka20, Sarasdale Wo20, Shorrocks Hu36, Mangano Hu33, Nyoka Sw41, Malakata Sw40, Rosehill Sw30, Lindley Va41, Valsrivier Va40, Zuiderzee Va20, Limpopo Oa46, Letaba Oa26, Sterkspruit Ss26, Stanford Ss23, Blinkklip Cv36, Annandale Cv33, Gelykvlakte Ar20, Enkeldoorn Es33, Estcourt Es36 Loskop Ms12 and Kalkbank Ms22.

Bd20

The landtype covers 25.76ha on the eastern side of the proposed expansion area. Geology for this landtype consists of shale, mudstone and sandstone of the Ecca and Beaufort Groups. Aeolian and possibly colluvial sand overlies the rocks. Soils for this landtype belong to the following soil series or land classes: Blinkklip Cv36, Soetmelk Av36, Annandale Cv33, Shorrocks Hu36, Mangano Hu33, Arniston Va31, Waterval Va11, Gelykvlakte Ar20, Rensburg Rg20, Lindley Va41, Valsrivier Va40, Killarney Ka20, Limpopo Oa46, Mutale Oa47, Killarney Ka20 and Gelykvlakte Ar20.

Ae40

The landtype covers 23.22ha on the western side of the proposed expansion area. Geology for this landtype consists of Ecca sandstone, mudstone, and shale with sporadic occurrence of intrusive dolerite sills. Aeolian sands derived from Ecca sandstone overlie all rocks. Soils for this landtype belong to the following soil series or land classes: Shorrocks Hu36, Mangano Hu33, Roodepoort Hu30, Sarasdale Wo20, Chinyika Wo21, Killarney Ka20,

Rensburg Rg20, Makuya Cv34, Annandale Cv33, Valsrivier Va40, Lindley Va41, Stanford Ss23, Sterkspruit Ss26, Malakata Sw40, Mispah Ms10, Loskop Ms12, Kalkbank Ms22, Bainsvlei Bv36, Bleeksand Av33, Blinkklip Cv36, Limpopo Oa46, Soetmelk Av36 and Sunbury Cv30.

During the operational months (3 or 4 months a year) vehicles will be moving on the site posing a risk of soil pollution should oil or fluid leakages occur. It will be necessary to ensure that vehicles are serviced regularly to prevent this from occurring.

Specific risks identified and reversibility/avoidance:
- Soil pollution caused by leakages and spills from vehicles and littering.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Temporary	Significant	40-70%	Probable	Low	Negative

Proposed mitigation and management:
- Drip trays must be used when refuelling and servicing construction vehicles or equipment. A spill "sock" should permanently be placed within the drip tray and replaced as and when required. Drip trays must be placed underneath stationary construction vehicles and the hazardous waste (e.g. fuel, oils etc.) taken to the nearest approved oil refiner or fuel recycling point for recycling.
- The existing road infrastructure as indicated in the land use map should be used, where possible.

8.1.3 Ecology and sensitive habitats

Vaal-Vet Sandy Grassland

The eastern 24.73 ha of the proposed expansion site historically consists of Vaal-Vet Sandy Grassland which is an endangered vegetation type located in the Dry Highveld Grassland Bioregion of the Grassland Biome (Appendix A). According to the South African National Spatial Biodiversity Assessment of 2004 about 36.8% of the vegetation type remains. It has a conservation target of 24% and currently only 0.3% is statutorily conserved (in the Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves). More than 63% is transformed for cultivation (ploughed for commercial crops) and the rest is under strong grazing pressure from cattle and sheep. Erosion is classified as very low in 85.3% of this vegetation type and low in 11%.

The part of the proposed expansion covered historically by this vegetation type has been completely transformed due to the agricultural history of the area.

Western Free State Clay Grassland

The western 28.04 ha of the proposed expansion site historically consists of Western Free State Clay Grassland which is classified as Least Threatened and located in the Dry Highveld Grassland Bioregion of the Grassland Biome (Appendix A). According to the South African National Spatial Biodiversity Assessment of 2004 about 80.8% of the vegetation type remains. It has a conservation target of 24% and currently only 0% is statutorily conserved. Almost 20% already transformed for maize and wheat cultivation. A species of *Prosopis*

appears as occasional invasive alien. Erosion is classified as very low in 38% of this vegetation type, low in 30% and moderate in 28%.

The part of the proposed expansion covered historically by this vegetation type has been partially transformed due to the agricultural history of the area and approximately 11ha of indigenous vegetation remain.

The biodiversity classification (see Appendix A) of the proposed expansion site is as follows:
Critical Biodiversity Area 1 – 0.88ha
Ecological Support Area 1 – 0.63ha
Ecological Support Area 2 – 16.89ha
Degraded – 30.05ha

Due to a part of the site consisting of natural vegetation and the nature of the impact, specialist studies were conducted to determine the diversity of terrestrial ecology as well as the status of any wetlands at the site and the potential impact of the activity on these aspects. (Appendix E1 and E2).

Three broad-scale habitat units (vegetation associations – VAs) were identified

- Vegetation Association 1 (VA1) – Untransformed *Themeda triandra - Eragrostis lehmanniana* grassland. This vegetation association is restricted to the western part of the study site, whereby it forms a mosaic with the *Vachellia karroo - Asparagus laricinus* bush clumps. VA1 is considered to have a high ecological sensitivity.
- Vegetation Association 2 (VA2) – Semi-transformed *Vachellia karroo - Asparagus laricinus* bush clumps. This vegetation association is essentially a savannoid grassland confined to the western part of the study site, where it also overlaps with the untransformed *Themeda triandra - Eragrostis lehmanniana* grassland unit. VA2 is considered to have a medium ecological sensitivity.
- Vegetation Association 3 (VA3) - *Eragrostis lehmanniana - Cynodon dactylon* secondary grassland. This vegetation association occurs on the eastern part of the study site. It occurs on areas where historical tilling and cultivation were evident. VA3 is considered to have a medium ecological sensitivity.

No species of conservation concern were recorded. One data deficient species (c. *Lessertia phillipsiana*) is biogeographically restricted to the Vaal-Vet Sandy Grassland and hence could potentially occur on the study site. However, considering the secondary ecological condition of the *Eragrostis lehmanniana - Cynodon dactylon* grassland unit, the probability that it could be present is low.

No protected tree species according to the National Forests Act of 1998 (Act no.84 of 1998) (NFA, 1998), or plant species included in the Gauteng Orange and Red plant species list were recorded during the time of this study, neither any species listed as threatened or protected by the National Environmental Management: Biodiversity Act's (Act No. 10 of 2004) list of Threatened or Protected Species (TOPS) as published in Government Gazette

no. 36375 of 16 April 2013 (TOPS, 2013), were recorded in the study area during the time of the study.

During the study only 19 naturalised alien plant species were recorded in the study area. According to the Conservation of Agricultural Resources Act (Act No. 43 of 1983) in Henderson (2001) and the National Environmental Management Biodiversity Act's 2014 list of proposed weeds and invaders (NEMBA, 2014), seven of these species are classified as alien weed and invader species. All the alien species observed on the study site are classified as Category 1b invasive species.

The following possible impacts were highlighted by the specialist study:

- The study site represents untransformed and transformed grassland, including semi-transformed bush clump habitat. From an ecological perspective, the impact of the proposed development/activity will not have any significant effect on a threatened vegetation type or species.
- The potential occurrence of threatened or near threatened plant and fauna species on any of the identified habitat units on the study site is low, and given the small surface area and fragmented nature of the untransformed grassland unit, it is unlikely that the proposed development/activity will have a detrimental effect on the local ecological integrity of prevalent ecological processes, especially when considering that more than 65% of the study site have been historically transformed.
- The dominant fauna composition consists mainly of generalist species with widespread distribution ranges, while the untransformed grassland unit appears to have limited ecological connectivity to the west and south. For this reason, the long-term conservation value of the untransformed grassland unit on the study site is questionable based on its limited ecological connectedness.

Specific risks identified and reversibility/avoidance:

- Increased turbidity as a result of storm water run-off from cleared areas and roads.

This impact can be **avoided** by implementing a storm water management plan.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Significant	70-90%	Definite	High	Negative

- Acceleration of erosion and loss of topsoil at cleared areas.

This impact can be **sufficiently mitigated** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Significant	70-90%	Definite	High	Negative

- Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material by means of wind and rain).

This impact can be **avoided** by implementing a storm water management plan.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Significant	70-90%	Definite	High	Negative

- Loss of sense of place.

This impact cannot be avoided, but is **reversible** through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Very significant	>90%	Definite	Very high	Negative

- Increase in dust levels, especially during the dry and windy season.

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Moderate	70-90%	Probable	Low	Negative

- The introduction and spreading of exotic invasive weed species at cleared areas

This impact cannot be **avoided**, but is reversible through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Significant	>90%	Definite	High	Negative

- Loss of indigenous vegetation.

This impact cannot be **avoided**, but is reversible through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Very significant	>90%	Definite	High	Negative

- Loss of wildlife habitat.

