

**AfriSam (South Africa) Properties (Pty)
Ltd: Ulco Cement Plant and Mining
Operation**

**Application for Environmental Authorisation for the
proposed Bergville Project**

**Draft Environmental Impact Assessment Report and
Environmental Management Programme Report**

Report date: January 2020

DMR Reference: NC30/5/1/1/3/2/1/177MR

SHANGONI
Management Services (Pty) Ltd



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Environmental Impact Assessment Report and Environmental Management Programme Report

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

Name of Applicant AfriSam (South Africa) Properties (Pty) Ltd

Project Application for Environmental Authorisation for the proposed Bergville Project

Document Draft Environmental Impact Assessment Report and Environmental Management Programme Report

Tel No. 011 670 5560

Fax No. 011 670 5060

Postal Address PO Box 6367, Weltevredenpark, 1715

Physical Address Ulco cement factory, Kimberley area, Northern Cape

DMR Reference No NC30/5/1/1/3/2/1/177MR



IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is, therefore, an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process:-

- (a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- (c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified



development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

- (d) determine the—
 - i. nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii. degree to which these impacts—
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources, and
 - (cc) can be avoided, managed or mitigated;
- (e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- (f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- (g) identify suitable measures to manage, avoid or mitigate identified impacts; and
- (h) identify residual risks that need to be managed and monitored.



Table of Contents

PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1.	Details of Project Applicant and EAP	1
1.1.	Details of the Project Applicant	1
1.2.	Details of the EAP	1
1.3.	Expertise of the EAP	1
2.	Description of the property	2
3.	Locality map	6
3.1.	Magisterial district and administrative boundaries	6
3.2.	Location of the mine	6
3.3.	Location of the proposed activities	6
4.	Description of the scope of the proposed overall activity	8
4.1.	Listed and specified activities	8
4.2.	Description of the proposed activities to be undertaken	21
4.3.	Description of the existing main mining activities and processes	30
5.	Policy and Legislative Context	60
6.	Need and Desirability of the Proposed Activities	62
7.	Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site.	75
7.1.	Details of alternatives considered as part of the proposed Bergville Project	75
7.2.	Details of the Public Participation Process Followed	83
7.3.	Summary of Issues Raised by I&APs	83
7.4.	The Environmental Attributes Associated with the Development Footprint Alternatives.	90
7.5.	Impacts and Risks Identified	162
7.6.	Methodology used in determining and ranking potential environmental impacts and risks ...	266
7.7.	Positive and negatives that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and community affected	276



7.8.	Possible mitigation measures that could be applied and the level of risk.....	277
7.9.	Motivation where no alternative sites were considered	281
7.10.	The outcome of the Site Selection Matrix. Final site layout plan	281
8.	Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity.....	281
9.	Assessment of each identified potentially significant impact and risk.....	282
10.	Summary of specialist reports.....	282
11.	Environmental Impact Statement	289
11.1.	Summary of the key findings of the environmental impact assessment	289
11.2.	Final Site Map	289
11.3.	Summary of the positive and negative implications and risks of the proposed activity	291
12.	Proposed impact management objectives and the impact management outcomes for inclusion into the EMPr	315
13.	Final proposed alternatives	316
13.1.	Mining layout alternative.....	316
13.2.	Site alternatives for the crusher	316
13.3.	Site alternatives for the road and conveyor crossing point	316
13.4.	Layout alternatives for the stream diversion	316
13.5.	Design alternatives for the R31 crossing	316
13.6.	Design alternatives for the proposed haul/access road stream crossing	316
13.7.	No-go option.....	317
14.	Aspects for inclusion as conditions of the authorisation.....	317
15.	Description of any assumptions, uncertainties and gaps in knowledge	317
16.	Reasoned opinion as to whether the proposed activity should or should not be authorised	321
16.1.	Reasons why the activity should be authorised or not.....	321
16.2.	Conditions that must be included in the authorisation	322
17.	Period for which Environmental Authorisation is required	322



18.	Undertaking	323
19.	Financial Provisions	323
19.1.	Explain how the aforesaid amount was derived.....	323
19.2.	Confirm that this amount can be provided for from operating expenditure	323
20.	Deviations from the approved scoping report and plan of study	323
21.	Other information required by the competent authority	323
21.1.	Compliance with the provisions of section 24(4)(a) and (b) read with section 24(3)(a) and (7) of the National Environmental Management Act 107 of 1998.....	324
22.	Other matters required in terms of section 24(4) (a) and (b) of the Act	324

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1.	Draft environmental management programme	325
1.1.	Details of the EAP	325
1.2.	Description of the aspects of the activity	325
1.3.	Composite map	325
1.4.	Description of impact management objectives including management statements	325
1.5.	Impact management outcomes	330
1.6.	Impact management actions	330
1.7.	Closure Objectives	331
1.8.	Mechanisms for monitoring compliance with and performance assessments against the environmental management programme	332
1.9.	Indicate the frequency of the submission of the performance assessment report.....	341
1.10.	Environmental Awareness Plan	341
1.11.	Specific information required by the Competent Authority	346
2.	Undertaking	346
3.	Declaration of independence	347



Annexures

- Annexure A: Site Layout Maps
- Annexure B: Project Team CVs
- Annexure C: Government Correspondence
- Annexure C1: Pre-application meeting with DMR
- Annexure C2: Submitted application form
- Annexure C3: Acceptance of Final Scoping Report from DMR
- Annexure D: Specialist studies
- Annexure D1: Air Quality Impact Assessment
- Annexure D2: Biodiversity Assessment
- Annexure D3: Blasting and Vibration study
- Annexure D4: Groundwater study
- Annexure D5: Heritage Impact Assessment
- Annexure D6: Stormwater Management plan
- Annexure D7: Traffic Impact Assessment
- Annexure D8: Wetland study for the Bergville project
- Annexure D9: Wetland study for the Mining Right area
- Annexure D10: Palaeontological study
- Annexure E: Public Participation Report
- Annexure F: Financial Provision Report

References

- Blasting Management and Consulting. 2019. *Blast Impact Assessment Proposed Bergville Mine Project*.
- Department of Environmental Affairs. 2014. *National Environmental Management Act, 1998 (Act 107 of 1998). GNR.982 Environmental Impact Assessment (EIA) Regulations, dated December 2014, as amended*.
- Department of Environmental Affairs. 2014. *National Environmental Management Act, 1998 (Act 107 of 1998). GNR.983 Environmental Impact Assessment Regulations Listing Notice 1 of 2014, dated December 2014, as amended*.



