ANNUAL REHABILITATION PLAN ENVIRONMENTAL AUTHORISATION FOR AN EXTENSION OF DOLOMITIC LIMESTONE MINE AND CONSTRUCTION OF LIME KILNS ON FARM WELVERDIEND NEAR VANRHYNSDORP, WESTERN CAPE PROVINCE

DMR Reference Numbers: WC 30/5/1/2/3/2/1 (401) EM

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LIST OF ABBREVIATIONS

DMR	Department of Mineral Resources
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
IAPs	Interested and Affected Parties
LoM	Life of the Mine
MHSA	Mine Health and Safety Act (Act 29 of 1996) 1996
MPRDA	Minerals and Petroleum Resources Development Act of 2002 (Act No. 28 of 2002)
NEMA	National Environmental Management Act of 1998 (Act No. 107 of 1998)
NWA	National Water Act of 1998 (Act No. 36 of 1998)

1 INTRODUCTION

Cape Lime (Pty) Ltd, a subsidiary of Afrimat (Pty) Ltd, has applied for an Environmental Authorisation to extend the current mining area of dolomitic limestone mine and construction of limekilns on Remainder Farm Welverdiend No 511. Cape Lime (Pty) Ltd. (hereafter referred to as "the Applicant") has, in June 2012 been awarded a Mining Right, in terms of Section 22 of the Mineral and Petroleum Resources Development Act 2002 (Act No. 28 of 2002), for the mining of limestone and dolomite from within a 321.11ha area on the Remainder of Farm 511 (Farm Welverdiend), Vanrhynsdorp. Subsequently, environmental authorization has been obtained in June 2015 in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) related to mining activities on 6ha. It was followed by a General Authorization in terms of section 39 of the National Water Act (Act 36 of 1998) as well as authorization by the Matzikama Municipality in terms of article 25 of the Land Use Planning Ordinance , 1985 (No 15 of 1985) LUPO. The proposed expansion activities are intended to expand the already authorised mining activities of 6Ha. The table below shows the property details of the proposed mining right. The proposed expansion activities are intended to expand the already authorised mining activities of 6Ha. Figure 1 and 2 shows the site coordinates and aerial and topographical locality of the site below.

Cape Lime currently mine and process limestone and dolomite, currently mine and process limestone and dolomite on the Farm Vaderlandsche Rietkuil, 7 km east of the proposed project (see Figure 3 below). The current activities entail, apart from mining of limestone and dolomite, crushing and screening of all mined material as well as calcination of limestone in an existing Fluid Bed Lime Kiln. The markets currently served are:

- Water treatment (potable and effluent)
- Glass Industry (Flat glass and container glass)
- Aggregates
- Chemical Industries (Calcium Mineral Fillers
- hypochlorite, mineral separation processes and tanneries)

The extent of the current limestone deposit being mined is such that it cannot support the supply of limestone to additional processing facilities without drastically reducing the life of the resource. Expansion in terms of additional capacity on the current site is also limited due to numerous constraints. Cape Lime is confronted on a regular basis with enquiries with regard to supply of high quality white lime products to potential new projects in South Africa, for which Cape Lime does not have the current production capacity.

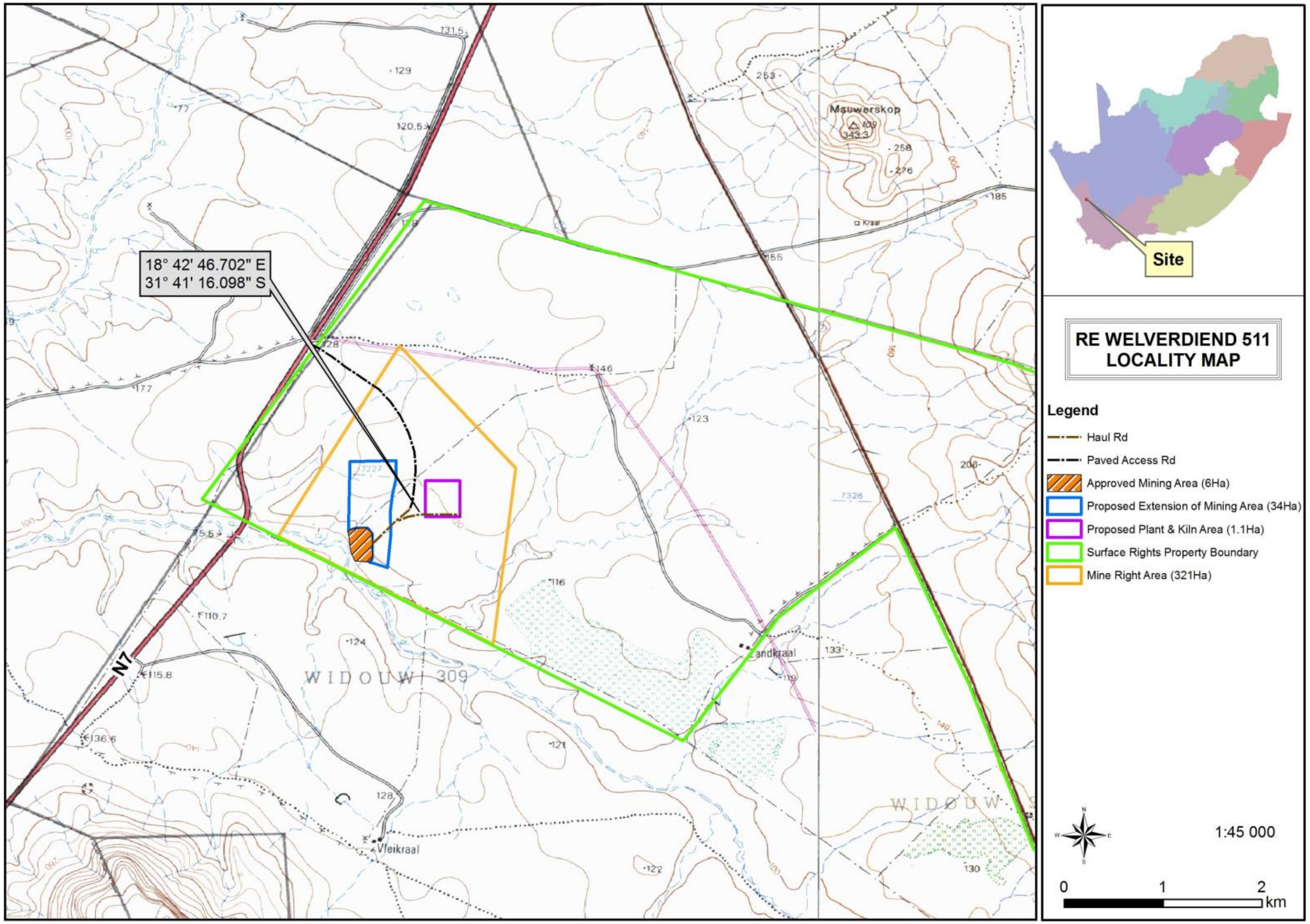

Figure 1: Zoomed in locality map showing the proposed mine extension on farm Welverdiend