This impact cannot be **avoided**, but is reversible through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Very significant	>90%	Definite	High	Negative

Proposed mitigation and management:

- As a precautionary principle a brief follow-up survey is recommended aimed specifically at searching for potentially occurring sub-populations of Giant Girdled Lizard (*Smaug giganteus*) on the secondary grassland. Although the likelihood that this species could occur is low, the study site coincides with the western distribution range of *S. giganteus*.
- In the event of any protected or Declining species being recorded within the approved development site, permission for the removal of such species should be obtained from the Permitting Office of DESTEA, and the appropriate in situ and / or ex situ conservation measures should be developed and implemented with the approval of the DESTEA conservation authorities. Where feasible, protected or Declining species can be translocated to degraded or untransformed parts of the study area which provide potentially suitable habitat, but such translocations will have to be carried out in a way that ensures no ecological degradation of the host habitat occurs, and will have to be evaluated by an ecologist for each species and each potential translocation area. Alternatively, protected or Declining species can be rescued and donated to appropriate conservation and research institutions such as the Walter Sisulu National Botanical Garden (Roodepoort) or the Pretoria National Botanical Garden of SANBI.
- Where possible, development should avoid habitat identified with high ecological sensitivity.
- According to the AIS regulations all declared alien weeds must be effectively controlled or eradicated.

Two artificial wetlands are located within a 500m radius from the proposed expansion. A Wetland Study was completed to assess any possible impact on these wetlands. The nearest is an artificial wetland within the existing quarry that is an unavoidable result of a depression created by opencast mining. The wetland may change over time as mining continues in the quarry, but it could also be utilised as part of the post-mining landuse of the quarry. This artificial wetland is located more than 200 m south of the study area and is therefore unlikely to be negatively influence by proposed future mining activities within the study area. The distance between the study area and the delineated artificial wetlands reduces the likelihood of quantifiable negative impacts occurring. The artificial nature of the wetlands with an associated Low/Marginal Ecological Importance and Sensitivity (EIS) further reduces the significance of new mining related impacts on these watercourses.

Due to the very low significance of mining related impacts on the artificial wetlands, no recommendations are provided to mitigate impacts on artificial wetlands for proposed mining activities confined within the study area.

A site layout and composite ecological map with sensitive areas is included as Appendix F.

8.1.4 Topography

The site is very flat with a general gradient of 1:250. If the rehabilitation plan is followed the topography should not be impacted.

8.1.5 Current land use and general status

The farm is located in an area that is used for grazing and clay mining. The proposed site is currently used for grazing and was bought by the applicant for the purposed of mining. It can be rehabilitated back to a state that is suitable for agriculture.

Specific risks identified and reversibility/avoidance:

- Loss of available agricultural land.

This impact cannot be **avoided**, but is reversible through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Very significant	>90%	Definite	High	Negative

- Loss of indigenous vegetation.

This impact cannot be avoided, but is reversible through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Very significant	>90%	Definite	High	Negative

- Loss of wildlife habitat.

This impact cannot be **avoided**, but is reversible through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Very significant	>90%	Definite	High	Negative

Proposed mitigation and management:

- Care must be taken that unnecessary clearance of vegetation does not take place. The

footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.

- As a precautionary principle a brief follow-up survey is recommended aimed specifically at searching for potentially occurring sub-populations of Giant Girdled Lizard (*Smaug giganteus*) on the secondary grassland. Although the likelihood that this species could occur is low, the study site coincides with the western distribution range of *S. giganteus*.
- In the event of any protected or Declining species being recorded within the approved development site, permission for the removal of such species should be obtained from the Permitting Office of DESTEA, and the appropriate in situ and / or ex situ conservation measures should be developed and implemented with the approval of the DESTEA conservation authorities. Where feasible, protected or Declining species can be translocated to degraded or untransformed parts of the study area which provide potentially suitable habitat, but such translocations will have to be carried out in a way that ensures no ecological degradation of the host habitat occurs, and will have to be evaluated by an ecologist for each species and each potential translocation area. Alternatively, protected or Declining species can be rescued and donated to appropriate conservation and research institutions such as the Walter Sisulu National Botanical Garden (Roodepoort) or the Pretoria National Botanical Garden of SANBI.
- Where possible, development should avoid habitat identified with high ecological sensitivity.
- According to the AIS regulations all declared alien weeds must be effectively controlled or eradicated.

8.1.6 Air quality

Other open cast mining occur directly adjacent to the proposed expansion at the existing quarry, resulting in higher dust levels.

There will be an increased risk of dust pollution during the operational 3 – 4 months.

Specific risks identified and reversibility/avoidance:

- Increase in dust levels, especially during the dry and windy season.

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Moderate	70-90%	Probable	Low	Negative

Proposed mitigation and management:

- It should be ensured that the personnel comply with speed restriction of 20 km per hour within the site boundaries to reduce the generation of dust.
- Dust suppression through the spraying of water should be practiced.

8.1.7 Water

Water will be used for dust control. The water necessary will be obtained from rainwater collecting in the existing quarry and the proposed new quarry.

Specific risks identified and reversibility/avoidance:

- Contamination of surface water caused by the storage and disposal of construction and domestic waste.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study	Temporary	Insignificant	40-70%	Probable	Low	Negative

area						

- Chemical pollution of water as a result of leaks or spills from vehicles.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Temporary	Insignificant	40-70%	Probable	Low	Negative

- Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material by means of wind and rain.

This impact can be **avoided** by implementing a storm water management plan.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Significant	70-90%	Definite	High	Negative

- Added pressure on water resources.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Site	Temporary	Moderate	<40%	Improbable	Low	Negative

Proposed mitigation and management:

- Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.
- In order to contain oil and fuel spills, drip pans or PVC lining shall be provided for drip pans Spill kits be readily available on site and in every vehicle.
- Existing roads / tracks should be used wherever possible.
- Any new tracks must be pre-approved by the ECO and landowner. It should be ensured that steep slopes and sensitive environments (e.g. watercourses) are avoided during the planning of the new routes.
- Any stock piles that start to erode significantly or cause dust problems, should be covered with hessian or a plastic cover.
- To prevent storm water damage, the increase in storm water run-off resulting from mining activities must be estimated and the drainage system assessed accordingly, to prevent downstream impacts on water resources (including but not limited to: scouring, sedimentation, erosion and undercutting).
- Water should be used sparingly and it should be ensured that no water is wasted e.g. regular inspection of pipes to ensure that no leaks occur.
- Water tanks should be regularly inspected to ensure that no leaks occur.

8.2 Human environment

8.2.1 Cultural heritage

A cultural heritage assessment was conducted at the proposed site (Appendix E3). No heritage (historical or archaeological) sites were recorded during the survey and it is therefore recommended that the project proceed as no further mitigation will be required. Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (cf. NHRA (Act No. 25 of 1999), Section 36 (6)).

8.2.2 Socio-economic environment

The Matjhabeng Local Municipality is a Category B municipality situated in the Lejweleputswa District in the Free State Province. It is bound by Nala to the north, Masilonyana to the south, Tswelopele to the east and Moqhaka to the west. It is one of five municipalities in the district. Matjhabeng represents the hub of mining activity in the Free State Province. There is one formal land-based protected area in the municipality, being the Willem Pretorius Nature Reserve. There are no Ramsar sites. Grassland is the one biome in the Matjhabeng Municipality. Seven vegetation types are found, namely Bloemfontein Karroid Shrubland, Central Free State Grassland, Highveld Alluvial Vegetation, Highveld Salt Pans, Vaal-Vet Sandy Grassland, Western Free State Clay Grassland and Winburg Grassy Shrubland. There is one endangered ecosystem, covering 11% of the Matjhabeng Municipality. This is the Vaal-Vet Sandy Grassland. There is only one water management area, namely the Middle Vaal. Five rivers run through the municipality, including the Koolspruit, Sand, Sandspruit and Vet. Wetlands cover 5.5% of the Matjhabeng Municipality. Matjhabeng covers a total area of 5 690km² and includes the towns/cities of Allanridge, Hennenman, Odendaalsrus, Ventersburg, Virginia and Welkom. The main economic sectors are mining and manufacturing.

Demographic details for are listed below:

	2016	**2011**
Population	429 113	407 020
Age Structure		
Population under 15	25.0%	27.3%
Population 15 to 64	70.2%	68.1%
Population over 65	4.8%	4.7%
Dependency Ratio		
Per 100 (15-64)	42.4	46.9
Sex Ratio		
Males per 100 females	101.2	98.3
Population Growth		
Per annum	1.20%	n/a
Labour Market		
Unemployment rate (official)	n/a	n/a
Youth unemployment rate (official) 15-34	n/a	n/a
Education (aged 20 +)		
No schooling	3.0%	4.4%
Matric	33.8%	27.2%
Higher education	7.9%	8.3%
Household Dynamics		
Households	149 163	123 382
Average household size	2.9	3.1
Female headed households	39.3%	39.8%
Formal dwellings	84.5%	78.5%

Housing owned	71.5%	58.5%
Household Services		
Flush toilet connected to sewerage	84.6%	81.0%
Weekly refuse removal	72.7%	86.1%
Piped water inside dwelling	53.3%	54.8%
Electricity for lighting	94.7%	91.1%

Source: Census 2011 Municipal Fact Sheet, published by Statistics South Africa.

A Social and Labour Plan has been compiled as part of the Mining Works Programme (Appendix H).

- Execution of this plan contribute R5 459 000 in Human Resource Development and R630 000 in Local Economic Development over the first 10 years of operation.
- Revenue of R87 733 000 is expected for the first year and estimated to increase by 6% annually.
- There are no capital expenditure requirements planned at the site as only quarrying will be carried out at the site and only for about 3-4 months a year.

Specific risks identified and reversibility/avoidance:

- Loss of human lives as a result of mining activities and the movement of construction vehicles on site.

This impact can be **avoided** through the implementation of the correct safety and management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Site	Permanent	Significant	40-70%	Improbable	Medium	Negative

- Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site.