Department of Environmental Affairs. 2014. *National Environmental Management Act, 1998 (Act 107 of 1998). GNR.984 Environmental Impact Assessment Regulations Listing Notice 2 of 2014, dated December 2014, as amended.*

Department of Environmental Affairs. 2014. *National Environmental Management Act, 1998 (Act 107 of 1998). GNR.985 Environmental Impact Assessment Regulations Listing Notice 3 of 2014, dated December 2014, as amended.*

Department of Environmental Affairs. 2017. *Integrated Environmental Management Guideline: Guideline on Need and Desirability.*

Department of Environmental Affairs. 2017. *Public Participation guideline in terms of NEMA EIA Regulations.*

Department of Environmental Affairs. 2018. *Draft: National Guideline on minimum information requirements for preparing Environmental Impact Assessments for mining activities that require Environmental Authorisation.*

Department of Mineral Resources. *Guideline for Consultation with communities and Interested and Affected Parties.*

EDL Consulting Engineers. 2019. *Proposed Expansion: Afrisam, Ulco, Northern Cape: Traffic Impact Assessment Report.*

Fourie. H. 2019. *Palaeontological Impact Assessment: Desktop Study AfriSam (South Africa) Properties (Pty) Ltd: Ulco Cement Plant and Mining Operation: Proposed Bergville Project Dikgatlong Local Municipality, Frances Baard District Municipality, Northern Cape Province. Farm: Portion 3 (Bergville) of Hondefontein 216, Portion 2 of Vogelfontein 176, Portion of Erven 4 Delportshoop.*

Miller. S. 2018. *1st phase H.I.A. of a study area that includes portion 3 (Bergville) of the farm Hondefontein 216, portion 2 of the farm Vogelfontein 176 and a portion of Erven 4 Delportshoop, Kimberley district Northern Cape for: AfriSam – Ulco. Northern Cape.*

Scientific Aquatic Services CC. 2018. *Freshwater resource ecological assessment as part of the environmental assessment and authorisation process for the Ulco Afrisam mining operation, near Kimberley, Northern Cape Province.*

Scientific Aquatic Services CC. 2019. *Freshwater resource ecological assessment as part of the environmental assessment and authorisation process for the Ulco Afrisam mining operation, near Kimberley, Northern Cape Province.*

Scientific Terrestrial Services CC. 2019. *Terrestrial ecological habitat integrity investigation as part of the environmental authorisation process for the for the Ulco-Afrisam mining operation, near Kimberley, Northern Cape Province.*

Shangoni Management Services (Pty) Ltd. 2019. *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Operation – Bergville Project Storm Water Management Plan.*

Shangoni Management Services (Pty) Ltd. 2019. *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Operation – Proposed Bergville Project Air Quality Impact Assessment.*



Shangoni Management Services (Pty) Ltd. 2019. *Geohydrological input as part of the Environmental Authorisation for the new mining area.*

Umhlaba Environmental Consulting Cc. 2005. *Afrisam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme.*



PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. Details of Project Applicant and EAP

1.1. Details of the Project Applicant

Name of Mine	Ulco Cement Plant and Mining Operation
Applicant	AfriSam (South Africa) Properties (Pty) Ltd
Postal Address	PO Box 6367, Weltevredenpark, 1715
Responsible Person	Gavin Venter
Reviewer	Nivashni Govender
Telephone No.	011 670 5560
Fax No.	011 670 5060
e-mail address	gavin.venter@za.afrisam.com
Company Registration No.	1934/005750/07

1.2. Details of the EAP

Name of EAP	Shangoni Management Services (Pty) Ltd.: Minnette Le Roux
Tel No	(012) 807 7036
Fax No	(012) 807 1014
e-mail Address	minnette@shangoni.co.za

1.3. Expertise of the EAP

Name	Qualifications and summary of experience
Brian Hayes	Brian is a registered professional engineer (Chemical) with a master's degree in Environmental Engineering from the University of Nottingham. Brian has 26 years' experience in environmental management and environmental engineering.
Minnette Le Roux	Minnette is a senior environmental consultant in the Mining Department with over 12 years consulting experience. She obtained her B.Sc. Hons degree from the University of Pretoria and is a registered <i>Pr.Sci.Nat.</i> She has been project manager and coordinator



Name	Qualifications and summary of experience
	<p>on a number of large environmental authorisations for predominantly industrial and mining clients.</p> <p>Minnette has extensive integrated environmental management experience, including amongst other; Environmental Impact Assessments, Scoping Reports, Basic Assessments, Environmental Management Plans, Environmental Management Programmes, Integrated Water Use Licence Applications, Integrated Water and Waste Management Plans, Waste Tyre Abatement plans, Biodiversity Action Plans, Screening Reports and Gap-Analysis, Waste Management Licence Applications, Mining and Prospecting Right Applications and various other Application Forms as part of the Environmental Application Process.</p> <p>She also has experience in Environmental Management Programme Report Performance Assessments and Environmental Authorisation Compliance Audits, Legal Compliance Audits, Water Use Licence Compliance Audits, Regulation GN 704 Audits and Environmental Management Systems Audits (ISO 14001) for the mining sector.</p>

2. Description of the property

AfriSam (South Africa) Properties (Pty) Ltd (“AfriSam”) is one of South Africa’s largest cement manufacturers, operating cement factories and blending facilities across the country. The Ulco Cement Plant and Mining Operation (“Ulco operations”) is situated near Delpportshoop in the Northern Cape. The Mining Right for the Ulco operations includes Donderboschfontein No.147, Groot Rietfontein No.234, Die Puts No.217, Portions of Harison (a Portion of Delpportshoop Commonage, which includes Erven 4 Delpportshoop) No.335, Portion 3 (Bergville) of the Farm Hondefontein No.216, Lime 1 and Lime 2 of the Farm Klein Rietfontein No.215, Portion 2 and the Remainder of the Farm Vogelfontein No.176 and Farm Zononder No.175.

As part of the proposed Bergville Project, AfriSam proposes to expand the current limestone, shale and dolerite mining activities to the north-east of the current Ulco operations within the currently approved mining right area. The activities as part of the proposed Bergville Project are to be undertaken on Portion 3 (Bergville) of the farm Hondefontein 216, Portion 2 of the Farm Vogelfontein 176 and a Portion of Erven 4 Delpportshoop (“the study area”). The location of the proposed Bergville Project in relation to the farm portions is depicted in Figure 1 and a description of the properties applicable to the Bergville Project indicated in Table 1.



Table 1: Description of the properties applicable to the proposed Bergville project

Fame Name	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop
Application Area (Ha)	220.63 ha
Magisterial District	The study area forms part of the Dikgatlong Local Municipality in the Frances Baard District Municipality, in the Northern Cape Province.
Distance and Direction from Nearest Town	The study area is situated immediately north of the R31, and 8 km northwest of the R370. The town of Delportshoop is situated approximately 13.6 km southeast of the study area, while Kimberley is situated approximately 65 km in the same direction. The existing Ulco operations is situated approximately 200 m to the south of the study area.
21-digit Surveyor General Code for each farm portion	C00700000000021600003 C00700000000017600002 C00700030000000400000