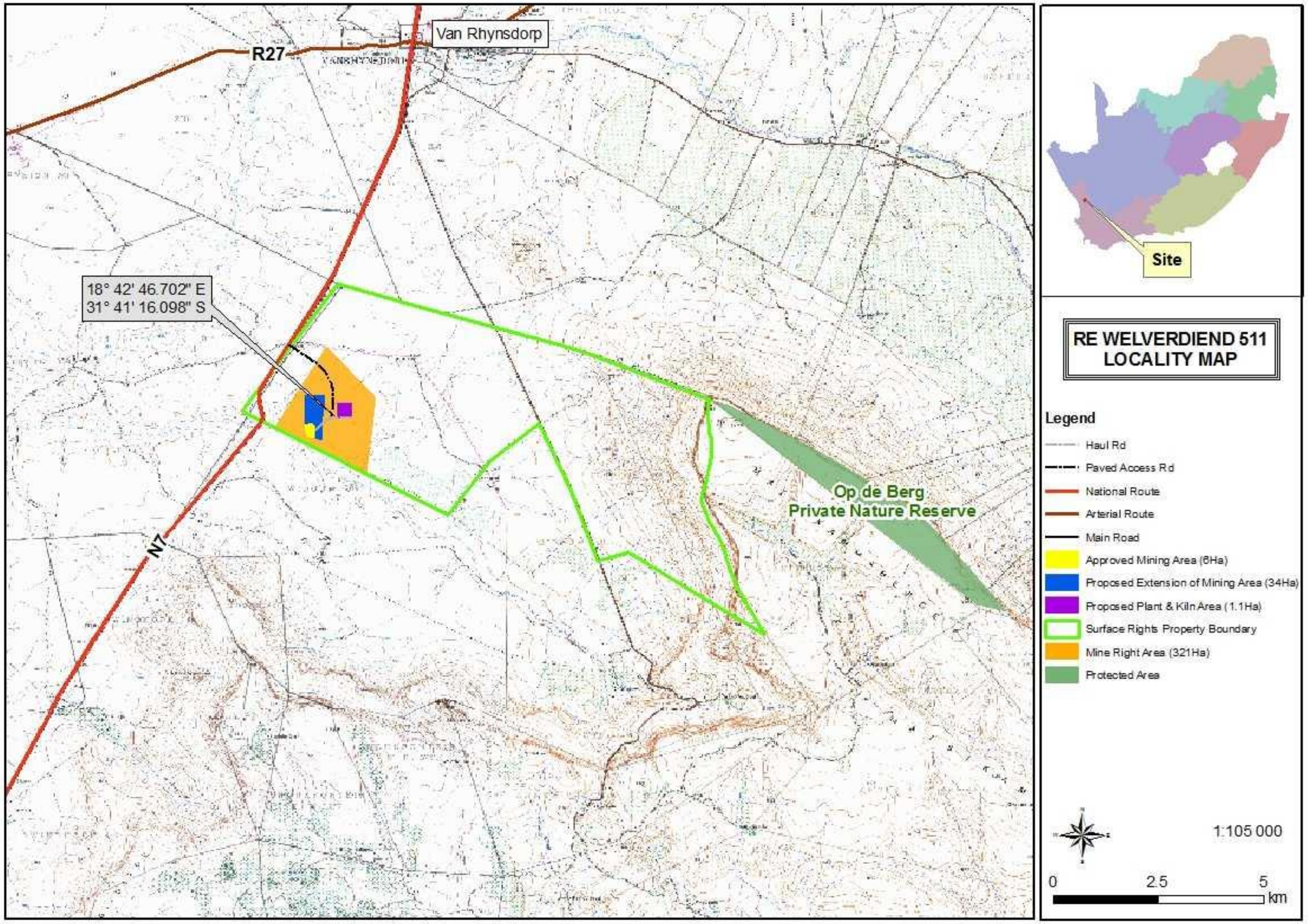

Figure 2: Locality map of the proposed mine extension and the entire Mining right of the farm Welverdiend

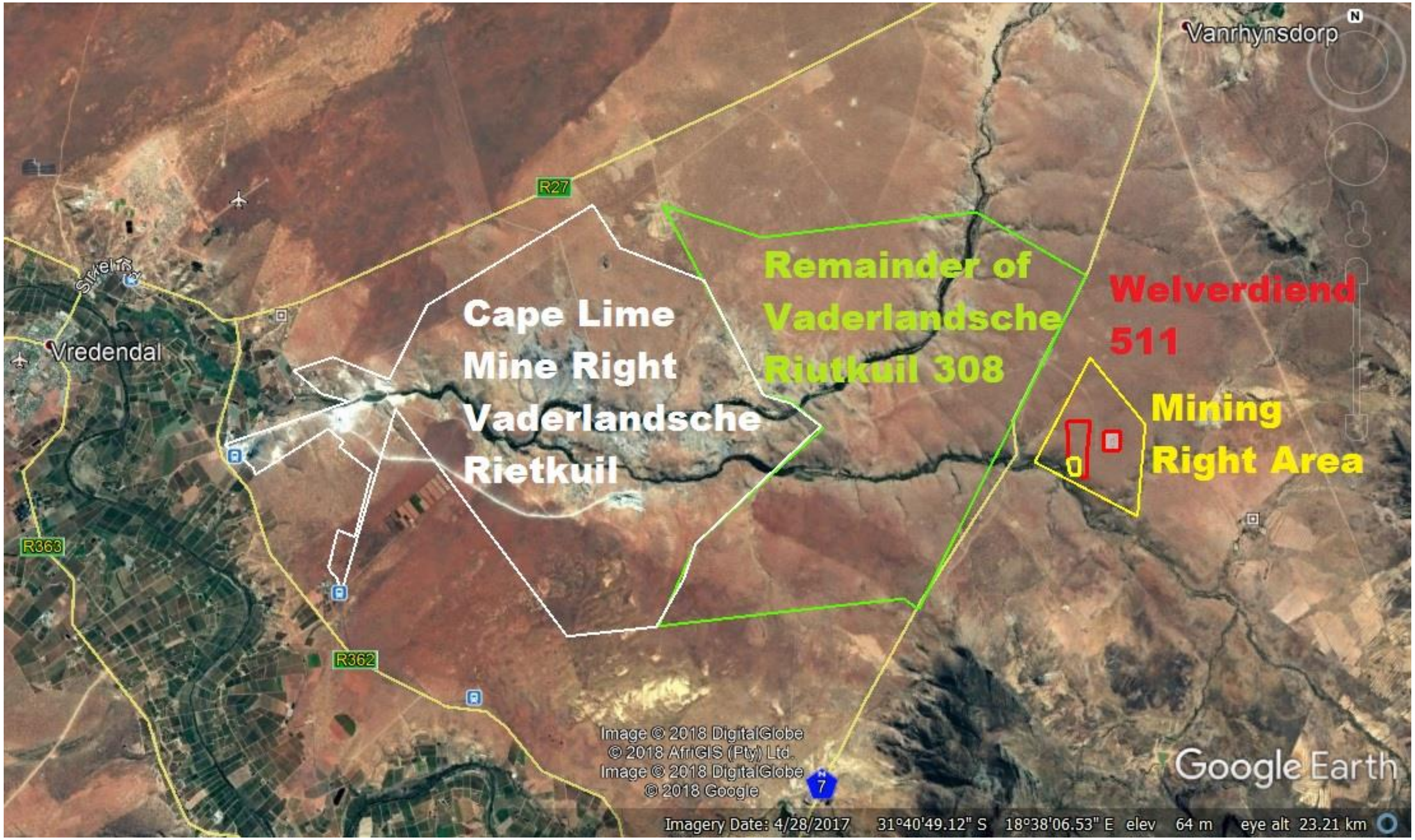

Figure 3: Google Earth Map showing the two Cape Lime mining rights: Farm Vaderlandsche Rietkuil and Welverdiend Farm

1.1 Project Context

The proposed project entails clearing of ±40ha of virgin (undeveloped) land for the purpose of mining limestone deposits, the erection of a crushing plant, four (4) Fluid Bed Lime Calciners and associated supporting services. The layout will be planned to allow the phasing in of the 4 kilns to the process line as when required and justified. It will also include real logistical facilities, workshops and an office complex.