This impact can be **minimised** through the implementation of the correct safety and management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Significant	40-70%	Probable	Medium	Negative

- Increased criminal activities.

This impact can be **minimised** through correct management and by not allowing staff to stay on site after hours.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Insignificant	<40%	Improbable	Low	Negative

- Increasing environmental awareness by educating community and contractors on the outlines of the EMP.

No mitigation suggested.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Significant	>90%	Definite	High	Positive

Proposed mitigation and management:

- The site must be properly demarcated and the proposed access routes approved by the

ECO and landowner prior to the commencing of the mining activities.
- No open fires are allowed outside designated cooking areas.
- Site supervisors must ensure that the staff remains within the demarcated mining areas and access routes at all times.
- No smoking is to be allowed in the vicinity of fuel dispensing areas (smoking is only to be allowed in designated "safe" areas).
- Adequate firefighting equipment must be available onsite at all times and at least one person present on the site must be trained in the use thereof.
- Labourers and contract workers (if any) should be accompanied by a responsible supervisor at all times.
- Strict access control must be exercised to ensure that no unauthorised persons enter the property.
- The workers must wear Personal Protective Equipment (PPE) to ensure their safety during mining.
- Workers may not receive any visitors while they are within the property.
- Workers should not be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the mining area while on the influence of alcohol or drugs.
- Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
- It must be ensured by the relevant contractor that all the a list of all the relevant emergency telephone numbers and contact persons are kept up to date and posted at relevant locations at the site.

8.2.3. Waste

General waste will be collected in bins, recycled as far as possible and disposed of at a licences facility. No hazardous waste will be generated at the site. Chemical toilets will be erected at the site for the use of contractors while on site.

Specific risks identified and reversibility/avoidance:

- Contamination of surface water caused by the storage and disposal of construction and domestic waste.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Temporary	Insignificant	40-70%	Probable	Medium	Negative

- Loss of sense of place.

This impact can be **minimised** through the implementation of the correct safety and management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Very significant	>90%	Definite	Very high	Negative

Proposed mitigation and management:

- Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.

8.2.4 Traffic

Traffic to the site will be increased due to the collection of raw material from the quarry.

Specific risks identified and reversibility/avoidance:

- Increased turbidity as a result of storm water run-off from cleared areas and roads.

This impact can be **avoided** by implementing a storm water management plan.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Significant	70-90%	Definite	High	Negative

- Soil pollution caused by leakages and spills from vehicles and littering.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Temporary	Insignificant	40-70%	Probable	Low	Negative

- Chemical pollution of water as a result of leaks or spills from vehicles.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Temporary	Insignificant	40-70%	Probable	Low	Negative

- Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property.

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Moderate	70-90%	Probable	Low	Negative

- Increased levels of noxious gas emissions from construction vehicles and machinery

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Moderate	70-90%	Probable	Low	Negative

- Increase in dust levels, especially during the dry and windy season.

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Moderate	70-90%	Probable	Low	Negative

- Loss of human lives as a result of mining activities and the movement of construction vehicles on site.

This impact can be **avoided** through the implementation of the correct safety and management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Site	Permanent	Significant	40-70%	Improbable	Medium	Negative

- Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site.

This impact can be **minimised** through the implementation of the correct safety and management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Significant	40-70%	Probable	Medium	Negative

- Degradation of access road.

This impact can't be avoided, but can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Significant	70-90%	Probable	Medium	Negative

Proposed mitigation and management:

- To prevent storm water damage, the increase in storm water run-off resulting from mining activities must be estimated and the drainage system assessed accordingly, to prevent downstream impacts on water resources (including but not limited to: scouring, sedimentation, erosion and undercutting).
- Drip trays must be used when refuelling and servicing construction vehicles or equipment. A spill "sock" should permanently be placed within the drip tray and replaced as and when required. Drip trays must be placed underneath stationary construction vehicles and the hazardous waste (e.g. fuel, oils etc.) taken to the nearest approved oil refiner or fuel recycling point for recycling.
- The existing road infrastructure as indicated in the land use map should be used, where possible.
- Any new tracks must be pre-approved by the ECO and landowner. It should be ensured that steep slopes and sensitive environments (e.g. watercourses) are avoided during the planning of the new routes.
- Mining should only take place between 08h00 and 17h00 from Monday to Friday.
- Vehicles and construction equipment must be well serviced so that it does not produce excessive smoke.
- It should be ensured that the personnel comply with speed restriction of 20 km per hour within the site boundaries to reduce the generation of dust.
- The site must be properly demarcated and the proposed access routes approved by the ECO and landowner prior to the commencing of the mining activities.
- No open fires are allowed outside designated cooking areas.
- Site supervisors must ensure that the staff remains within the demarcated mining areas and access routes at all times.
- No smoking is to be allowed in the vicinity of fuel dispensing areas (smoking is only to be allowed in designated "safe" areas).
- Adequate firefighting equipment must be available onsite at all times and at least one person present on the site must be trained in the use thereof.
- Labourers and contract workers (if any) should be accompanied by a responsible supervisor at all times.
- Strict access control must be exercised to ensure that no unauthorised persons enter the property.
- The workers must wear Personal Protective Equipment (PPE) to ensure their safety during mining.
- Workers may not receive any visitors while they are within the property.
- Workers should not be allowed to keep or use alcohol, recreational drugs, traditional or

modern weapons, snares or otherwise dangerous objects on-site, or to enter the mining area while on the influence of alcohol or drugs.
- Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
- It must be ensured by the relevant contractor that all the a list of all the relevant emergency telephone numbers and contact persons are kept up to date and posted at relevant locations at the site.
- Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
- Any damage to public or private property, including roads, storm water systems, fences, gates, buildings and other structures, pipes, lines and other utilities or infrastructure and movable properties, should be repaired, replaced or otherwise compensated for as agreed with the affected person.
- The applicant must arrange for a discussion session with the surrounding access route users with regard to the maintenance of the access road.
- A complaints register should be maintained to log complaints by landowners, occupants and other Interested and Affected Parties, and response to such complaints.
- The complaints register should be provided to DMR on an annual basis and at any point in time if requested by the DMR.

8.2.5 Noise

Excavation activities will result in an increase in noise during the operational months. The increased traffic on the road will also increase the amount of noise.

Specific risks identified and reversibility/avoidance:
- Elevated noise levels in the area as a result of the front end loader and the movement of hauling trucks along the access road.

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Significant	40-70%	Definite	High	Negative

- Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property.

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Moderate	70-90%	Probable	Low	Negative

Proposed mitigation and management:
- Vehicles and construction equipment must be well serviced so that they do not produce excessive noise.
- Mining should only take place between 08h00 and 17h00 from Monday to Friday.
- It should be ensured that the personnel comply with speed restrictions of 20 km per hour within the site boundaries to reduce the generation of noise.
- Contractors must comply with provincial noise regulations. The construction machinery

must be fitted with noise mufflers and be maintained properly.
- Mining should only take place between 08h00 and 17h00 from Monday to Friday.

8.2.6. Visual

Similar quarries exist in the area and a brickmaking factory is located directly north of the site.

Specific risks identified and reversibility/avoidance:
- Acceleration of erosion and loss of topsoil at cleared areas.

This impact can't be avoided, but can be significantly **mitigated** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Significant	70-90%	Definite	High	Negative

- Contamination of surface water caused by the storage and disposal of construction and domestic waste.

This impact can be **avoided** through the correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Temporary	Insignificant	40-70%	Probable	Low	Negative

- Loss of sense of place

This impact can't be avoided, but is **reversible** through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Very significant	>90%	Definite	Very high	Negative

- Visual disturbance to surrounding residents as a result of the mining activities.

This impact can't be avoided, but is **reversible** through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Very significant	>90%	Definite	Very high	Negative

- Increase in dust levels, especially during the dry and windy season.

This impact can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Temporary	Moderate	70-90%	Probable	Low	Negative

- Degradation of access road.

This impact can't be avoided, but can be **minimised** through correct management measures.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Significant	70-90%	Probable	Medium	Negative

- Loss of available agricultural land.

This impact can't be avoided but is **reversible** through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Study area	Permanent	Very significant	>90%	Definite	High	Negative

- The introduction and spreading of exotic invasive weed species at cleared areas.

This impact can't be avoided but is **reversible** through proper rehabilitation.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Significant	>90%	Definite	High	Negative

- The rehabilitation process will enhance the scenic beauty of the area.

No mitigation proposed.

Extent	Duration	Severity	Certainty	Probability	Significance	Status
Local	Permanent	Irreversible	>90%	Definite	Very high	Positive

Proposed mitigation and management:

- Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
- The rehabilitation and soil management must be done in accordance with the guidelines provided in the EMPr.
- Any stock piles that start to erode significantly or cause dust problems, should be covered with hessian or a plastic cover.
- Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.
- Access to the site should be pre-arranged with the landowner. Only authorised personnel may be permitted on site.
- The mining area and stockpiled material must be positioned and managed in an ecologically sound manner, minimising the potential negative impacts on the surrounding environment.
- It should be ensured that the personnel comply with speed restriction of 20 km per hour within the site boundaries to reduce the generation of dust.
- Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
- Any damage to public or private property, including roads, storm water systems, fences, gates, buildings and other structures, pipes, lines and other utilities or infrastructure and movable properties, should be repaired, replaced or otherwise compensated for as agreed with the affected person.
- The applicant must arrange for a discussion session with the surrounding access route users with regard to the maintenance of the access road.
- A complaints register should be maintained to log complaints by landowners, occupants and other Interested and Affected Parties, and response to such complaints.
- The complaints register should be provided to DMR on an annual basis and at any point in time if requested by the DMR.
- Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
- Alien invasive plants should be removed from all disturbed and subsequently rehabilitated areas.