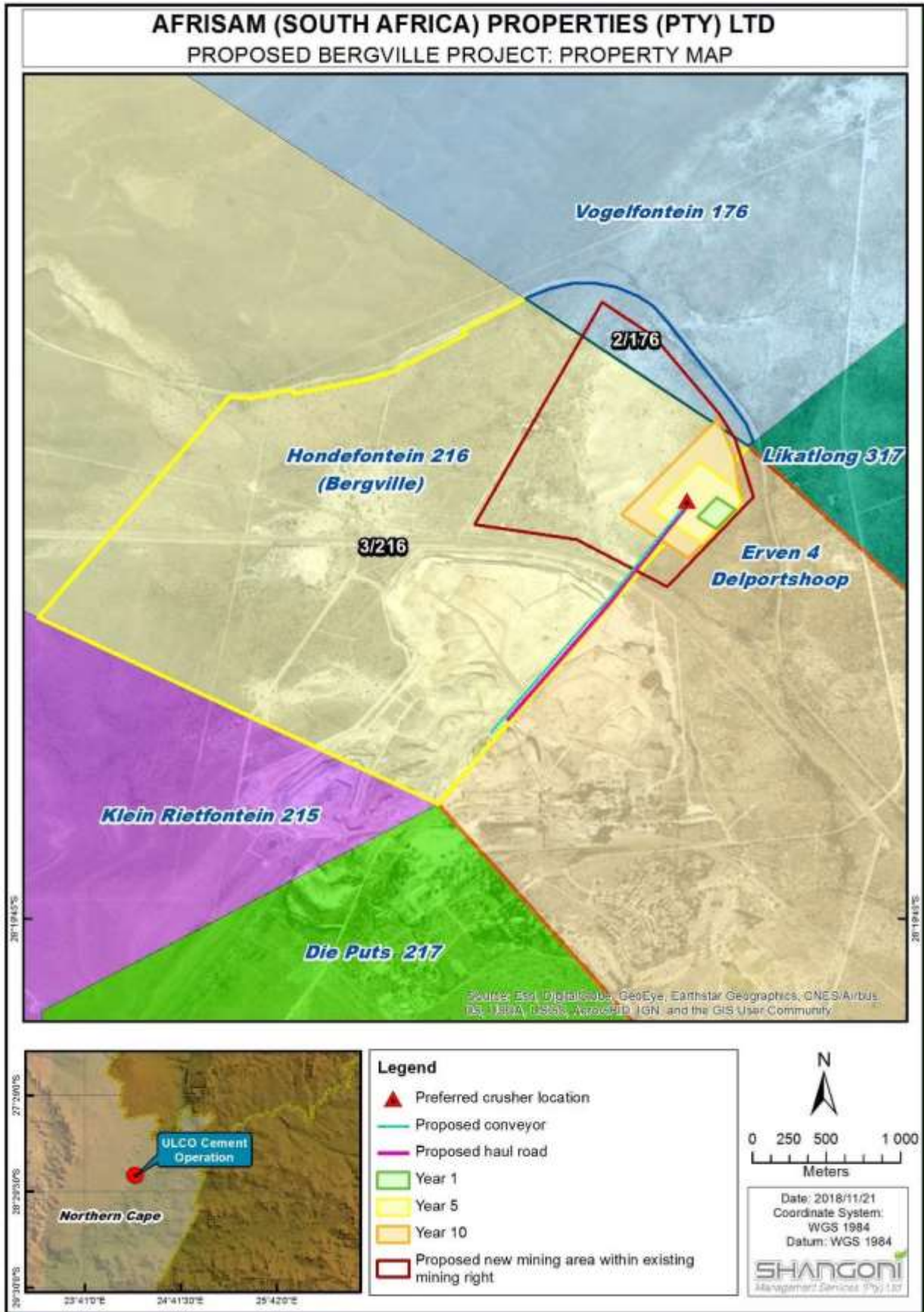


Figure 1: Proposed Bergville Project in relation to the properties applicable to the application



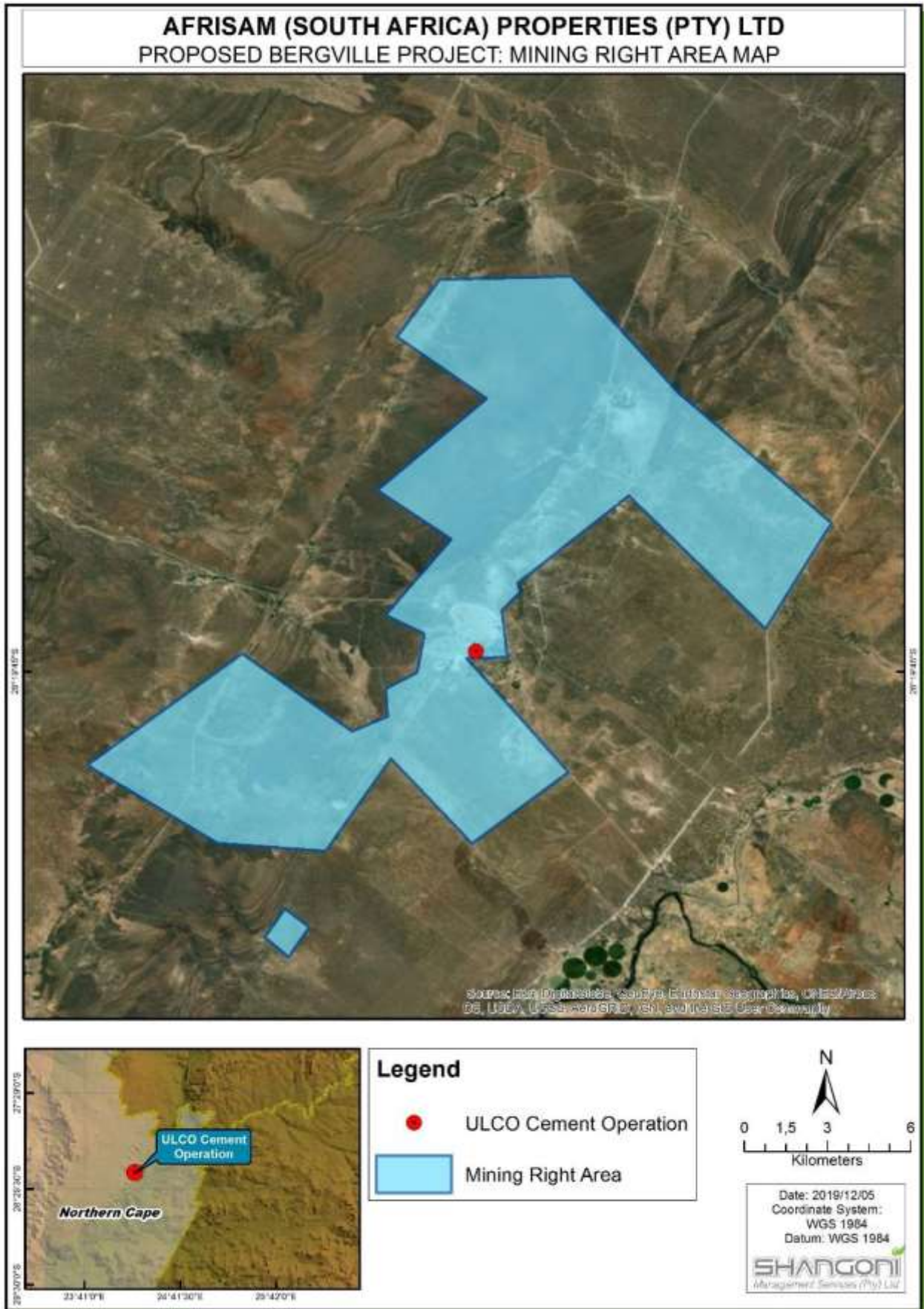


Figure 2: Mining Right area



3. Locality map

3.1. Magisterial district and administrative boundaries

The proposed Bergville Project falls within the administrative boundaries presented in Table 2.