Access roads to the facilities will be extended from the existing tarred road from the N7. The total footprint of the mining development on the Remainder of Farm 511 (Welverdiend), Vanrhynsdorp will be ± 34 ha and the process plant and logistical facilities will have a maximum footprint of ± 10 ha (see Figure 4 above).

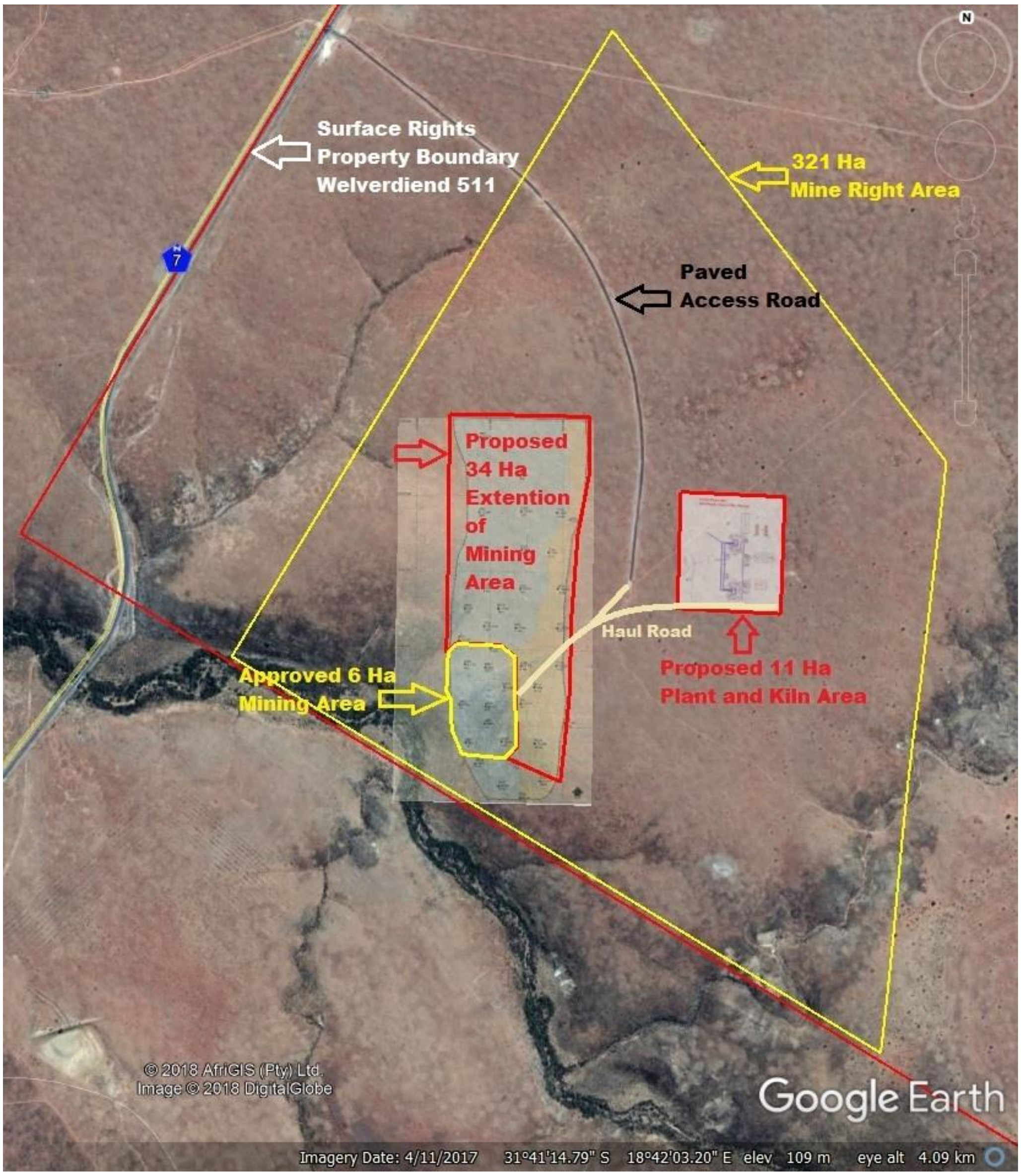

Figure 4: Aerial view of the site showing the position of the proposed mining extension area and mine kilns site. The mining rights area is outlined in Yellow

Mining/Excavation

Mining will be done by removal of overburden to expose the underlying limestone. Overburden thickness varies from virtually none on the southern end of the deposit to ±10m on the northern side. This allows strip mining to be done by drilling and blasting ±30m wide and 50m long strips on the shallow end of the deposit. This will facilitate backfilling of the southern end of the excavation to commence relatively early (±3 years after start), thereby minimizing the need for overburden stockpiles. This will assist in minimizing the visual impact of the operation and expedite rehabilitation of backfilled slopes.

Excavation of blasted limestone will be done by an excavator and trucks will haul the limestone to the crushing plant less than 500m from the excavation. The mining and crushing plant will operate on a single day shift basis.

Processing

Crushing will consist of a three stage crushing operation to reduce the limestone to < 6mm particle size. Co-products in the crushing and screening process will be <1mm material which will be supplied to existing and new customers in the glass and industrial minerals industry. The <6mm material will be stockpiled for use as feed to the lime kilns.

The lime kilns will be fed by a common limestone feed conveyor, drawing from underneath the limestone stockpile. The coal to be used as fuel in the kilns will also be fed from underneath a coal stockpile, via a common coal conveyor, to the respective kilns.

The kilns will be replicas of the existing Fluid Bed Calciner, which has been in operation at Cape Lime's Vredendal operation since 2004. Lime produced will be stored in silos before being dispatched to various clients in bulk tanker or bulk bags. The operation of the kilns will be, by nature of the process, a continuous operation.

Supporting Services

It is envisaged that the following supporting service infrastructure be provided on site:

- Workshops for mechanical and electrical maintenance.
- Laboratory for quality control testwork.
- Administrative offices including a weighbridge.

1.2 Environmental Context

TOPOGRAPHY

The site is located in an undulating plain, with relatively flat areas interspersed with low-undulating hills. Mauwerskop is located ±5.5km north-east of the site, while the Matzikama mountains are ±7.5km due east, and the Gifberg, Windhoekberg and Spitsberg mountain ranges are located 4 – 6 km south of the proposed development site. The development site itself is relatively flat, with slight undulations in the eastern and southern sections. The southern-most portion of the proposed site slopes slightly more steeply towards the Wiedou River. The surrounding area comprises a relatively flat area that dips gently down towards the Widou River on the southern boundary of the Mining Right area The Gifberg forms a dramatic backdrop 7 km to the east.

GEOLOGY

The underlying geology comprises Namibian Gariep Supergroup metasediments, in particular dolomite-rich sediments (Mucina & Rutherford 2006). The proposed development area is currently undeveloped and consists of natural Knersvlakte Dolomite Vygieveld and Vanrhynsdorp Gannabos vegetation in a generally poor/ degraded condition. Limestone is exposed on the steeper slopes above the Widou River.

VEGETATION

According the Ecological study conducted by Mark Berry Consultants (2016) the area proposed for the limestone mine comprises mainly a low grassland, dominated by Stipa capensis. Salsola (= Caroxylon) cf. zeyheri (vaalganna), Atriplex lindleyi subsp inflata, Psilocaulon junceum, Asparagus capensis, Hoplophyllum spinosum, Trachyandra falcata and Brunsvigia bosmaniae (Maartblom) are also common. The latter is especially plentiful on the eastern side of the site. The dominance of Stipa capensis indicates to disturbance or severe overgrazing. The increase in cover of Stipa capensis reduces grazing potential for sheep due to wool damage by seeds.