9. POTENTIAL IMPACTS

9.1 Full description of impacts and risks identified

Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which these impacts can be mitigated

9.1.1 Activity alternative 1 – Clay mining (preferred activity)

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance before mitigation	Status of Impact	Reversibility/Mitigation Measures to be Implemented
Increased turbidity as a result of storm water run-off from cleared areas and roads	2	5	3	2	5	High	Negative	This impact can be avoided by implementing a storm water management plan.
Acceleration of erosion and loss of topsoil at cleared areas	2	5	3	2	5	High	Negative	This impact can't be avoided, but can be sufficiently mitigated through the correct management measures.
Soil pollution caused by leakages and spills from vehicles and littering	2	1	1	3	3	Low	Negative	This impact can be avoided through the correct management measures.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance before mitigation	Status of Impact	Reversibility/Mitigation Measures to be Implemented
Contamination of surface water caused by the storage and disposal of construction and domestic waste	2	1	1	3	3	Low	Negative	This impact can be avoided through the correct management measures.
Chemical pollution of water as a result of leaks or spills from vehicles	2	1	1	3	3	Low	Negative	This impact can be avoided through the correct management measures.
Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material by means of wind and rain	2	5	3	2	5	High	Negative	This impact can be avoided by implementing a storm water management plan.
Added pressure on water resources	1	1	2	4	2	Low	Negative	This impact can be avoided through the correct management measures.
Loss of sense of place	3	5	4	1	5	Very high	Negative	This impact cannot be avoided, but is reversible through proper rehabilitation.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance before mitigation	Status of Impact	Reversibility/Mitigation Measures to be Implemented
Visual disturbance to surrounding residents as a result of the mining activities	3	5	4	1	5	Very high	Negative	This impact cannot be avoided, but is reversible through proper rehabilitation.
Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route	3	1	3	3	5	High	Negative	This impact can be minimised through correct management measures.
Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property	3	1	2	2	3	Low	Negative	This impact can be minimised through correct management measures.
Increased levels of noxious gas emissions from construction vehicles and machinery	3	1	2	2	3	Low	Negative	This impact can be minimised through correct management measures.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance before mitigation	Status of Impact	Reversibility/Mitigation Measures to be Implemented
Increase in dust levels, especially during the dry and windy season	3	1	2	2	3	Low	Negative	This impact can be minimised through correct management measures.
Loss of human lives as a result of mining activities and the movement of construction vehicles on site	1	5	3	3	2	Medium	Negative	This impact can be avoided through the implementation of the correct safety and management measures.
Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site	3	5	3	3	3	Medium	Negative	This impact can be minimised through the implementation of the correct safety and management measures.
Increased criminal activities	3	1	1	4	2	Low	Negative	This impact can be minimised through correct management and by not allowing staff to stay on site after hours.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance before mitigation	Status of Impact	Reversibility/Mitigation Measures to be Implemented
Increasing environmental awareness by educating community and contractors on the outlines of the EMP	3	5	3	1	5	High	Positive	No mitigation suggested
Degradation of access road	3	5	3	2	3	Medium	Negative	This impact cannot be avoided, but can be minimised through correct management measures.
Loss of available agricultural land	2	5	4	1	5	High	Negative	This impact cannot be avoided, but is reversible through proper rehabilitation.
Loss of indigenous vegetation	2	5	4	1	5	High	Negative	This impact cannot be avoided, but is reversible through proper rehabilitation.
Loss of wildlife habitat	2	5	4	1	5	High	Negative	This impact cannot be avoided, but is reversible through proper rehabilitation.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance before mitigation	Status of Impact	Reversibility/Mitigation Measures to be Implemented
The introduction and spreading of exotic invasive weed species at cleared areas	3	5	3	1	5	High	Negative	This impact cannot be avoided, but is reversible through proper rehabilitation.
The rehabilitation process will enhance the scenic beauty of the area	3	5	5	1	5	Very high	Positive	No mitigation proposed

9.1.2 “No-go” alternative

Site to remain fallow field

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance	Status of Impact	Reversibility/Mitigation Measures to be Implemented
Increased turbidity as a result of storm water run-off from cleared areas and roads	2	5	1	4	1	Very low	No impact	No mitigation to be implemented since no activity will take place.
Acceleration of erosion and loss of topsoil at cleared	2	5	1	4	1	Very low	No impact	No mitigation to be implemented since no activity will take place.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance	Status of Impact	Reversibility/Mitigation Measures to be Implemented
areas								
Soil pollution caused by leakages and spills from vehicles and littering	2	2	2	3	2	Low	Negative	No mitigation to be implemented since no activity will take place.
Contamination of surface water caused by the storage and disposal of construction and domestic waste	3	5	3	3	3	Medium	Negative	No mitigation to be implemented since no activity will take place.
Chemical pollution of water as a result of leaks or spills from vehicles	2	2	2	3	2	Low	Negative	No mitigation to be implemented since no activity will take place.
Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material by means of	3	5	4	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance	Status of Impact	Reversibility/Mitigation Measures to be Implemented
wind and rain								
Added pressure on water resources	3	5	2	4	1	Very low	No impact	No mitigation to be implemented since no activity will take place.
Loss of sense of place	3	5	4	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.
Visual disturbance to surrounding residents as a result of the mining activities	3	5	4	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.
Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route	3	1	3	4	1	Very low	No impact	No mitigation to be implemented since no activity will take place.
Nuisance to the surrounding residents and livestock caused by excessive movement of	3	1	2	4	1	Very low	No impact	No mitigation to be implemented since no activity will take place.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance	Status of Impact	Reversibility/Mitigation Measures to be Implemented
construction vehicles or machinery on the property								
Increased levels of noxious gas emissions from construction vehicles and machinery	3	1	2	4	1	Very low	No impact	No mitigation to be implemented since no activity will take place.
Increase in dust levels, especially during the dry and windy season	3	1	2	3	2	Low	Negative	No mitigation to be implemented since no activity will take place.
Loss of human lives as a result of mining activities and the movement of construction vehicles on site	1	5	5	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.
Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles	3	5	3	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance	Status of Impact	Reversibility/Mitigation Measures to be Implemented
on site								
Increased criminal activities	4	5	3	2	3	Medium	Negative	No mitigation to be implemented since no activity will take place.
Increasing environmental awareness by educating community and contractors on the outlines of the EMP	3	5	3	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.
Degradation of access road	3	5	3	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.
Loss of available agricultural land	2	5	4	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.
Loss of indigenous vegetation	2	5	4	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.
Loss of wildlife habitat	2	5	4	4	1	Low	No impact	No mitigation to be implemented since no

Specific Impact & Risk	Extent	Duration	Severity	Degree of Certainty	Probability	Significance	Status of Impact	Reversibility/Mitigation Measures to be Implemented
								activity will take place.
The introduction and spreading of exotic invasive weed species at cleared areas	3	5	3	2	4	High	Negative	No mitigation to be implemented since no activity will take place.
The rehabilitation process will enhance the scenic beauty of the area	3	5	5	4	1	Low	No impact	No mitigation to be implemented since no activity will take place.

9.2 Methodology of determining impacts

- Various site visits were conducted by the EAP and information was gathered regarding the nature of the process and the baseline environment.
- Comments were gathered from I&APS in order to identify additional possible impacts that may have been overlooked.
- A botanist was appointed to determine the vegetation diversity and the impacts and mitigation related to ecology.
- A heritage specialist was appointed to determine the cultural and heritage related impacts.
- The significance of identified impacts were determined as follows:

- **Extent**

The extent of the impact refers to the spatial dimension to which an impact will be felt (i.e. site, study area, local, regional, or national scale). The criteria for rating the impact extent are described in more detail in Table 1**.**

Table 1: Extent of Impact

Extent					
Rating	1	2	3	4	5
Description	On site or the impact will be restricted to its immediate area	Study area Or the impact will be restricted to the site or route	Local Or the impact will affect an area up to 5 km from the site and route	Regional/Provincial Or the impact will be felt on a Local, district municipal or Provincial level	National/International Or the maximum extent of any impact

- **Duration**

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The criteria for rating the duration of the impact is described in more detail in Table 2.

Table 2: Duration of Impact

Duration					
Rating	1	2	3	4	5
Description	Temporary Or the impact will occur very sporadically or less than 1 year from commencement of activity	Short-term Or the impact will continue to occur for a period between 1 to 5 years from commencement of activity	Medium term Or the impact will continue to occur for a period between 5 to 10 years from commencement of activity	Long term Or the impact will continue to occur for a period longer than 10 years from commencement of activity	Permanent Or the impact will be continue until the conclusion of activity

- **Severity**

A description must be given as to whether an impact is destructive, or benign. It determines whether the intensity of the impact on the natural environment or society is permanently, significantly changes its functionality, or slightly alters it. The mitigation potential must be determined for

each impact. If limited information or expertise exists, estimates based on experience will be made. The criteria for rating the severity of the impact are described in more detail in Table 3.