Table 2: Administrative boundaries

Province	Northern Cape Province
District Municipality	Frances Baard District Municipality
Local Municipality	Dikgatlong Local Municipality
Ward	6
Department of Mineral Resources and Energy (“DMRE”) Local Office	DMRE (Kimberley)
Department of Human Settlements, Water and Sanitation (“DHWS”) Local Office	DHWS (Kimberley)
Department of Environmental Affairs Local Office	Department of Agriculture, Conservation and Environmental Affairs (Northern Cape)
Catchment Zone	Quaternary catchments C33C
Water Management Area	Lower Vaal

3.2. Location of the mine

The existing Ulco operations is situated adjacent to the R31, and 8 km north west of the R370. The town of Delportshoop is situated approximately 13.6 km southeast of the mine, while Kimberley is situated approximately 65 km in the same direction. The regional setting of Ulco operations is indicated in Figure 3.

3.3. Location of the proposed activities

The activities as part of the proposed Bergville Project are to be undertaken on Portion 3 (Bergville) of the farm Hondfontein 216, Portion 2 of the farm Vogelfontein 176 and a Portion of Erven 4 Delportshoop. The existing Ulco operations is situated approximately 200 m to the south of the study area.



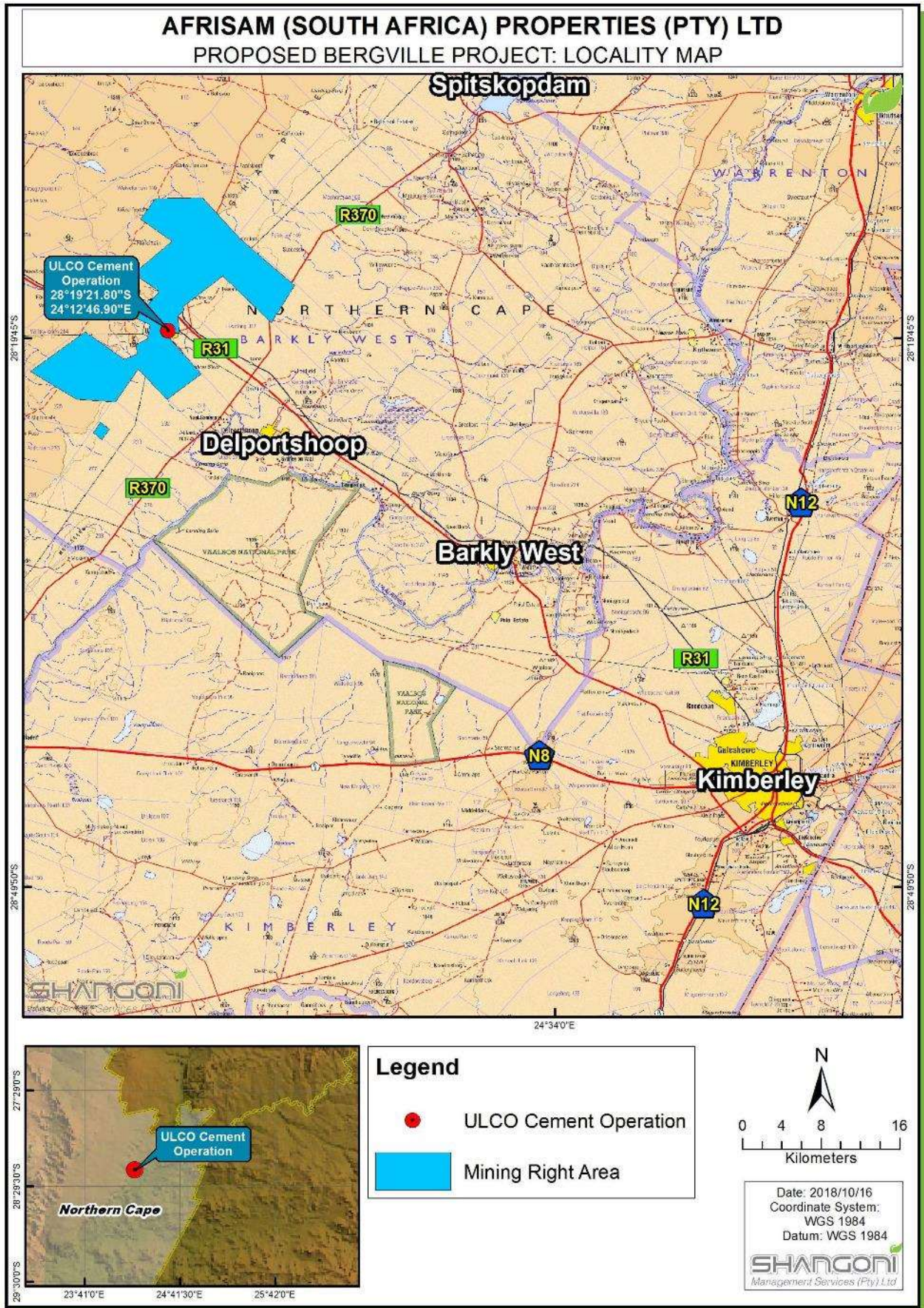


Figure 3: Regional locality of the Ulco operations and Mining Right area

4. Description of the scope of the proposed overall activity

4.1. Listed and specified activities

The latest Environmental impact Assessment (“EIA”) regulations, GN R.982, promulgated in terms of Sections 24(5), 24M and 44 of the NEMA and subsequent amendments, commenced on 8 December 2014 and amended in 2017. GN R.983 lists those activities for which a Basic Assessment is required, GN R.984 lists the activities requiring a full EIA (Scoping and Impact Assessment phases) and GN R.985 lists certain activities and competent authorities in specific identified geographical areas. GN R.982 defines the EIA processes that must be undertaken to apply for Environmental Authorisation in respect of activities listed in GN R.983, GN R.984 and GN R.985.

In terms of Section 39 (3)(a) and (b) of the MPRDA, read together with Regulation 50 (a) 2.5 that states the following: “Provide a list of any listed activities (in terms of NEMA EIA regulations) which will be occurring within the proposed project”. Listed activities have been identified as associated with the proposed Bergville Project and provided in Table 3.



Table 3: Activities and listed activities associated with the proposed Bergville project

Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
Mining activities (Opencast Mining) and Mining related activities (Surface Infrastructure)					
Clearance of vegetation for the development of mining activities and mining related activities (including all infrastructure and structures)	Within the 220.63 Ha	X	<p><u>Activity 15 of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017):</u> <i>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—(i) the undertaking of a linear activity; or(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i></p> <p><u>Activity 12 (g) (ii) of Listing Notice 3 (GNR 985 of GG 40772 of 7 April 2017):</u> <i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.(g) Northern Cape (ii) Within critical biodiversity areas identified in bioregional plans.</i></p>	N/A	N/A
Development of mining activities and mining related activities (including all infrastructure and structures)	Within the 220.63 Ha	X	<p><u>Activity 14 (i)(ii)(a)(b)(c)(g)(ii)(dd)(ff) of Listing Notice 3 (GNR 985 of GG 40772 of 7 April 2017):</u> <i>The development of—(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—(a) within a watercourse; (b) in front of a development setback; or(c) if no development setback has been adopted, within 32 metres of a</i></p>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<i>watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.(g) Northern Cape ii. Outside urban areas:(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i>		
Mining activities (Opencast Mining)					
Opencast mining of the pan/episodic drainage lines	Within the 220.63 Ha	X	<u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i> <u>Activity 17 (a) of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017):</u> <i>Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—(a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource.</i>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
Backfilling/rehabilitation of the opencast pit	Within the 220.63 Ha	X	<u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i>	X	<u>Activity 11 of Category B (GN No. 921 of 29 November 2013, as amended 11 October 2017):</u> <i>The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).</i>
Mining related activities (Surface Infrastructure)					
Dewatering of the pit by discharging pit water into river diversion or existing artificial wetlands via an overflow/gravity	Within the 220.63 Ha	X	<u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i>	N/A	N/A
Borehole/s for water supply to the existing Ulco operations and the proposed crusher complex	Within the 220.63 Ha	X	<u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i> <u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i>		
Pipelines for conveying water from boreholes to the existing Ulco operations and the proposed crusher complex	Within the 220.63 Ha	X	<p><u>Activity 9 (i)(ii) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where—(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.</i></p> <p><u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i></p> <p><u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i></p>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
Topsoil stockpiles	Within the 220.63 Ha	X	<u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i>	N/A	N/A
Overburden stockpiles	Within the 220.63 Ha	X	<u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i>	X	<u>Activity 11 of Category B (GN No. 921 of 29 November 2013, as amended 11 October 2017):</u> <i>The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).</i>
ROM intermediate stockpiles	Within the 220.63 Ha	X	<u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i> <u>Activity 6 of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017):</u> <i>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or</i>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<i>licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding - (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.</i>		
Diversion of drainage line	Within the 220.63 Ha	X	<u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i>	N/A	N/A
Crusher complex Potable water storage tank at the crusher complex (potable water supplied by water tanker)	Within the 220.63 Ha	X	<u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a</i>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
Diesel tanks at the crusher complex			<p><i>watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i></p> <p><u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u></p> <p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i></p> <p><u>Activity 6 of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017):</u></p> <p><i>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding - (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the</i></p>		
Septic tank/Conservancy tank at the crusher complex					



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<p>wastewater discharge capacity will not exceed 50 cubic metres per day.</p> <p>Activity 17 (b) of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017):</p> <p><i>Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing.</i></p>		
Conveyor for conveying ROM from crusher complex to the existing Ulco operations	Within the 220.63 Ha	X	<p>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</p> <p><i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i></p> <p>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</p> <p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i></p>	N/A	N/A
Roads, Culverts, Aqueduct structure and Tunnels	Within the 220.63 Ha	X	<p>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</p> <p><i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such</i></p>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<p><i>development occurs—(a) within a watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i></p> <p><u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u></p> <p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i></p> <p><u>Activity 24 (ii) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u></p> <p><i>The development of a road—(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.</i></p> <p><u>Activity 4 (i) (cc) and (ee) of Listing Notice 3 (GNR 985 of GG 40772 of 7 April 2017):</u></p> <p><i>The development of a road wider than 4 metres with a reserve less than 13,5 metres</i></p> <p><i>(i) Outside urban areas:(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee)Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i></p>		
Powerlines (11 kV) from existing Ulco operations to crusher complex	Within the 220.63 Ha	X	<p><u>Activity 12(ii)(a) and 12(ii)(c) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u></p> <p><i>The development of—(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—(a) within a</i></p>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<p><i>watercourse;(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</i></p> <p><u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u></p> <p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i></p>		
Sumps	Within the 220.63 Ha	X	<p><u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u></p> <p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i></p> <p><u>Activity 6 of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017):</u></p> <p><i>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding - (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of</i></p>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<i>facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.</i>		
Storm management infrastructure water	Within the 220.63 Ha	X	<u>Activity 9 (i) and (ii) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i)with an internal diameter of 0,36 metres or more; or (ii)with a peak throughput of 120 litres per second or more; excluding where—(a)such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.</i> <u>Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017):</u> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i>	N/A	N/A
Dust suppression on haul roads from pit water	Within the 220.63 Ha	X	<u>Activity 6 of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017):</u> <i>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial</i>	N/A	N/A



Name of Activity	Area/Extent of Activity Ha or m ²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity
			<p><i>legislation governing the generation or release of emissions, pollution or effluent, excluding - (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.</i></p>		



4.2. Description of the proposed activities to be undertaken

4.2.1 Background to the proposed Bergville project

Mining of high-grade secondary limestone reserves began in 1936, when Union Lime mined it for lime. In 1949, it was decided to mine the low-grade limestone material for cement and the company built two wet process kilns (Kiln 1 and Kiln 2) and associated cement mills for the cement manufacturing process. Subsequently in 1964, two further kilns (Kiln 3 and Kiln 4) were added on to increase the production capacity. In 1985, Union Lime Company was purchased by Anglo Alpha. In 1985, Anglo Alpha began mining primary limestone reserves and commissioned a fifth kiln (UK5), with a capacity to produce a maximum of 4400 tons of clinker per day. The old lime kilns and cement kilns were decommissioned in 1992. In 1995, Anglo Alpha changed name to Alpha (Pty) Ltd, that subsequently changed its name to Holcim (South Africa) (Pty) Ltd in January 2004 and finally to AfriSam (South Africa) Properties (Pty) Ltd (“AfriSam”) in April 2008. In addition to limestone, shale is also mined onsite. The limestone and secondary components are all mined in multi-bench opencast quarries.

Acceptable secondary limestone reserves in the current mining area at Ulco operations are starting to run low (refer to item 1 on the layout map in Figure 4 for the location of the existing quarry). The estimated time horizon remaining is less than 5 years. Already quality consistency on the limestone stockpiles are getting more difficult to maintain. Therefore, AfriSam is investigating the possibility of expanding the mining operation onto the north-eastern portions that are adjacent to the current operation, and still within its existing mining right. These limestone resources are available north of Ulco operations on the opposite side of the R31 provincial road and bounded by the rail line further north (refer to item 2 on the layout map in Figure 3 for an indication of the proposed new mining area). In the latter part of 2017, a prefeasibility study was commissioned to consider the best solutions to confirm these reserves, what legislative requirements there are to access these reserves as well as the most cost-effective solution to mine the limestone. A Ground Penetrating Radar (“GPR”) investigation was done to highlight the area and extent of the deposit. After a General Authorisation was obtained in March 2019 to drill within 500m of a water resource, the area was close spaced drilled and sampled to provide data for a 10-year proven reserve and a further 20 years probable reserve as well as to develop a block model for proper mine planning. The GPR as well as the drill records from the area indicated that mining should be similar to what is happening on the existing mining area. i.e. several benches going down between 20 and 40 m from ground level.

4.2.2 Proposed mining activities (opencast mining) and mining related activities (surface infrastructure) associated with the Bergville project

The following structures and infrastructure as listed in Table 3 will be constructed and operated as part of the proposed Bergville project:

- Dewatering of the pit by discharging pit water into the river diversion or existing artificial wetlands via an overflow/gravity.
- Borehole/s for water supply to the existing Ulco operations and the proposed crusher complex.