Succulent shrubs are dominant on the steeper limestone slopes directly above the Widou River where a low, open shrubland prevails. Euphorbia mauritanica (dominant), Tylecodon wallichii, Phyllobolus nitidus (= Mesembryanthemum nitidum), Mesembryanthemum cf. guerichianum, Ruschia cf. bolusiae, R. leucosperma, Aloe falcata, Didelta carnosa, D. spinosa, Eriocephalus microphyllus, Pteronia succulenta, Elytropappus rhinocerotis, Berkheya fruticosa, Asparagus retrofractus, Roepera morgsana, R. cordifolia, Lessertia (= Sutherlandia) frutescens, Hermannia sp (not in flower), Galenia africana, Searsia undulata and Atriplex semibaccata were recorded on the limestone slopes. A single occurrence of Quaqua cf. armata (not in flower; 31° 41' 16.5"S, 18° 42' 27.4"E) was also recorded in the good quality vygieveld directly west of the proposed mining site.

The Widou River (seasonal) to the south of the site supports Acacia (= Vachellia) karroo thicket (see Figure 4). The latter has been invaded with Prosopis glandulosa and Nerium oleander. From a distance it is impossible to distinguish between the A. karroo and P. glandulosa due to their similar growth form and armed branches. It is understood that the riverine area will not be affected by mining activities. Erosion does not seem to be a problem in the area (due to low rainfall), although signs of minor sheet and gully erosion were noted on the southern side (left bank) of the Widou River.

Figure 5: Widou River, with Acacia karroo and Prosopis glandulosa thicket.

Trachyandra falcata, Brunsvigia bosmaniae and Albuca cf. canadensis were the only bulb species recorded. Alien species recorded include Limonium sinuatum (alien weed), Prosopis glandulosa and Nerium oleander. Prosopis glandulosa is a declared alien invader under the Conservation of Agricultural Resources Act (Act 43 of 1983). It is considered the most important woody invader species in Namaqualand (Mucina & Rutherford 2006). Galenia africana can also become invasive along watercourses.

With regards to the presence of mammal fauna, only aardvark (see Figure 7), porcupine and mole or molerat activity was noted on site. Antelope species that may frequent the area include the common duiker, steenbok and grysbok. Termite (snout harvester termite mounds) and cocktail ant (Crematogaster sp) nests were also noted. The farm was utilised as a sheep farm until recently. The sheep was removed at the beginning of 2016.

Figure 6: An aardcark burrow. These burrows may also be occupied by aardwolf, bat-eared fox, Cape fox and black-backed jackel. Insert: termite mound

AIR QUALITY

The operation of the proposed lime kilns will emit emissions to the atmosphere. An Air Emissions License (AEL) will be applied with the National Department of Environmental Affairs (DEA) in terms of Section 36(5)(e) of the National Environmental Management: Air Quality (Act 39 of 2004). It is anticipated that dust may be generated by the operation. Ambient dust level will be impacted by occasional vehicles on gravel roads in the area, dust may be generated from mining activities in the surrounding area as well wind generated dust. Dust suppression measures will be implemented to prevent excessive dust on site.

SURFACE WATER AND GROUND WATER

Major watercourses in the surrounding landscape include the Wiedou River, which flows along the southern boundary of Welverdiend (120 – 200m south/ south-west of the development site), and the Troe-Troe River which flows ±3.5 km north-west of the site. An application for use of underground water to use for dust suppression, will be submitted to the Department of Water and Sanitation (DWS).

Existing land use on adjacent land

The land use of the surrounding properties mainly consist of agriculture in particular grazing. The Maheane Village is within close proximity to the mining area. The road (R31) passes by the site and serves as a link to the Kuruman town and other areas in the proximity of the site.

1.3 Legislative framework

South Africa's legislation unambiguously places the responsibility of mitigating environmental damage as a result of mining operations on mining companies. The liability exists throughout the life of the mine, and beyond in terms of residual impacts. It includes commitments for remediation and/or rehabilitation. This includes compulsory legislative commitments for remediation and/or rehabilitation and ultimate close out. The key relevant legislation applicable to rehabilitation and closure includes the following:

- Constitution of the Republic of South Africa (Act 108 of 1996) (Constitution);
- Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA);
- National Environmental Management Act (Act No. 107 of 1998) (NEMA);
- National Water Act (Act 36 of 1998) (NWA).
- National Heritage Resources Act No. 25 of 1999
- National Environmental Management Biodiversity Act No. 10 of 2004 (NEMBA)

Constitution of the Republic of South Africa (Act 108 of 1996)

Chapter 2 of the Constitution of the Republic of South Africa, 1996 outlines the Bill of Rights. The chapter addresses all constitutional rights of the citizens of South Africa and confirms the democratic values of human dignity, equality and freedom (Section 24 of the Constitution). A constitutional mandate to have an environment that is not harmful to health or wellbeing is provided for in this Section. This section of the Constitution provides the framework for the formulation and interpretation of other legislation which control environmental management.

Mineral and Petroleum Resources Development Act (Act 28 of 2002)

The MPRDA is the principle legislation governing the mining industry and along with its regulations (GN R527) have several provisions relating to rehabilitation. The objectives of the act in terms of rehabilitation are to give effect to environmental rights as outlined in the constitution. The cradle-to-grave principle (described above) is applied by means of the above-mentioned provisions, which cover the various stages of the project that apply from the period prior to mining through the construction, operation to closure and beyond.

National Environmental Management Act 107 of 1998 (as amended)

Sections 28 (1) and (3) of NEMA set out the duty of care principle, which is applicable to all types of pollution and must be taken into account in considering any aspects of potential environmental degradation.

Section 24(P)(1) of NEMA states that (paraphrased) an applicant for an environmental authorisation relating to mining on a mining area must make the prescribed financial provision for the rehabilitation, management and closure of environmental impacts, before the Minister responsible for mineral resources issues the environmental authorisation. This Interim Closure Plan "Closure Plan" has therefore been prepared as part of the

Environmental Authorisation process in order to determine the rehabilitation, management and closure requirements for the proposed Friersdale Project. This Closure Plan is a component of the EMPr, and will be subjected the same requirements in terms of stakeholder review and comment. Aspects of this Closure Plan relating to monitoring and reporting must be adhered to throughout the Life of Mine (LoM). The Closure Plan is to be audited annually and updated when necessary (i.e. if changes in the mine layout occur or additional potential residual impacts arise).

The mining industry will therefore remain liable for the damage or degradation caused by its activities throughout the life cycle of the mining operations until decommissioning and rehabilitation.

National Water Act (Act 36 of 1998)

Section 19 of the Act sets out the principles for “an owner of land, a person in control of land or a person who occupies or uses land” to:

- Cease, modify or control any act or process causing pollution;
- Comply with any prescribed waste standard or management practice;
- Contain or prevent the movement of pollutants;
- Eliminate any source of pollution;
- Remedy the effects of the pollution;
- Remedy the effects of any disturbance to the bed and banks of a watercourse.

It also describes the actions that can be taken by the catchment management agency to enforce the requirements of the Act.

The regulations contained in GN R704 published in terms of NWA consist of regulations on the “use of water for mining and related activities “and are aimed at the protection of water resources”. GN R704 acknowledges the principle of co-operative governance and the respective roles for the DMR, the Department of Environmental Affairs (DEA) and the Department of Water Affairs (DWA) in regulating pollution from mining activities

National Heritage Resources Act (No 25 of 1999)

This Act serves to protect manage South African heritage and cultural resources which includes places, buildings, structures and equipment of cultural significance.