Table 3: Severity of Impact

Severity					
Rating	1	2	3	4	5
Description	Temporary impact easily reversible. Insignificant change or deterioration or disturbance Or improvement of natural and social environments	Short-term impact. Low cost to mitigate Small Moderate change or deterioration or disturbance Or improvement of natural and social environments	Medium term impact, which require substantial cost to mitigate. Potential to mitigate and potential to reverse impact Significant change or deterioration or disturbance Or improvement of natural and social environments	Long term impact High cost to mitigate Possible to mitigate Very significant change or deterioration or disturbance Or improvement of natural and social environments	Permanent impact Prohibitive cost to mitigate Little or no mechanism to mitigate Irreversible Disastrous change or deterioration or disturbance or improvement of natural and social environments

- **Degree of certainty**

As with all studies it is not possible to be 100% certain of all facts and for this reason a standard "Degree of certainty" scale is used as discussed in Table 4.

Table 4: Degree of Certainty of Impact Occurrence

Degree of Certainty					
Rating	1	2	3	4	5
Description	Definite Or more than 90% sure of the fact or the likelihood of the impact occurring	Probable Or between 70% and 90% sure of the fact or the likelihood of the impact occurring	Possible Or between 40% and 70% sure of the fact or the likelihood of the impact occurring	Unsure Or less than 40% sure of a the fact or the likelihood of the impact occurring.	Unknown or the consultant or specialist believes an assessment is not possible even with additional research.

- **Probability**

The criteria used for rating the likelihood of impact occurrence are described in more detail in Table 5.

Table 5: Probability of Impact Occurrence

Probability					
Rating	1	2	3	4	5
Description	Impossible Or the impact will not occur	Improbable Or the possibility of the impact occurring is very low	Probable Or there is a possibility that the impact will occur, provision must be provided	Highly probable Or It is most likely that the impact will occur at some stage, provision must be provided	Definite Or the impact will take place regardless of any prevention plans and there can only be relied on mitigation measures to contain the impact

- **Significance**

Evaluating the significance of environmental impacts is a critical component of impact analysis. The matrix uses the consequence and the probability of the different activities and associated impacts to determine the significance of the impacts. Consequence is determined by the sum total of criteria like extent, duration and severity, degree of certainty of impact as well as compliance to applicable legislation. Values of 1-5 are assigned to each of the different criteria to determine the overall consequence, which is divided by 3 to give a criterion rating.

The overall consequence and probability rating are multiplied to give a final significance rating. The values as shown in the following table are then used to rank the significance. It must be said however that in the end, a subjective judging of an impact can still be done, but the reasons for doing so must be qualified. The matrix used to determine the significance of each of the identified impact in this study is shown in Table 6.

Table 6: Impact Significance Matrix

Impact Significance Matrix					
Rating	Very Low	Low	Medium	High	Very High
	1-4	5-10	11-15	16-20	21-25+
Description	There is little or no impact at all	Impact is of a low order and therefore likely to have little real effect In the case of adverse impacts: mitigation and or remedial activity is either easily achieved or little will be required, or both In the case of beneficial impacts,	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur In the case of adverse impacts: mitigation and or remedial activity are both feasible and	Impact is of substantial order within the bounds of impacts which could occur In the case of adverse impacts: mitigation and or remedial activity are feasible but difficult, expensive, time- consuming or some combination	Of the highest order possible within the bounds of impacts which could occur In the case of adverse impacts: there is no possible mitigation and or remedial activity which could offset the impact In the case of

		alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.	fairly easily possible In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.	In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.	beneficial impacts, there is no real alternative to achieving this benefit.

Table 7: How to Apply the Rating Scale

Impact Significance = (Extent + Duration + Severity + Degree of Certainty)/3] X Probability

9.3 Mitigation measures

Specific impact or risk	Mitigation measures
Increased turbidity as a result of storm water run-off from cleared areas and roads	To prevent storm water damage, the increase in storm water run-off resulting from mining activities must be estimated and the drainage system assessed accordingly, to prevent downstream impacts on water resources (including but not limited to: scouring, sedimentation, erosion and undercutting).
Acceleration of erosion and loss of topsoil at cleared areas	Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
	The rehabilitation and soil management must be done in accordance with the guidelines provided in the EMPr.
	Any stock piles that start to erode significantly or cause dust problems, should be covered with hessian or a plastic cover.
Soil pollution caused by leakages and spills from vehicles and littering	Drip trays must be used when refuelling and servicing construction vehicles or equipment. A spill “sock” should permanently be placed within the drip tray and replaced as and when required. Drip trays must be placed underneath stationary construction vehicles and the hazardous waste (e.g. fuel, oils etc.) taken to the nearest approved oil refiner or fuel recycling point for recycling.
	The existing road infrastructure as indicated in the land use map should be used, where possible.
Contamination of surface water caused by the storage and disposal of construction and domestic waste	Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.
Chemical pollution of water as a result of leaks or spills from vehicles	In order to contain oil and fuel spills, drip pans or PVC lining shall be provided for drip pans Spill kits be readily available on site and in every vehicle.
	Existing roads / tracks should be used wherever possible.
	Any new tracks must be pre-approved by the ECO and landowner. It should be ensured that steep slopes and sensitive environments (e.g. watercourses) are avoided during the planning of the new routes.
Decrease in water quality as a result of the transportation of stockpiled material (topsoil and	Any stock piles that start to erode significantly or cause dust problems, should be covered with hessian or a plastic cover.

Specific impact or risk	Mitigation measures
infill material by means of wind and rain	To prevent storm water damage, the increase in storm water run-off resulting from mining activities must be estimated and the drainage system assessed accordingly, to prevent downstream impacts on water resources (including but not limited to: scouring, sedimentation, erosion and undercutting).
Added pressure on water resources	Water should be used sparingly and it should be ensured that no water is wasted e.g. regular inspection of pipes to ensure that no leaks occur.
	Water tanks should be regularly inspected to ensure that no leaks occur.
Loss of sense of place	Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.
	Access to the site should be pre-arranged with the landowner. Only authorised personnel may be permitted on site.
	The mining area and stockpiled material must be positioned and managed in an ecologically sound manner, minimising the potential negative impacts on the surrounding environment.
Visual disturbance to surrounding residents as a result of the mining activities	Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.
	Access to the site should be pre-arranged with the landowner. Only authorised personnel may be permitted on site.
	The mining area and stockpiled material must be positioned and managed in an ecologically sound manner, minimising the potential negative impacts on the surrounding environment.
Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route	Vehicles and construction equipment must be well serviced so that they do not produce excessive noise. Mining should only take place between 08h00 and 17h00 from Monday to Friday.
	It should be ensured that the personnel comply with speed restrictions of 20 km per hour within the site boundaries to reduce the generation of noise.
	Contractors must comply with provincial noise regulations. The construction machinery must be fitted with noise mufflers and be maintained properly.
Nuisance to the surrounding residents and livestock caused by excessive movement of	Mining should only take place between 08h00 and 17h00 from Monday to Friday.

Specific impact or risk	Mitigation measures
construction vehicles or machinery on the property	
Increased levels of noxious gas emissions from construction vehicles and machinery	Vehicles and construction equipment must be well serviced so that it does not produce excessive smoke.
Increase in dust levels, especially during the dry and windy season.	It should be ensured that the personnel comply with speed restriction of 20 km per hour within the site boundaries to reduce the generation of dust.
Loss of human lives as a result of mining activities and the movement of construction vehicles on site	The site must be properly demarcated and the proposed access routes approved by the ECO and landowner prior to the commencing of the mining activities.
	No open fires are allowed outside designated cooking areas.
	Site supervisors must ensure that the staff remains within the demarcated mining areas and access routes at all times.
	No smoking is to be allowed in the vicinity of fuel dispensing areas (smoking is only to be allowed in designated “safe” areas).
	Adequate firefighting equipment must be available onsite at all times and at least one person present on the site must be trained in the use thereof.
	Labourers and contract workers (if any) should be accompanied by a responsible supervisor at all times.
	Strict access control must be exercised to ensure that no unauthorised persons enter the property.
	The workers must wear Personal Protective Equipment (PPE) to ensure their safety during mining.
	Workers may not receive any visitors while they are within the property.
	Workers should not be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the mining area while on the influence of alcohol or drugs.
	Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
	It must be ensured by the relevant contractor that all the a list of all the relevant emergency telephone numbers and contact persons are kept up to date and posted at relevant

Specific impact or risk	Mitigation measures
	locations at the site.
Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site	The site must be properly demarcated and the proposed access routes approved by the ECO and landowner prior to the commencing of the mining activities.
	No open fires are allowed outside designated cooking areas.
	Site supervisors must ensure that the staff remains within the demarcated mining areas and access routes at all times.
	No smoking is to be allowed in the vicinity of fuel dispensing areas (smoking is only to be allowed in designated "safe" areas).
	Adequate firefighting equipment must be available onsite at all times and at least one person present on the site must be trained in the use thereof.
	Labourers and contract workers (if any) should be accompanied by a responsible supervisor at all times.
	Strict access control must be exercised to ensure that no unauthorised persons enter the property.
	The workers must wear Personal Protective Equipment (PPE) to ensure their safety during mining.
	Workers may not receive any visitors while they are within the property.
	Workers should not be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the mining area while on the influence of alcohol or drugs.
	Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
	It must be ensured by the relevant contractor that all the a list of all the relevant emergency telephone numbers and contact persons are kept up to date and posted at relevant locations at the site.
Increased criminal activities	Site supervisors must ensure that the staff remains within the demarcated mining areas and access routes at all times.
	Labourers and contract workers (if any) should be accompanied by a responsible supervisor at all times.
	Strict access control must be exercised to ensure that no unauthorised persons enter the property.