- Pipelines for conveying water from boreholes to the existing Ulco operations and the proposed crusher complex.
- Topsoil stockpiles.
- Overburden stockpiles.
- Run of Mine (“ROM”) intermediate stockpiles.
- Diversion of drainage line (refer to section 4.3.2.2 on more detail regarding the diversion).
- Crusher complex.
- Potable water storage tank at the crusher complex (potable water supplied by water tanker).
- Diesel tanks at the crusher complex.
- Septic tank/Conservancy tank at the crusher complex.
- Conveyor for conveying ROM from crusher complex to the existing Ulco operations.
- Roads, Culverts, Aqueduct structure and Tunnels (refer to section 4.3.2.1 on detail with regards to the temporary road diversion).
- Powerlines (11 kV) from existing Ulco operations to crusher complex.
- Sumps.
- Storm water management infrastructure (refer to section 4.3.2.3 for more detail on the storm water management infrastructure).
- Dust suppression on haul roads from pit water.

Construction activities will be limited to the areas of the proposed access and haul road; the crusher; and the overland conveyor that include the construction of tunnels under the R31. Prior to mining in an area, vegetation and whatever topsoil there is, will be stripped. This mix of topsoil and vegetation will be moved to the topsoil stockpile. Since there is little to no overburden over the limestone, when it is encountered, it will be stripped separately to the topsoil and used soon after as fill material for concurrent rehabilitation requirements on the mine. A one-year, five-year, ten-year and post ten-year mine plan is available (refer to item 9, 10, 11 and 17 on the layout map in Figure 4).

Mining will be as currently done on a blast, load and haul-back-under-the-road basis to the existing crusher. Later when economics justify it, a crusher will be installed within the proposed Bergville project boundary. The crusher will be installed within the pit (refer to item 16 on the layout map). Once the crusher has been installed, a conveyor belt will be constructed along the haul road route to transport the product to the existing mining operations (refer to item 13 and 15 on the layout map).

At the existing operation, primary and secondary limestone are blended together through selective mining and crushing operation to ensure the correct chemical mix of limestone for cement production. Crushed limestone, shale, dolerite and corrective raw materials are stockpiled on existing blending beds and reclaimed for further processing through the cement kiln and cement mills, as required. The clinker, aggregate and cement product generated at Ulco operations is dispatched from site via road and rail both in bulk and in bags.



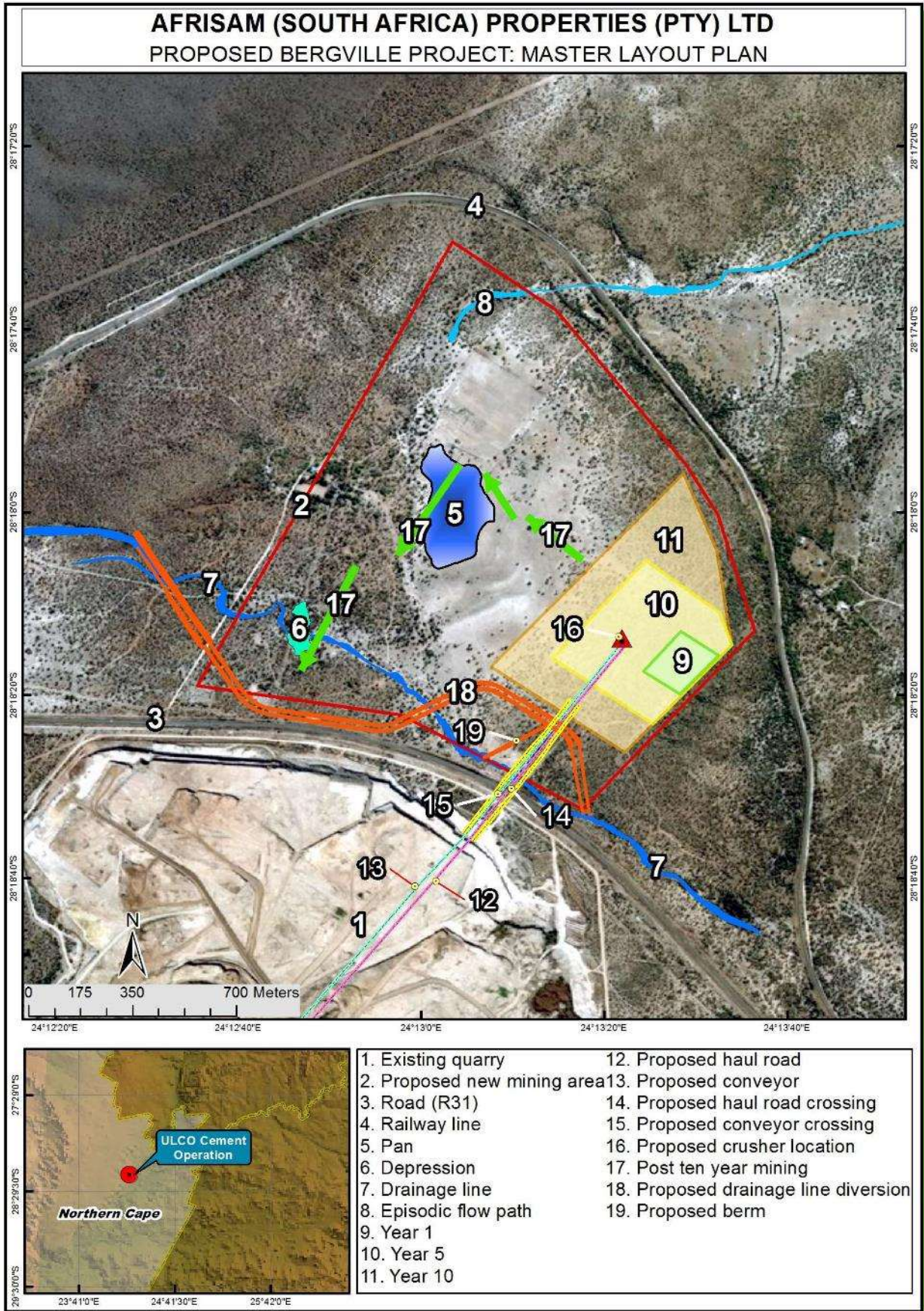


Figure 4: Layout of the proposed activities associated with the Bergville Mining project



4.2.2.1 Temporary Road Diversion

It is intended that the new quarry will be accessed via a slot in the limestone barrier (~100 m) between the mining areas and the R31, and twin tunnels under the R31 large enough to safely get the existing side tipping road trucks through (refer to item 12 and 14 on the layout map for the location of the proposed haul road and haul road crossing). The tunnel will comprise two separate culvert sections, each having internal dimensions of approximately 5 m x 5 m. A detour (deviation) is proposed on the north eastern side of the R31 for closure of a short portion of the R31 for the construction of culverts underneath the road surface. The detour is proposed to be approximately 410 m long, 7.5 m wide, and have a sealed surface and a crossfall of 2% along the length of the detour allowing 2 way traffic.

4.2.2.2 R31 Road Crossing

The original intention was to consider jacking the culverts under the R31, but pending final designs, timing and cost considerations, as an alternative a conventional cut and cover operation for the tunnel insertion was investigated. The final preferred option is a hybrid of the two to optimise cost and reduce the time that the R31 would be affected.