National Environmental Management Biodiversity Act [NEMBA] (No.10 of 2004)

The NEMBA provides conservation and management of South Africa’s biodiversity within the framework of the NEMBA. This includes: the protection of species and ecosystems; the sustainable use of indigenous biological resources; the equitable sharing benefits arising from bioprospecting involving indigenous biological resources and the establishment of a South African National Biodiversity Institute (SANBI)

2 REHABILITATION AND CLOSURE OBJECTIVES

It is widely recognised that landscape rehabilitation after mining is essential in order to reinstate a functional end land use which positively contributes towards the future biophysical and societal demands of the people and the animals living in proximity to a disturbed environment. Mining activity in South Africa has a legacy of poor rehabilitation post extraction however this has changed substantially in recent years due to legislative requirement, enforcement and environmental responsibility by mining houses.

Mine rehabilitation must be considered as an on-going process aimed at restoring the physical, chemical and biological quality or potential of air, land and water regimes disturbed by mining to a state acceptable to the regulators and to post mining land users (Whitehorse Mining Initiative, 1994).

2.1 Closure Objectives

In the South African context and the world as a whole, the broad closure objectives include the three schools of thought, outlined below:

- Restoration of previous land capability and land use;
- No net loss of biodiversity; and
- Maintain peaceful relations with the affected community

The main objective for the Cape Lime project will be to rehabilitate the land as far as possible to its original form and land use.

Other objectives include:

- Ensure adherence to all statutory and other legal requirements;
- Re-establishment of the pre-mining land capability to allow for suitable post mining land use;
- Ensure that closure supports productive uses considering pre-mining conditions;
- Promote bio-diversity and biological sustainability to the maximum extent practicable
- To reinstate a self-sustaining system over the rehabilitated mined and infrastructure areas, requiring minimum maintenance to facilitate a walk away situation;
- To in-fill and slope ramps and voids to be free draining;
- Remove mine infrastructure that cannot be used by the applicant or a third party. Where buildings can be used by a third party, arrangements will be made to ensure their long term sustainable use; and
- Ensure that community safety is not adversely impacted (i.e. the pit area is adequately fenced off to restrict entry by humans and animals).

Rehabilitation requires on-going monitoring and evaluation of the objectives to validate the effectiveness of rehabilitation techniques and management measures. In rehabilitation planning it is important that goals, objectives and success criteria (key performance indicators – KPI's) are clearly defined. This allows the task to be approached in a systematic way, leaving room for adaptive management as on-going rehabilitation yields results (Hobbs, 2003; Johnson and Tanner, 2005).

This report addresses the National Environmental Management Act (Act No. 107 of 1998): Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations Government Gazette Notice No. 1147 issued on 20 November 2015. Table 1 indicates the sections in which the specific requirements of the legislation has been provided as part of this Rehabilitation Plan.

Table 1: Contents of an Annual rehabilitation plan in terms of Appendix 4 of the NEMA Financial Provision Regulations, 2015

Nr.	**Requirement**	**Reference**
(a)	Details of the ─	Section 3
(i)	person or persons that prepared the plan;	Section 3
(ii)	professional registrations and experience of the person or persons;	Section 3
(iii)	timeframes of implementation of the current, and review of the previous rehabilitation activities;	Section 4.2
(b)	The pertinent environmental and project context relating directly to the planned annual rehabilitation and remediation activity;	Section 1.2 – Project Context Section 1.3 – Environmental Context
(C)	results of monitoring of risks identified in the final rehabilitation, decommissioning and mine closure plan with a view to informing rehabilitation and remediation activities;	Section 4.2
(d)	an identification of shortcomings experienced in the preceding 12 months	N/A – no mining activities currently taking place on site
(e)	details of the planned annual rehabilitation and remediation activities or measures for the forthcoming 12 months, including those which will address the shortcomings contemplated in (d) above or which were identified from monitoring in the preceding 12 months, and including ─	Section 4.4
(i)	if no areas are available for annual rehabilitation and remediation concurrent with mining, an indication to that effect and motivation why no annual rehabilitation or remediation can be undertaken;	Section 4.1
(ii)	where areas are available for annual rehabilitation and remediation concurrent with mining, annual rehabilitation and remediation activities related to previous disturbance or expected planned impacts and disturbance, as per the mine works programme, in the period under consideration, which should be tabulated and must indicate, but not necessarily be limited to, --	Section 4.1

(aa)	nature or type of activity and associated infrastructure;	N/A – no mining activities currently taking place on site
(bb)	planned remaining life of the activity under consideration;	N/A – no mining activities currently taking place on site
(cc)	area already disturbed or planned to be disturbed in the period of review;	N/A – no mining activities currently taking place on site
(dd)	percentage of the already disturbed or planned to be disturbed area available for concurrent rehabilitation and remediation activities;	N/A – no mining activities currently taking place on site
(ee)	percentage of the already disturbed or planned to be disturbed area available as per (dd) and on which concurrent rehabilitation and remediation can be undertaken;	N/A – no mining activities currently taking place on site
(ff)	notes to indicate why total available or planned to be available area differs from area already disturbed or planned to be disturbed;	N/A – no mining activities currently taking place on site,
(gg)	notes to indicate why concurrent rehabilitation will not be undertaken on the full available or planned to be available area;	N/A – no mining activities currently taking place on site
(hh)	details of rehabilitation activity planned on this area for the period of review;	N/A – no mining activities currently taking place on site
(ii)	the pertinent closure objectives and performance targets that will be addressed in the forthcoming year, which objectives and targets are aligned to the final rehabilitation, decommissioning and mine closure plan;	Section 2.1
(jj)	description of the relevant closure design criteria adopted in the annual rehabilitation and remediation activities and the expected final land use once all rehabilitation and remediation activities are complete for the activity or aspect; and	Section 2
(iii)	a site plan indicating at least the total area disturbed, area available for rehabilitation and remediation and the area to be rehabilitated or remediated per aspect or activity;	Section 1.1
(f)	a review of the previous year's annual rehabilitation and remediation activities, indicating a comparison between activities planned in the previous year's annual rehabilitation and remediation plan and actual rehabilitation and remediation implemented, which should be tabulated and as a minimum contain ─	
(aa)	area planned to be rehabilitated and remediated during the plan under review;	N/A – no mining activities currently taking place on site
(bb)	actual area rehabilitation or remediated; and	Section 4
(cc)	if the variance between planned and actual exceeds 15%, motivation	N/A – no mining

	indicating reasons for the inability to rehabilitate or remediate the full area; and	activities currently taking place on site
(g)	costing, including ─	
(i)	an explanation of the closure cost methodology;	Section 6
(ii)	auditable calculations of costs per activity or infrastructure;	Section 6
(iii)	cost assumptions; and	Section 6
(iii)	monitoring and maintenance costs likely to be incurred both during the period of the annual rehabilitation plan and those that will extend past the period of the final rehabilitation, decommissioning and mine closure plan, on condition that the monitoring and maintenance costs included in previous annual rehabilitation plans must be accumulated into subsequent versions of the annual rehabilitation plan until such time as the monitoring and maintenance obligation is discharged.	

3 DETAILS OF AND EXPERTISE OF THE EAP

Table 2: Details of Environmental Assessment Practitioner (EAP)

Name	**Qualification and experience**
Ntsanko Ndlovu	Ntsanko is a Professional Environmental Scientist (EAPASA – 2019/1335 and Pri.Sci.Nat -127870) and holds a Masters degree in Environmental Management from North-West University with over twelve (12) years of professional experience as an Environmental Scientist in the consulting industry. Ntsanko is currently Group Environmental Specialist based at Afrimat. She has a wealth of experience in managing Environmental Impact Assessments (EIAs) with the required Public Participation Process (PPP), carrying out environmental audits and conducting environmental awareness, which she gained through the years.
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In terms of Section 13 (2) of the NEMA EIA Regulations 2014 the proponent must appoint an independent Environmental Assessment Practitioner (EAP) in the event where the EAP or specialist is not independent. Afrimat Aggregates (Operations) (Pty) Ltd has therefore appointed Biogeotech Environmental Consultance as an independent EAP to externally review this report. This report has been independently reviewed Mr Victor Manavhela of Biogeotech Environmental Consultance. Table 2 below provides information of the independent reviewer.