Specific impact or risk	Mitigation measures
	Workers may not receive any visitors while they are within the property.
	Workers should not be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the mining area while on the influence of alcohol or drugs.
Increasing environmental awareness by educating community and contractors on the outlines of the EMP	No mitigation suggested.
Degradation of access road	Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
	Any damage to public or private property, including roads, storm water systems, fences, gates, buildings and other structures, pipes, lines and other utilities or infrastructure and movable properties, should be repaired, replaced or otherwise compensated for as agreed with the affected person.
	The applicant must arrange for a discussion session with the surrounding access route users with regard to the maintenance of the access road.
	A complaints register should be maintained to log complaints by landowners, occupants and other Interested and Affected Parties, and response to such complaints.
	The complaints register should be provided to DMR on an annual basis and at any point in time if requested by the DMR.
Loss of available agricultural land	Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
Loss of indigenous vegetation	Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible. In the event of any protected or Declining species being recorded within the approved development site, permission for the removal of such species should be obtained from the Permitting Office of DESTEA, and the appropriate in situ and / or ex situ conservation measures

Specific impact or risk	Mitigation measures
	should be developed and implemented with the approval of the DESTEA conservation authorities. Where feasible, protected or Declining species can be translocated to degraded or untransformed parts of the study area which provide potentially suitable habitat, but such translocations will have to be carried out in a way that ensures no ecological degradation of the host habitat occurs, and will have to be evaluated by an ecologist for each species and each potential translocation area. Alternatively, protected or Declining species can be rescued and donated to appropriate conservation and research institutions such as the Walter Sisulu National Botanical Garden (Roodepoort) or the Pretoria National Botanical Garden of SANBI. Where possible, development should avoid habitat identified with high ecological sensitivity.
Loss of wildlife habitat	As a precautionary principle a brief follow-up survey is recommended aimed specifically at searching for potentially occurring sub-populations of Giant Girdled Lizard (*Smaug giganteus*) on the secondary grassland. Although the likelihood that this species could occur is low, the study site coincides with the western distribution range of *S. giganteus*.
	Where possible, development should avoid habitat identified with high ecological sensitivity.
	Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
The introduction and spreading of exotic invasive weed species at cleared areas	Alien invasive plants should be removed from all disturbed and subsequently rehabilitated areas.
	According to the AIS regulations all declared alien weeds must be effectively controlled or eradicated.
The rehabilitation process will enhance the scenic beauty of the area	No mitigation proposed

9.4 Reversibility of impacts

Risk or impact	Significance	Can impact be avoided? (Y/N)	Can impact be mitigated? (Y/N)	Significance after mitigation
CONSTRUCTION / OPERATIONAL PHASE				
Increased turbidity as a result of storm water run-off from cleared areas and roads.	High	Y	Y	Very low

Risk or impact	Significance	Can impact be avoided? (Y/N)	Can impact be mitigated? (Y/N)	Significance after mitigation
Acceleration of erosion and loss of topsoil at cleared areas.	High	N	Y	Very low
Soil pollution caused by leakages and spills from vehicles and littering.	Low	Y	Y	Very low
Contamination of surface water caused by the storage and disposal of construction and domestic waste.	Low	Y	Y	Low
Chemical pollution of water as a result of leaks or spills from vehicles.	Low	Y	Y	Very low
Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material) by means of wind and rain.	High	Y	Y	Low
Added pressure on water resources.	Low	Y	Y	Low
Loss of sense of place.	Very high	N	Y	Low
Visual disturbance to surrounding residents as a result of the temporary structures and mining activities.	Very high	N	Y	Low
Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route.	High	N	Y	Very low
Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property.	Low	N	Y	Very low
Increased levels of noxious gas emissions from construction vehicles and machinery.	Low	N	Y	Very low
Increase in dust levels, especially during the dry and windy season.	Low	N	Y	Low
Loss of human lives as a result of mining activities and the	Medium	Y	Y	Low

Risk or impact	Significance	Can impact be avoided? (Y/N)	Can impact be mitigated? (Y/N)	Significance after mitigation
movement of construction vehicles on site.				
Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site.	Medium	N	Y	Low
Increased criminal activities	Low	N	Y	Low
Increasing environmental awareness by educating community and contractors on the outlines of the EMP.	High	N (Positive impact)	N (Positive impact)	High
Degradation of the access road.	Medium	N	Y	Low
Loss of available agricultural land.	High	Y	N	Low
Loss of indigenous vegetation	High	Y	N	Low
Loss of wildlife habitat	High	Y	N	Low
DECOMMISSIONING PHASE				
The introduction and spreading of exotic invasive weed species at cleared areas.	High	N	Y	Low
The rehabilitation process will enhance the scenic beauty of the area.	Very high	N (Positive impact)	N (Positive impact)	Very high

39.5 Activities resulting in impacts

Name of activity	Potential impact	Aspects affected	Phase	Significance before mitigation	Significance after mitigation
Use of access roads	Drainage disturbance	Increased turbidity as a result of storm water run-off from cleared areas and roads.	Pre-construction, Construction, Operational and Decommissioning Phases	High	Very low
	Surface water pollution	Chemical pollution of water as a result of leaks or spills from vehicles.		Low	Very low
	Noise	Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route.		High	Very low
	Disturbance	Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property.		Low	Very low
	Air pollution	Increased levels of noxious gas emissions from construction vehicles and machinery.		Low	Very low
	Air pollution	Increase in dust levels, especially during the dry and windy season.		Low	Low
Mine site establishment	Soil pollution	Soil pollution caused by leakages and spills from vehicles and littering.	Pre-construction and Construction Phase	Low	Very low
	Surface water pollution	Contamination of surface water by the storage and disposal of construction and domestic waste.		Low	Low
	Disturbance of	Acceleration of erosion and loss of		High	Very low

Name of activity	Potential impact	Aspects affected	Phase	Significance before mitigation	Significance after mitigation
	land forms and soils	topsoil at cleared areas.			
	Drainage disturbance	Increased turbidity as a result of storm water run-off from cleared areas and roads.		High	Very low
	Surface water pollution	Chemical pollution of water as a result of leaks or spills from vehicles.		Low	Very low
	Surface water pollution	Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material by means of wind and rain.		High	Low
	Groundwater pollution	Added pressure on water resources.		Low	Low
	Disturbance of aesthetic environment	Loss of sense of place.		Very high	Low
	Disturbance of aesthetic environment	Visual disturbance to surrounding residents as a result of the temporary structures and mining activities.		Very high	Low
	Noise	Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route.		High	Very low
	Disturbance	Nuisance to the surrounding residents and livestock caused by		Low	Very low

Name of activity	Potential impact	Aspects affected	Phase	Significance before mitigation	Significance after mitigation
		excessive movement of construction vehicles or machinery on the property.			
	Air pollution	Increased levels of noxious gas emissions from construction vehicles and machinery.		Low	Very low
	Air pollution	Increase in dust levels, especially during the dry and windy season.		Low	Low
	Health, safety and security problems	Loss of human lives as a result of mining activities and the movement of construction vehicles on site.		Medium	Low
	Health, safety and security problems	Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site.		Medium	Low
	Health, safety and security problems	Increased criminal activities.		Low	Low
	Environmental protection	Increasing environmental awareness by educating community and contractors on the outlines of the EMP.		High	High
	Disturbance	Degradation of the access road.		Medium	Low
	Disturbance of land forms and soils	Loss of available agricultural land.		High	Low
	Ecological	Loss of indigenous vegetation		High	Low

Name of activity	Potential impact	Aspects affected	Phase	Significance before mitigation	Significance after mitigation
	disturbance				
	Ecological disturbance	Loss of wildlife habitat		High	Low
Topsoil storage	Disturbance of land forms and soils	Acceleration of erosion and loss of topsoil at cleared areas.	Pre-construction and Construction Phase	High	Very low
	Surface water pollution	Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material by means of wind and rain.		High	Low
	Air pollution	Increase in dust levels, especially during the dry and windy season.		Low	Low
Chemical and fuel transportation	Soil pollution	Soil pollution caused by leakages and spills from vehicles and littering.	Construction and Operational Phases	Low	Very low
Equipment transportation	Soil pollution	Soil pollution caused by leakages and spills from vehicles and littering.	Construction and Operational Phases	Low	Very low
	Surface water pollution	Chemical pollution of water as a result of leaks or spills from vehicles.		Low	Very low
	Disturbance	Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property.		Low	Very low
	Air pollution	Increased levels of noxious gas emissions from construction vehicles and machinery.		Low	Very low

Name of activity	Potential impact	Aspects affected	Phase	Significance before mitigation	Significance after mitigation
Excavation of the borrow pit	Disturbance of aesthetic environment	Loss of sense of place.	Operational Phase	Very high	Low
	Disturbance of aesthetic environment	Visual disturbance to surrounding residents as a result of the temporary structures and mining activities.		Very high	Low
	Ecological disturbance	Loss of indigenous vegetation		High	Low
	Ecological disturbance	Loss of wildlife habitat		High	Low
	Noise	Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route.		High	Very low
	Health, safety and security	Loss of human lives as a result of mining activities and the movement of construction vehicles on site.		Medium	Low
	Health, safety and security	Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site.		Medium	Low
Waste removal and disposal	Soil pollution	Soil pollution caused by littering	Operational Phase	Low	Low
	Surface water pollution	Contamination of surface water caused by the storage and disposal of domestic waste.		Low	Low