The floor of the culverts will be approximately 11 m below the overhead Kimberley-Postmasberg Road. This depth of tunnel will provide ± 5 m of cover above the culverts. The culverts would be separated by a gap. The dimension of the culverts is dictated by the steepness of the embankment that may be created on either side of the road, the width of the pipe servitude (15 m) and the road reserve (32 m). It is estimated the culvert length to be ± 50 m, should the 8 m encroachment into the pipe servitude be approved.

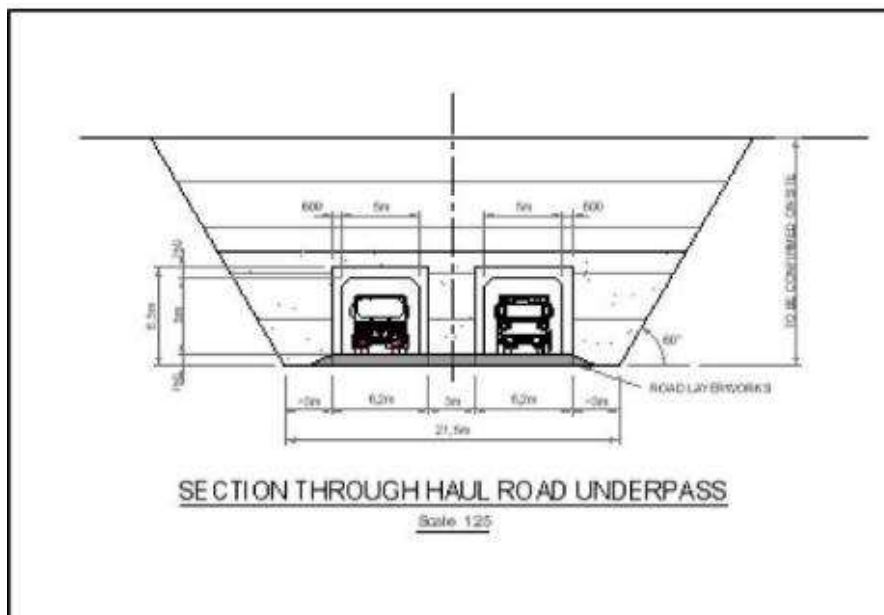


Figure 5: Cross section of tunnel



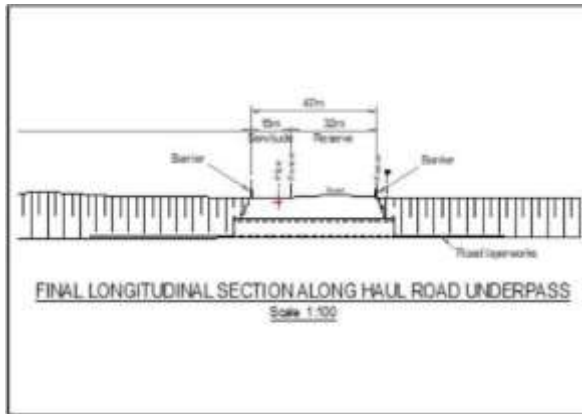


Figure 6: Long-section of tunnel

With the construction process of the tunnel the existing approximately 500 mm diameter water pipe that runs in the pipe servitude, alongside the Kimberley-Postmasberg Road, must be maintained in an operational condition. Although the intention is to excavate into this pipe servitude, a five-meter-wide accessway and a two meter- wide reserve around the pipe is to be maintained. A new section of pipe will be laid closer to the R 31 road within the pipeline servitude provided with either a temporary or a permanent support system to protect it during the construction phase. The pipe support system is to span across the excavation zone in order to temporarily separate the pipe from the surrounding soil while the culvert is being constructed beneath to reduce any risk of damage to the pipe and to reduce the length of the culverts.. Water will be diverted from the old section of pipe to the new section and the old section removed.

A construction area and launching area, approximately 12 m deep, will be excavated on the west side of the road (In the area of the old quarry). A tunnel exit area will be constructed on the east side of the main road (in the new quarry area). This excavation will encroach into the pipe servitude by about 8 m. The faces of these excavations will be provided with lateral support where required, to ensure that the sides of the excavation are safe, and the construction volumes and culvert length are minimised. This arrangement will be adjusted to accommodate the requirements of the stream diversion that is planned as part of the quarry expansion. The floor of the construction terrace will be levelled and provided with a concrete working surface. Once the construction of the culverts is completed, jacks and thrust blocks will be installed at the west end of the culverts.

Simultaneously the planned road diversion construction will be undertaken. When all the preparatory work is complete, the R31 will be diverted and the slot for the culverts extended into the road reserve. This should be a relatively short operation and once the culverts are in place, the slot will be backfilled, compacted, resurfaced and the R31 re-instated.

The area will be cleared, tidied up and all lateral support will be checked for the permanent condition.

4.2.2.3 Diversion of drainage line

The stream diversion berm is planned to convey the flow of water in the non-perennial watercourse around the proposed quarry (refer to item 7 and 18 on the layout map for the location of the existing



drainage line and the stream diversion). It would appear that this watercourse was already altered a number of years ago for the construction of the R31. Although already designed, the following final diversions will only be done as and when mining progression require it.

The water will be initially directed into the diversion canal by means of a berm. The canal will essentially follow the alignment of the R31 road in an easterly and south-easterly direction and will cross the access road to the new quarry prior to discharging back into the current watercourse to the southeast. The stream diversion canal will be designed to accommodate a 1 in 100-year flood event, estimated to peak at 74 m³/s. It is proposed to provide a trapezoidal canal cross section. Preliminary dimensions for the canal to convey the design flood event were calculated to be 15 m in width at the invert, a minimum canal depth of 3.5 m, and side slopes of 1:1.5 on either side. The canal will be designed to convey the water in a gentle (sub-critical) flow regime as far as is practicable. However, the natural topography steepens towards the downstream, eastern end and portions of the canal will be steep. In steep sections, the canal will require erosion protection in the form of either a concrete or rip-rap lining, while in flat sections, where erosion is not expected, the need for a canal lining will depend on the nature of the material exposed in the canal excavation. It is proposed that the stream diversion involves cutting through the southwest corner of the mining area.