Table 3: Details of independent Reviewer

Name	**Qualification and Experience**
Victor Manavhela	Mr Victor Manavhela hold a Bachelor of science: Environmental Sciences, Certificate of Environmental Law and Certificate: EIA Reviewers course. He has over 20 years in the field of environmental management and sustainability. Out of the 17 years, at least over 6 years were spent on EIA regulations which include review of EIA applications to advice on EIA decisions at government level. He has also worked as an Environmental specialist for Anglo American company in Pulp and Paper industry. In addition he also holds the vast experience in ISO standards implementation and has participated in global standard development for Aluminium mining and processing sector led by IUCN.
Telephone	072 130 2832

Number	
e-mail	vmanavhela@biogeotech.co.za

4 ANNUAL REHABILITATION PLAN

4.1 Concurrent Rehabilitation commitments

Mining operations will only commence once an Environmental Authorisation is approved for the proposed project and since no mining operations has taken place on the proposed site), no concurrent rehabilitation commitments have been made.

4.2 Risks impacting rehabilitation and closure

The aim of this section of this Risk Assessment is to provide information regarding the potential environmental impacts associated with the current activities/current conditions in the mine.

The objective of the environmental risk assessment is to—
(a) Ensure timeous risk reduction through appropriate interventions;
(b) Identify and quantify the potential latent environmental risks related to post closure;
(c) Detail the approach to managing the risks;
(d) Quantify the potential liabilities associated with the management of the risks; and
(e) Outline monitoring, auditing and reporting requirements.

The risks that were identified during the assessment are documented below. After all impacts have been identified, the nature and scale of each impact can be predicted. The impact prediction aim to provide a basis from which the significance of each impact can be determined and appropriate mitigation measures can be developed. Table 4 below provide a summary of the identified the risks as well as the as the consequence of the risk occurring. Criteria used to assess consequence and probability of the risk is outlined is Annexure A.

There are a number of challenges associated with rehabilitating this landscape due to the unique vegetation type and dune type of the environment. The risks that were identified during the assessment are documented below.

Top soil: The main impact on the environment will result from the shortage of top soil to backfill the mined areas. The mine has limited topsoil since the site is mainly covered with rocky outcrops. It cannot be quantified if the available top soil will fill the already disturbed areas.

Wind Erosion: The primary erosive force in the area is wind. Stabilisation of bare slopes and the prevention of wind erosion is therefore another challenge in this area. Studies in other area show that landscaping the natural topography and preventative measures, such as the erection of rows of shade cloth during the initial stages of restoration, have been successful in mitigating this challenge.
as soon as suitable cover has been established, the windbreaks must be removed (van der Merwe, 2004).

Aspects Affected	Activity	Potential Impact	Phase in which impact is anticipated	Significance if not mitigated			Mitigation Type (modify, remedy, control, or stop) through	Mitigation measures	Significance if mitigated			Standard to be achieved	Compliance with standards	Time period for implementation
				Probability	Magnitude	Significance			Probability	Magnitude	Significance			
Top soil	Sand burial by not stockpiling top soil	Loss of top soil	Operation and rehabilitation and closure	4	8	VH	• Control through planning and scheduling	• Topsoil of at least 300mm depth (0.3m) must be set aside for rehabilitation purposes, • Soil stripping must be limited to areas required for the construction activities • Ensure subsoil stripping and stockpiling for future rehabilitation purposes are conducted correctly under supervision. • Identify and demarcate a stockpiling area for topsoil • Over-seed the permanent stockpiles	2	7	H	Maintain functional soil structure to sustain post-mining land capability	Rehabilitation, Closure plan and Closure Objectives.	During Operational and Rehabilitation / Closure Phases.
Soil and land capability	Wind erosion on stockpiled topsoil and rehabilitated area		Operation and rehabilitation and closure	3	6	H	• Control through	• Replacing topsoil on the stripped land before the next strip is opened and mined. • Stabilise exposed (bare) areas with vegetation and/or erosion control blankets. Establishing and maintaining vegetation as a soil cover is the most common practical technique for controlling erosion on disturbed soils. A 70 % dead grass or reed cover will slow down flow, minimise wind erosion and suppress weed growth. • All areas susceptible to erosion (including roads, bare areas and drainage channels) must be monitored on a monthly basis to ensure that there is no undue soil erosion resultant from activities. If erosion is identified it must not be allowed to develop on a large scale before effecting repairs.	3	6	M	Maintain functional soil structure to sustain post-mining land capability	Rehabilitation, Closure plan and Closure Objectives.	During Operational and Rehabilitation / Closure Phases

Aspects Affected	Activity	Potential Impact	Phase in which impact is anticipated	Significance if not mitigated			Mitigation Type (modify, remedy, control, or stop) through	Mitigation measures	Significance if mitigated			Standard to be achieved	Compliance with standards	Time period for implementation
				Probability	Magnitude	Significance			Probability	Magnitude	Significance			
Vegetation	Establishing seedlings	Impact on vegetation type and habitat Alien vegetation spreading into disturbed soil, especially in the absence of successful rehabilitation	Operation and rehabilitation and closure	2	6	H	Remedy through rehabilitation	• Assess the need for in-planting and the establishment of woody vegetation as functional plant groupings. These plants must be harvested from the veld, and directly planted into the rehabilitation areas. • Control alien species through ongoing alien invasive eradication programme •	3	5	M	Ensure effective rehabilitation of disturbed areas.	Rehabilitation, Closure plan and Closure Objectives.	Rehabilitation / Closure Phase

4.3 Shortcomings identified during the preceding 12 months

This is not applicable as the site is in a greenfield state.

4.4 Rehabilitation Activities

In order to gain the best possible rehabilitation outcomes from the mining processes, different actions are required to occur at different times within the life of the project from commencement to closure. Similarly, there are management and monitoring actions that is required throughout the life of the mining project and for years after decommissioning and closure.

Traditional mining phases include Construction-, Operational- and Closure phase. Outlined below are the actions to occur through the Operational and Closure phases that are needed to ensure successful rehabilitation

4.4.1 Land Preparation

The overall aim of land preparation is to ensure that the mining area is limited as far as possible, pollution or contamination does not occur and maximise the recovery and effective storage of those mining profile materials that could be used for rehabilitation after mining operations have been completed. The following points should be considered for the current operational phase of the project:

- Mine planning should be designed in a way so as to ensure the area to be occupied by mine infrastructure is minimized.
- The affected area should be kept as small as is practically possible and should be clearly defined and demarcated.
- Mine operators should restrict their activities to planned areas. Clear instructions and control systems should be in place and compliance to the instructions should be policed by inter alia the mine manager.
- All stockpiles should be located in demarcated and approved areas where they will not have to be removed far prior to final placement.
- Sand and soils which cannot be replaced directly onto rehabilitated land should be stockpiled
- All stockpiles should be clearly and permanently demarcated and located in defined no-go areas, revegetated and monitored on an annual basis.

4.4.2 Sand Removal and Disturbance of Soils

4.4.2.1 Soil Stockpiling

The correct handling of topsoil is one of the most critical determining factors for successful rehabilitation. Soil disturbance is only envisaged within the demarcated stockpile area. Sufficient soil through soil stockpiling should be available for rehabilitation of mined area and of adequate quality to support vegetation growth and thus ensure successful rehabilitation.