Name of activity	Potential impact	Aspects affected	Phase	Significance before mitigation	Significance after mitigation
Sewage removal and disposal	Surface water pollution	Contamination of surface water caused by the storage and disposal of domestic waste.	Operational Phase	Low	Low
General site-levelling and reinstatement	Noise	Elevated noise levels in the area.	Decommissioning and Rehabilitation Phases	High	Very low
	Disturbance	Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property.		Low	Very low
	Air pollution	Increased levels of noxious gas emissions from construction vehicles and machinery.		Low	Very low
	Air pollution	Increase in dust levels, especially during the dry and windy season.		Low	Low
	Health, safety and security	Loss of human lives as a result of mining activities and the movement of construction vehicles on site.		Medium	Low
	Health, safety and security	Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site.		Medium	Low
Soil amelioration and revegetation	Ecological disturbance	The introduction and spreading of exotic invasive weed species at cleared areas.	Decommissioning and Rehabilitation Phases	High	High
	Aesthetic environment	The rehabilitation process will enhance the scenic beauty of the		Very high	Very high

Name of activity	Potential impact	Aspects affected	Phase	Significance before mitigation	Significance after mitigation
		area.			
	Air pollution	Increase in dust levels, especially during the dry and windy season.		Low	Low

9.6 Summary of specialist reports

Study	Recommendations	Included in the report	Applicable section
Vegetation diversity assessment	• As a precautionary principle a brief follow-up survey is recommended aimed specifically at searching for potentially occurring sub-populations of Giant Girdled Lizard (*Smaug giganteus*) on the secondary grassland. Although the likelihood that this species could occur is low, the study site coincides with the western distribution range of *S. giganteus*. • In the event of any protected or Declining species being recorded within the approved development site, permission for the removal of such species should be obtained from the Permitting Office of DESTEA, and the appropriate in situ and / or ex situ conservation measures should be developed and implemented with the approval of the DESTEA conservation authorities. Where feasible, protected or Declining species can be translocated to degraded or untransformed parts of the study area which provide potentially suitable habitat, but such translocations will have to be carried out in a way that ensures no ecological degradation of the host habitat occurs, and will have to be evaluated by an ecologist for each species and each potential translocation area. Alternatively, protected or Declining species can be rescued and donated to appropriate conservation and research institutions such as the Walter Sisulu National Botanical Garden (Roodepoort) or the Pretoria National Botanical Garden of SANBI.	Y	8.1.3 9.4

	• Where possible, development should avoid habitat identified with high ecological sensitivity. • According to the AIS regulations all declared alien weeds must be effectively controlled or eradicated.		
Baseline wetland study	Two artificial wetlands are located within a 500m radius from the proposed expansion. A Wetland Study was completed to assess any possible impact on these wetlands. The nearest is an artificial wetland within the existing quarry that is an unavoidable result of a depression created by opencast mining. The wetland may change over time as mining continues in the quarry, but it could also be utilised as part of the post-mining landuse of the quarry. This artificial wetland is located more than 200 m south of the study area and is therefore unlikely to be negatively influence by proposed future mining activities within the study area. The distance between the study area and the delineated artificial wetlands reduces the likelihood of quantifiable negative impacts occurring. The artificial nature of the wetlands with an associated Low/Marginal Ecological Importance and Sensitivity (EIS) further reduces the significance of new mining related impacts on these watercourses. Due to the very low significance of mining related impacts on the artificial wetlands, no recommendations are provided to mitigate impacts on artificial wetlands for proposed mining activities confined within the study area.	Y	8.1.3
Cultural heritage assessment	No heritage (historical or archaeological) sites were recorded during the survey and it is therefore recommended that the project proceed as no further mitigation will be required.	Y	8.2.1

9.7 Motivation for alternative selection

The site and activity was chosen due to the estimated reserves of Top Face Clay at the site. The exploration results have indicated that the clay underlying this property appears to be suitable for clay brick production as the property has enough clay of a desirable quality. The annual extraction of Top Face Clay required from this quarry for the Montana brick is 20,500 Spm^3. The estimated reserves of Top Face Clay at the Cullton Quarry is 528,547 Spm^3. Therefore, the estimated Life of Mine (LoM) of the Cullton Quarry is 30 years based on the consumption of the estimated Top Face Clay reserves.

10. ENVIRONMENTAL IMPACT STATEMENT

10.1 Key findings of the environmental impact assessment

The site and activity was chosen due to the estimated reserves of clay for brickmaking at the site. The exploration results have indicated that the clay underlying this property appears to be suitable for clay brick production as the property has enough clay of a desirable quality. The Corobrik Odendaalsrus Factory has produced and sold clay face bricks for the past 35 years and has developed a well-established market and customer base for its products. The total volume of shale consumed per annum is 135,600 Spm^3. The total volume of shale reserve is estimated at 2,620,000 Spm^3. Therefore the life of the quarry based on the above figures is 20 years.

10.2 Summary of the positive and negative impacts

Specific impact or risk	Preferred activity (Activity alternative 1)	"No-go" alternative
Bio-physical environment		
Increased turbidity as a result of storm water run-off from cleared areas and roads	Negative	No impact
Acceleration of erosion and loss of topsoil at cleared areas	Negative	No impact
Soil pollution caused by leakages and spills from vehicles and littering	No impact	Negative
Contamination of surface water caused by the storage and disposal of construction and domestic waste	No impact	Negative
Chemical pollution of water as a result of leaks or spills from vehicles	Negative	Negative

Specific impact or risk	Preferred activity (Activity alternative 1)	"No-go" alternative
Decrease in water quality as a result of the transportation of stockpiled material (topsoil and infill material by means of wind and rain	Negative	No impact
Added pressure on water resources	Positive	No impact
Increased levels of noxious gas emissions from construction vehicles and machinery	Negative	No impact
Increase in dust levels, especially during the dry and windy season	Negative	Negative
Loss of available agricultural land	Negative	No impact
Loss of indigenous vegetation	Negative	No impact
Loss of wildlife habitat	Negative	No impact
The introduction and spreading of exotic invasive weed species at cleared areas	No impact	Negative
The rehabilitation process will enhance the scenic beauty of the area	No impact	No impact
Human environment		
Loss of sense of place	Negative	No impact
Visual disturbance to surrounding residents as a result of the mining activities	Negative	No impact
Elevated noise levels in the area as a result of the front-end loader and the movement of hauling trucks along the access route	Negative	No impact
Nuisance to the surrounding residents and livestock caused by excessive movement of construction vehicles or machinery on the property	Negative	No impact
Loss of human lives as a result of mining activities and the movement of construction vehicles on site	No impact	No impact

Specific impact or risk	Preferred activity (Activity alternative 1)	"No-go" alternative
Injuries to residents and construction workers as a result of mining activities and the movement of construction vehicles on site	No impact	No impact
Increased criminal activities	Negative	Negative
Increasing environmental awareness by educating community and contractors on the outlines of the EMP	Negative	No impact
Degradation of access road	Negative	No impact
Loss of human lives as a result of mining activities and the movement of construction vehicles on site	No impact	No impact

11. IMPACT MANAGEMENT OBJECTIVES AND OUTCOMES

11.1 Ecological environment

- Injudicious and unnecessary destruction of natural vegetation should be avoided at all costs.
- Plant species of conservation significance should be conserved as far as possible by means of:
    - Avoidance of unnecessary disturbance or destruction of their habitat.
    - If possible, developments that jeopardize any specimens or large populations of red data or protected species should be planned in such a way as to avoid the specimens or populations.
- The eradication of declared weed and invader plant populations in the study area is strongly advised. A management plan and proper follow-up strategy for the prevention of the spread or establishment of new populations of such species should be developed and enforced.
- Where necessary, temporary water control structures should be put in place to minimize erosion and to create a favourable habitat for the establishment of vegetation during and after rehabilitation/landscaping.
- A legitimate and well-designed rehabilitation plan must be set in place before quarrying commences and be strictly enforced on an on-going basis throughout the operational phase and thereafter.
- As a precautionary principle a brief follow-up survey is recommended aimed specifically at searching for potentially occurring sub-populations of Giant Girdled Lizard (*Smaug giganteus*) on the secondary grassland. Although the likelihood that this species could occur is low, the study site coincides with the western distribution range of *S. giganteus*.
- In the event of any protected or Declining species being recorded within the approved development site, permission for the removal of such species should be obtained from the Permitting Office of DESTEA, and the appropriate in situ and / or ex situ conservation measures should be developed and implemented with the approval of the DESTEA conservation authorities. Where feasible, protected or Declining species can be translocated to degraded or untransformed parts of the study area which provide potentially suitable habitat, but such translocations will have to be carried out in a way that ensures no ecological degradation of the host habitat occurs, and will have to be evaluated by an

ecologist for each species and each potential translocation area. Alternatively, protected or Declining species can be rescued and donated to appropriate conservation and research institutions such as the Walter Sisulu National Botanical Garden (Roodepoort) or the Pretoria National Botanical Garden of SANBI.
- Where possible, development should avoid habitat identified with high ecological sensitivity.
- According to the AIS regulations all declared alien weeds must be effectively controlled or eradicated.

11.2 Landforms and soils

- Drip trays must be used when refuelling and servicing construction vehicles or equipment. A spill "sock" should permanently be placed within the drip tray and replaced as and when required. Drip trays must be placed underneath stationary construction vehicles and the hazardous waste (e.g. fuel, oils etc.) taken to the nearest approved oil refiner or fuel recycling point for recycling.
- The existing road infrastructure as indicated in the land use map should be used, where possible.
- Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
- Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.