The stripping of soil must be carefully planned, executed and monitored by the Mine manager. This to ensure soils are being stripped from the correct areas within the mining footprint, at the correct depths and placed in the correct location. The stockpiles should be used to help buffer the mine site during operation against the elements. The locations of the stockpile area should be on a topographical crest to ensure free drainage in all directions. If this is not possible then an alternative is a side slope location with suitable cut-off berms constructed upslope. Soils are further at risk to compaction when there is a high moisture content. The dry winter months are thus preferred to commence stockpiling during the site establishment phase. If soil stripping can only occur during the wet months there should be the adoption of methods that cause minimum compaction.

The steps that should be taken during sand stockpiling are as follows:

1. Mark stockpile locations accurately on a plan to ensure that re-handling is minimized (i.e. sand will not have to be moved a second or third time);
2. The soils should be stockpiled on the parent soils and demarcated mining area close to stripped and final rehabilitation areas as possible;
3. Ensure that the location is free draining to minimize erosion loss and waterlogging;
4. Erosion control measure and berms be installed;
5. Minimize compaction during stockpile formation; and
6. Ensure that the stockpiled sand is only used for the intended purposes.

Soils should be exposed for the minimum time possible once cleared of vegetation, i.e. the timing of clearing and grubbing should be coordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. The latter will facilitate the succession of indigenous vegetation.

Once soils are stockpiled they should be managed and monitored progressively (during the mine operation phase) to ensure no damage or degradation of the soils occur. The soil stock pile areas should be strictly no-go areas and security measures in place to ensure there is no theft of the fertile soil. Assessing post-mining soil characteristics and associated land capability and land uses is necessary to ensure that the end land uses goals can be met.

4.4.3 Erosion Control

During all the phases of the mine, active soil erosion prevention and rehabilitation should occur. Active monitoring by the Mine Manager must occur to ensure prevention or early detection of soil erosion. Early detection will increase the successful chances of rehabilitation of that area. Surrounding vegetation must be kept to act as screens that reduces erosion. Stockpiles that remain in the same location for more than one growing season and have not re-vegetated naturally have to be re-vegetated to prevent erosion losses (Chamber of Mines, 2004).

4.4.4 Infrastructure Removal

After mining has ceased, processing facilities; administration; mining; transport and storage facilities should be removed in order to re-establish land to a sustainable usable condition. Safety should be the leading factor during infrastructure removal as this is a dangerous operation.

Mine infrastructure that cannot be used by a subsequent landowner or third party should be removed. Where buildings can be used by a third party, arrangements will be made to ensure long term sustainable use.

4.4.5 Re-Vegetation and Biodiversity Establishment

The main aim when re-vegetating is to restore the area back to the pre-mining environmental state.

Aims and Objectives

The main aim of re-vegetation for the study area is to restore the area to the indigenous Kuruman Mountain Bushveld vegetation type. It is advised to restore the study area as far as possible to a stable and sustainable ecosystem. The overall objectives for the re-vegetation of reshaped and top soiled land are to:

- Prevent erosion;
- Restore the land to the agreed land capability;
- Re-establish eco-system processes to ensure that a sustainable land use can be established without requiring fertilizer additions; and
- Restore the biodiversity of the area as far as possible.

The main aim of re-vegetation for the mining site is to restore the area to the indigenous vegetation.

5 POST-CLOSURE MAINTENANCE, AFTERCARE, MONITORING AND REPORTING

Maintenance and aftercare must be planned for 2-3 years after the land preparation and replanting of vegetation has been completed. Maintenance will specifically focus on annual fertilising the rehabilitated area, control of all other alien plants and general maintenance, including rehabilitation of cracks, subsidence and erosion gullies. Continuous erosion monitoring of rehabilitated areas and slopes should be undertaken and zones with excessive erosion should be identified. The cause of the erosion should be identified, and rectified. Zones with erosion will need to be repaired with topsoil and re-vegetated.

5.1 Post-Closure Monitoring and Reporting

The purpose of monitoring is to ensure that the objectives of the rehabilitation programme are met and that the rehabilitation process is followed. A post-closure monitoring and maintenance period of five years after decommissioning and closure is assumed. It should be noted however that the Competent Authority (CA) will ultimately determine the period required. Monitoring and maintenance will be conducted until a closure certificate is issued. Table 4 summarises the post-closure monitoring programmes.

Table 4: Monitoring and reporting post-closure

Aspect	Detail	Authority reporting to	Monitoring Frequency	Completion
Groundwater	Groundwater Level	DWS	Quarterly	Monitoring should take place for five years or until a long term acceptable trend can be determined
	Groundwater Quality	DWS	Quarterly	Monitoring should take place for five years or until a long term acceptable trend can be determined
Biodiversity	Alien invasion of the disturbed areas	DMR & DEA&DP	Twice a year (November and March)	2 years after closure
	Biodiversity establishment and rehabilitation success	DMR & DEA&DP	Biodiversity assessments mid wet season should be undertaken by a qualified ecologist / botanist to	2 years after closure

			monitor the rehabilitation progress with regards to flora	
Soil	Erosion and associated degradation	DMR	Annually especially after the rainy	2 years after closure
	Soil fertility	DMR	Once prior to rehabilitation	Decommissioning Phase

A record of all rehabilitation and closure requirements and actions should be kept by the ECO. These records will be important during any auditing process. The records will further provide information where care and maintenance is required during the post-closure period. If records indicate that residual impacts are being realised, the appropriate specialist should be consulted and the recommended management measures implemented.

Water monitoring reports must be submitted to the DWS as they become available after each monitoring survey as indicated in Table 2. An annual post-closure report must be prepared, including all of the monitoring data recorded. This must be submitted to the DMR. The relinquishment criteria for the awarding of a closure certificate by the DMR will be that the closure objectives are met. Annual post-closure reporting by the ECO must include whether the relinquishment criteria have been achieved. Refer to Table 5 below for the reporting criteria and indicators. Recommendations for actions to be taken must also be included in the annual report.

5.2 Relinquishment Criteria

Following the implementation of the Action Plan (AP) described in the previous section, it is necessary to have measurable criteria against which to assess the effectiveness of the plan and its implementation. These criteria will assist Welverdiend limestone mine project in identifying when the standard of closure achieved is sufficient to relinquish responsibility for a specific area. The site specific relinquishment criteria for the mine area are documented in Table 5.These criteria relate mainly to the biophysical environment. Also included in the table are the indicators required to demonstrate achievement with the relinquishment criteria and the reporting requirements. The reporting requirements are those that are expected to fulfil the monitoring requirements set out by legislation.

Table 5: Relinquishment criteria for closure of the Welverdiend Project

ENVIRONMENTAL ATTRIBUTE	RELINQUISHMENT CRITERIA	INDICATORS	REPORTING REQUIREMEMBTS
Groundwater	Ensure groundwater levels and quality are not adversely affected	Groundwater levels return to the baseline levels and groundwater quality returns to baseline uncontaminated quality	Monitoring results signed off by a qualified Geohydrologist (after at least 5 years)
Soil and Land Capability	Ensure that the agricultural potential is returned to the present or improved potential (low agricultural potential) and the land is acceptable for the end land use in line with planning objectives (agriculture and urban development)	No erosion taking place, established and self-sustaining vegetation, land use and land capability rendered suitable for the planned end land uses	Photographic evidence of land returned to agricultural use, or development in line with planning objectives
Safety	Decommissioning of all structures and roads	Roads should be removed and sloped to blend in with the natural landscape. No visible man-made structures should remain	Photographic evidence that infrastructure has been removed
	Ensure that community safety is not adversely affected	The area is stable, the pit is fenced off with visible weather durable danger signs, all	Photographic evidence of the fenced off pit and rehabilitated areas

		surface infrastructure is dismantled and removed from site and no waste remains on site	
Vegetation	Return the affected area to the baseline or improved ecological state (i.e. low ecological sensitivity)	Successful rehabilitation (established and self-sustaining vegetation), increased species diversity compared to the pre-mining state and not invasive to the region	Monitoring report compiled by qualified botanist / ecologist confirming successful rehabilitation
Aesthetic quality	Develop a landform that is aesthetically acceptable	All surface infrastructure must be dismantled and removed from site, no waste remains on site, the landscape is unobtrusive in relation to the existing landscape	Photographic evidence of removal of all surface infrastructure and non-conspicuous project site

6 COST ESTIMATES

Closure liability costs were calculated by means of the cost methodology that has been applied was according to the DMR Guidelines for Calculating the Quantum of Financial Provision as per the MPRDA. The approach to calculating the closure quantum as specified in the DMR Guideline which was utilised in this assessment is as summarised as follows and is reported in Table 4.