11.3 Surface water

- Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.
- In order to contain oil and fuel spills, drip pans or PVC lining shall be provided for drip pans. Spill kits be readily available on site and in every vehicle.
- Existing roads / tracks should be used wherever possible.
- Any new tracks must be pre-approved by the ECO and landowner. It should be ensured that steep slopes and sensitive environments (e.g. watercourses) are avoided during the planning of the new routes.
- Any stock piles that start to erode significantly or cause dust problems, should be covered with hessian or a plastic cover.
- To prevent storm water damage, the increase in storm water run-off resulting from mining activities must be estimated and the drainage system assessed accordingly, to prevent downstream impacts on water resources (including but not limited to: scouring, sedimentation, erosion and undercutting).
- Water should be used sparingly and it should be ensured that no water is wasted e.g. regular inspection of pipes to ensure that no leaks occur.
- Water tanks should be regularly inspected to ensure that no leaks occur.
- Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.

11.4 Groundwater

- Drip trays must be used when refuelling and servicing construction vehicles or equipment. A spill "sock" should permanently be placed within the drip tray and replaced as and when required. Drip trays must be placed underneath stationary construction vehicles and the hazardous waste (e.g. fuel, oils etc.) taken to the nearest approved oil refiner or fuel recycling point for recycling.

11.5 Aesthetic environment:

- Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
- The rehabilitation and soil management must be done in accordance with the guidelines provided in the EMPr.
- Any stock piles that start to erode significantly or cause dust problems, should be covered with hessian or a plastic cover.
- Regular clean-up programs must be applied at and around the site to prevent litter and to ensure proper housekeeping practices.
- Access to the site should be pre-arranged with the landowner. Only authorised personnel may be permitted on site.
- The mining area and stockpiled material must be positioned and managed in an ecologically sound manner, minimising the potential negative impacts on the surrounding environment.
- It should be ensured that the personnel comply with speed restriction of 20 km per hour within the site boundaries to reduce the generation of dust.
- Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
- Any damage to public or private property, including roads, storm water systems, fences, gates, buildings and other structures, pipes, lines and other utilities or infrastructure and movable properties, should be repaired, replaced or otherwise compensated for as agreed with the affected person.
- The applicant must arrange for a discussion session with the surrounding access route users with regard to the maintenance of the access road.
- A complaints register should be maintained to log complaints by landowners, occupants and other Interested and Affected Parties, and response to such complaints.
- The complaints register should be provided to DMR on an annual basis and at any point in time if requested by the DMR.
- Care must be taken that unnecessary clearance of vegetation does not take place. The footprint of disturbance outside the mining area must be kept as small as possible, and must be rehabilitated as soon as possible.
- Alien invasive plants should be removed from all disturbed and subsequently rehabilitated areas.

11.6 Noise

- Vehicles and construction equipment must be well serviced so that they do not produce excessive noise.
- Mining should only take place between 08h00 and 17h00 from Monday to Friday.
- It should be ensured that the personnel comply with speed restrictions of 20 km per hour within the site boundaries to reduce the generation of noise.
- Contractors must comply with provincial noise regulations. The construction machinery must be fitted with noise mufflers and be maintained properly.
- Mining should only take place between 08h00 and 17h00 from Monday to Friday.

11.7 Air quality

- It should be ensured that the personnel comply with speed restriction of 20 km per hour within the site boundaries to reduce the generation of dust.
- Dust suppression through the spraying of water should be practiced.

11.8 Health, safety and security hazards

- The site must be properly demarcated and the proposed access routes approved by the ECO and landowner prior to the commencing of the mining activities.
- No open fires are allowed outside designated cooking areas.
- Site supervisors must ensure that the staff remains within the demarcated mining areas and access routes at all times.
- No smoking is to be allowed in the vicinity of fuel dispensing areas (smoking is only to be allowed in designated "safe" areas).
- Adequate firefighting equipment must be available onsite at all times and at least one person present on the site must be trained in the use thereof.
- Labourers and contract workers (if any) should be accompanied by a responsible supervisor at all times.
- Strict access control must be exercised to ensure that no unauthorised persons enter the property.
- The workers must wear Personal Protective Equipment (PPE) to ensure their safety during mining.
- Workers may not receive any visitors while they are within the property.
- Workers should not be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the mining area while on the influence of alcohol or drugs.
- Disturbance should be limited to the minimum and agreed upon footprint, and no vehicle turning, parking or access, or other form of disturbance e.g. vegetation clearance, soil compaction or excavation should be allowed outside these areas.
- It must be ensured by the relevant contractor that all the a list of all the relevant emergency telephone numbers and contact persons are kept up to date and posted at relevant locations at the site.
- A complaints register should be maintained to log complaints by landowners, occupants and other Interested and Affected Parties, and response to such complaints. The complaints register should be provided to DMR on an annual basis and at any point in time if requested by the DMR.

12. ASPECTS FOR INCLUSION IN AUTHORISATION

12.1 Reasoned opinion

The final site map was created taking into account all the concerns raised by the public, specialist reports and impact assessment. If this map is followed, and if proper management and mitigation is implemented and rehabilitation is done and monitored, the impact can be kept relative low. The site can be rehabilitated to its current status which will minimise the long term impact of the proposed activity.
It is recommended that the activity should be authorised.

12.2 Conditions that must be included in the authorisation

The proposed activity should follow the guidelines of the final site map.
Mitigation and management measures as stipulated in Sections 9 and 11 should be implemented.
The rehabilitation and soil management must be done in accordance with the guidelines provided in the EMPr.
Environmental audits should be conducted every two months during the Construction Phase and every six months during the Operational Phase.
Rehabilitation monitoring should be conducted according to the EMPr.
Rehabilitation should be ongoing while operation is taking place.

12.3 Period for which the Environmental Authorisation is required.

The total volume of shale consumed per annum is 135 600 Spm^3. The total volume of shale reserve is estimated at 2 620 000 Spm^3. Therefore the life of the quarry based on the above figures is 20 years.

13. UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports ☒

b) the inclusion of comments and inputs from stakeholders and I&APs ; ☒

c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒and

d) that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected. parties are correctly reflected herein. ☒

Signature of the environmental assessment practitioner:

Bucandi Environmental Solutions

Name of company:

23/01/2019

Date:

14. FINANCIAL PROVISION

Corobrik's quarrying and factory operations are financed from the company's retained earnings. The finance for the operation is budgeted for by the factory and is based on the raw material requirements from the quarry and current mining and transport costs. Corobrik then makes this budgeted amount available to the factory for the purposes of the mining operation. An annual mining cash flow budget for all the Corobrik operations is compiled for approval by Corobrik top management. See Appendix H the Mining Work Programme including the complete budget and cost analysis as well as financial statements.

Cash flow forecast (years 1-10)											
	Y1 (R,000)	Y2 (R,000)	Y3 (R,000)	Y4 (R,000)	Y5 (R,000)	Y6 (R,000)	Y7 (R,000)	Y8 (R,000)	Y9 (R,000)	Y10 (R,000)	Total (R,000)
Production ($m^{3)}$	135 600	135 600	135 600	135 600	135 600	135 600	135 600	135 600	135 600	135 600	1 356 000
Price	647	686	727	771	817	866	918	973	1 031	1 093	
Revenue	**87 733**	**92 997**	**98 577**	**104 492**	**110 761**	**117 407**	**124 451**	**131 918**	**139 833**	**148 223**	**1 156 393**
Mining cost	2 390	2 533	2 685	2 847	3 017	3 198	3 390	3 590	3 809	4 038	31 502
Technology cost	54 869	57 612	60 493	63 518	66 694	70 028	73 530	77 206	81 0167	85 120	523 950
Technical skills cost	572	606	643	681	722	765	811	860	912	966	7 539
Regulatory requirements	802	842	884	928	975	1 024	1 075	1 128	1 185	1 244	10 087
Environmental cost	5 675	5 959	6 257	6 570	6 898	7 243	7 605	7 985	8 385	8 804	71 380
Social and labour plan	484	508	534	560	588	618	649	681	715	751	6 088

Capital and other expenditure	0	0	0	0	0	0	0	0	0	0	0
Working profit/lost	22 941	24 936	27 081	29 388	31 867	34 530	37 391	40 464	43 761	47 301	339 661
Tax	6 424	6 982	7 583	8 229	8 923	9 669	10 470	11 330	12 253	13 244	95 105
Nett cash flow	16 518	17 954	19 499	21 159	22 944	24 862	26 922	29 134	31 508	34 056	244 556
Discounted cash	15 085	14 974	14 851	14 818	14 575	14 423	14 263	14 096	13 922	13 972	144 647

The costs shown above are in R'000.
Projected annual cash flow based on:

- Net price per Spm^3: 6% increase.
- Technology cost: 5% increase.
- Mining cost: 6% increase.
- Technical skills cost: 6% increase.
- Regulatory requirement cost: 5% increase.
- Environmental cost: 5% increase.
- Social and Labour Plan cost: 5% increase.

15. APPENDICES

Appendix A: Locality maps
Appendix B: Site photographs
Appendix C: Reg 2 (2) map
Appendix D1: Newspaper advertisements
Appendix D2: Site notices
Appendix D3: Copies and proof of letters send to I&APs together with Draft Scoping Report
Appendix D4: Public Meeting Information
Appendix D5: Comments and Responses Report including a list of Registered I&APs
Appendix E1: Terrestrial ecology assessment
Appendix E2: Baseline wetland study
Appendix E3: Heritage impact assessment
Appendix F: Composite map
Appendix G: Final site map
Appendix H: Mining work programme
Appendix I: Existing mining right
Appendix J: CV of EAP
Appendix K: Environmental Management Programme