- Step 1: Determine the ineral Mined
  - In the first step the mineral mined has been identified in the tables provided in the DMR guideline (Table B.13) as **"Limestone."**
- Step 2A: Determine Primary Risk Class
  - The "Primary Risk Class" has been determined from Table B.12 of the DMR Guideline as "**B (Medium Risk)".**
- Step 2B: Revision of Primary Risk Class
  - The Primary Risk Class can be revised on the basis of saleable by-products if required. However, this is not applicable at the proposed Olympic Project.
- Step 3: Determine Environmental Sensitivity
  - The "Environmental Sensitivity" has been determined by reference to Table B.4 of the DMR Guideline as "**Low**".
- Step 4.4 determination of weighting factors:
  - **Weighting Factor 1**: The nature of the terrain where the operation is located is **flat**.
  - **Weighting Factor 2**: The proximity of the operation to an urban centre. In this instance the Olympic Project is considered **urban**.

Table 6: Calculation of the quantum for Cape Lime

CALCULATION OF THE QUANTUM

Applicant :	**Maskam Cape Lime**		
Evaluator:	**Tali Tshikhovhokhovho**	**Location:**	**Vredendal**
Reference :	**WC 30/5/1/2/2/ (401) MR**	**Date:**	**Dec 2019**

Environmental Parameters

Risk Class	B
Area sensitivity	Low
Nature of terrain	Flat
Proximity to Urban Ara	Urban

No.	**Description**	**Unit**	**A** **Quantity**	**B** **Master Rate**	**C** **Multiplication factor**	**D** **Weighting factor 1**	**E=A*B*C*D** **Amount (Rands)**
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	0	R 15.15	1	1	R 0.00
2 (A)	Demolition of steel buildings and structures	m2	0	R 211.09	1	1	R 0.00
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	R 311.09	1	1	R 0.00
3	Rehabilitation of access roads	m2	3000	R 37.77	1	1	R 113 324.58
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	R 366.64	1	1	R 0.00
4 (B)	Demolition and rehabilitation of non-electrified railway lines	m	0	R 199.98	1	1	R 0.00
5	Demolition of housing and/or administration facilities	m2	0	R 422.19	1	1	R 0.00
6	Opencast rehabilitation including final voids and ramps	ha	0	R 214 872.28	0.04	1	R 0.00
7	Sealing of shafts adits and inclines	m3	0	R 113.32	1	1	R 0.00
8 (A)	Rehabilitation of overburden and spoils	ha	0.5	R 147 544.15	1	1	R 0.00
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	R 183 763.58	1	1	R 0.00
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	R 533 736.53	0.55	1	R 0.00
9	Rehabilitation of subsided areas	ha	0.5	R 123 546.01	1	1	R 0.00
10	General surface rehabilitation	ha	1	R 116 879.86	1	1	R 116 879.86
11	River diversions	ha	0	R 116 879.86	1	1	R 0.00
12	Fencing	m	0	R 133.32	1	1	R 0.00
13	Water management	ha	0	R 44 441.01	0.41	1	R 0.00
14	2 to 3 years of maintenance and aftercare	ha	0	R 15 554.35	1	1	R 0.00
15 (A)	Specialist study	Sum	1	R 26 664.61	1	1	R 26 664.61
15 (B)	Specialist study	Sum	1	R 26 664.61	1	1	R 26 664.61
					Sub Total 1		R 283 533.64
1	Preliminary and General		R 34 024.04		**weighting factor 2** 1		R 34 024.04
2	Contingencies		R 28 353.36				R 28 353.36
					Subtotal 2		R 345 911.05
					VAT (15%)		R 51 886.66
					Grand Total		**R 397 797.70**

7 CONCLUSION AND RECOMMENDATIONS

The Rehabilitation Plan and Closure Cost Calculation was based on the current conditions of the site. This document does not serve as a final closure plan, but rather as a starting point for consideration towards the various aspects of closure. This document must be assessed annually and updated as necessary, with the end target being a closed mine having minimal residual impact on the environment or safety of people.

Cape Lime mine will provide for the closure liability associated with the project through the purchase of a Bank Guarantee.

8 REFERENCES

- Constitution of the Republic of South Africa (Act 108 of 1996) (Constitution).
- DME, 2005: Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine, Pretoria, Department of Minerals and Energy.

ANNEXURE A – DETERMINATION OF MAGNITUDE OF IMPACT

The significance of both positive and negative potential impacts were determined through the evaluation of impact consequence and likelihood of occurrence.

The significance of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur. The following risk assessment model has been used for determination of the significance of impacts.

SIGNIFICANCE = CONSEQUENCE X PROBABILITY

WHERE Consequence = Extent + Intensity + Duration

The criteria used to determine impact consequence are presented on the table below. Each rating has been allocated a score weighting

Table 1: Criteria used to determine the Consequence of the Impact

Rating	Definition of Rating	Score
A. *Extent - the area over which the impact will be experienced*		
Local	limited to the immediate area(s) around the project site -	1
Regional	extends over a larger area that would include a major portion of an area or province	2
National/International	nationally or beyond	3
B. *Intensity - the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. Duration– the lifetime of the impact, that is measured in relation to the lifetime of the proposed development and its reversibility		
Short-term	(0 to 3 years)	1
Medium-term	(3 to 10 years) confined to the construction period	2
Long-term	(more than 10 years)	3
Permanent	beyond the anticipated lifetime of the project	4

The combined score of these three criteria corresponds to a **Consequence/Magnitude Rating**, as follows:

Table 7: Method used to determine the Consequence/Magnitude Score

Combined Score (A+B+C)	3 – 4	5	6	7	8 - 9
Consequence Rating	Very low	Low	Medium	High	Very high

Once the consequence was derived, the probability of the impact occurring was considered. Probability of impact occurrence - this describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time

- Improbable (very low to low likelihood).
- Possible (likely).
- Probable (distinct possibility).
- Definite (the impact would occur regardless of prevention or mitigation measures)

The probability of the impact using is presented in the table below.

Table 8: Probability Classification

Probability– the likelihood of the impact occurring	
Improbable	1
Possible	2
Probable	3
Definite	4

The overall significance of impacts was determined by considering consequence and probability using the rating system prescribed below

Table 9: Impact significance ratings

		Probability			
		1 Improbable	2 Possible	3 Probable	4 Definite
Consequence/Magnitude	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERY HIGH	VERY HIGH

Practicable mitigation and optimisation measures are recommended and impacts are rated in the prescribed way both without and with the assumed effective implementation of mitigation and optimisation measures.

The impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

- **Insignificant:** the potential impact is negligible and will not have an influence on the decision regarding the proposed activity/development.
- **Very Low:** the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity/development.
- **Low:** the potential impact may not have any meaningful influence on the decision regarding the proposed activity/development.
- **Medium:** the potential impact should influence the decision regarding the proposed activity/development.
- **High:** the potential impact will affect the decision regarding the proposed activity/development.
- **Very High:** the proposed activity should only be approved under special circumstances