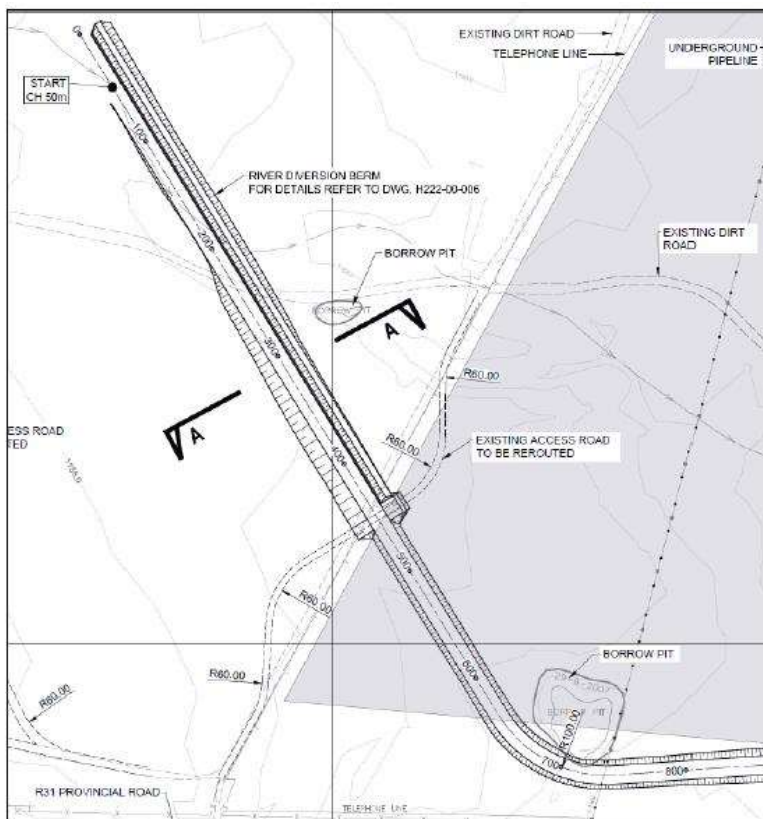


Figure 7: Stream diversion layout plan

The final stream diversion canal design to cross the proposed haul road involves the construction of an aqueduct supported by concrete columns over the access road (refer to item 14 on the layout map for the proposed location of the road crossing the stream). This aqueduct would convey the design flow over the access road. The aqueduct would have a rectangular cross section. Preliminary calculations



indicate a required width of 10 m with side walls 2.5 m high. This will be done when mining progression into this area requires it.

For the construction period and in the short term, the river will be diverted from its already previously diverted watercourse by a berm as detailed below to avoid the slot and tunnel excavations and then be allowed to return to its current watercourse.

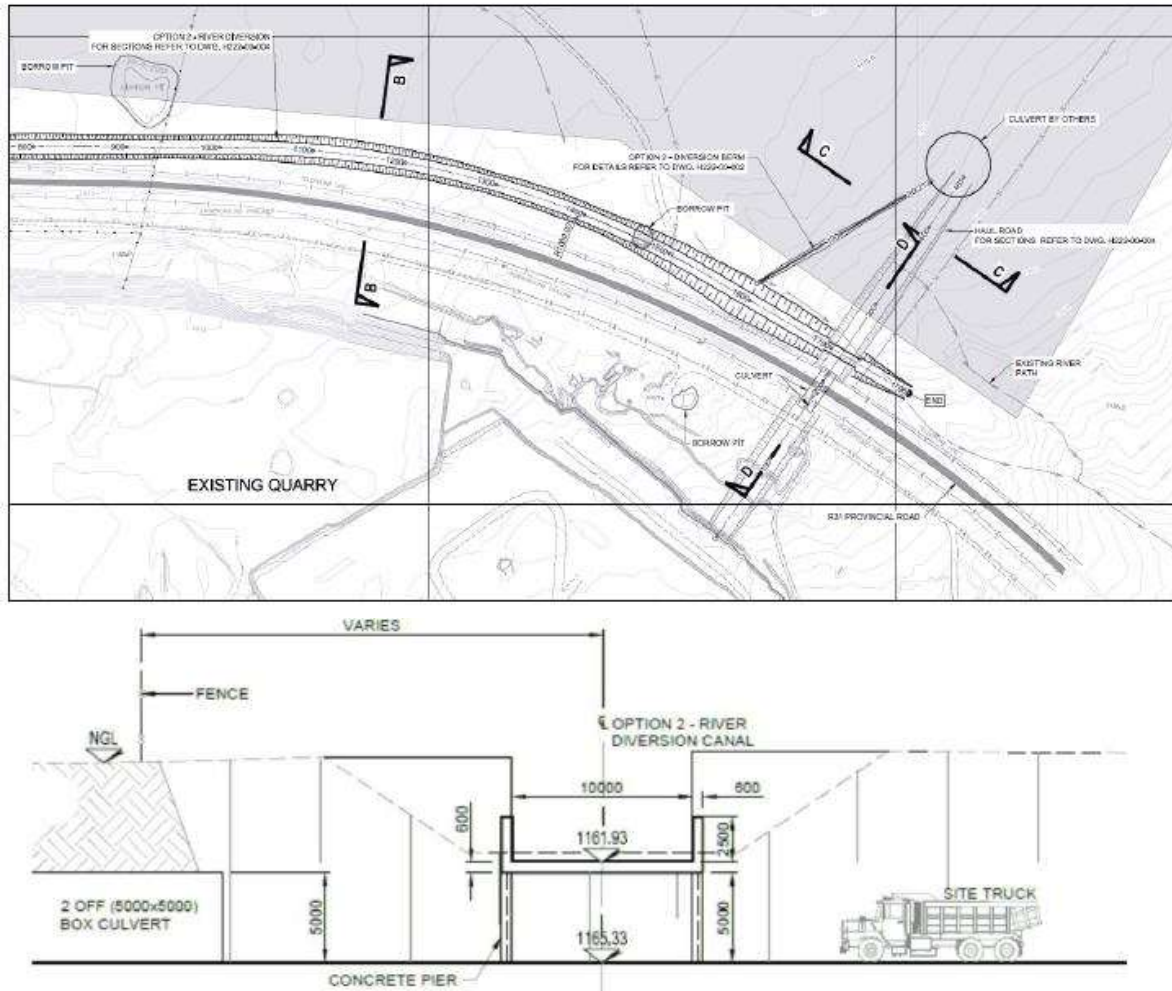


Figure 8: Stream crossing over access road by means of an aqueduct / bridge structure.

4.2.2.4 Stormwater management

A storm water management plan for the proposed Bergville project was compiled by Shangoni Management Services (Pty) Ltd (attached hereto in Annexure D6). The stormwater management plan aims to address concerns that have been identified in terms of the proposed development. The plan attempts to provide management measures that should be in place to prevent flood damage proactively and contribute to the effective channelling of clean surface water away from mining activities. Figure 9 illustrates the proposed storm water management measures for the proposed Bergville Project area. The following measures are proposed with reference to Figure 9:

Opencast mining pit (1A – 1C):



(1A) – It is proposed to construct clean water diversion berms around the proposed opencast mining pit to prevent clean surface water runoff from the upstream catchment entering the pit.

(1B – 1C) – The proposed clean water diversion berms should be continually extended or moved as mining progresses. This will ensure that the pit is isolated from the clean surface water environment.

It is recommended to use the overburden material for constructing the diversion berms. It should be noted that GN 704 exemption will be required for this activity.

Proposed road crossing and river diversion (2A – 2C):

(2A&B) – It is recommended to construct the haul road and twin tunnel system crossing the R31 and the drainage line as described above (Jones and Wagner, 2019). It is further recommended to construct the drainage line diversion as described above (i.e., option 5B, Jones and Wagner, 2019). 2B will only be constructed when mining starts encroaching on the area in the future. At this stage better data will also be known as to the flow characteristics of the watercourse.

(2C) – It is recommended to extend the drainage line diversion to the point where the diversion will join the natural drainage line. Further, equip the clean water discharge point with erosion prevention measures.

Construction of road crossing and river diversion (3):

(3) – It is proposed to construct a berm during the construction phase, starting at the drainage line and extending to the river diversion. This will prevent runoff from the upstream catchment from flowing into the construction site.

Proposed haul road (4):

(4) – It is proposed to construct a culvert along the haul road to allow clean runoff water to report to the downstream clean water environment.



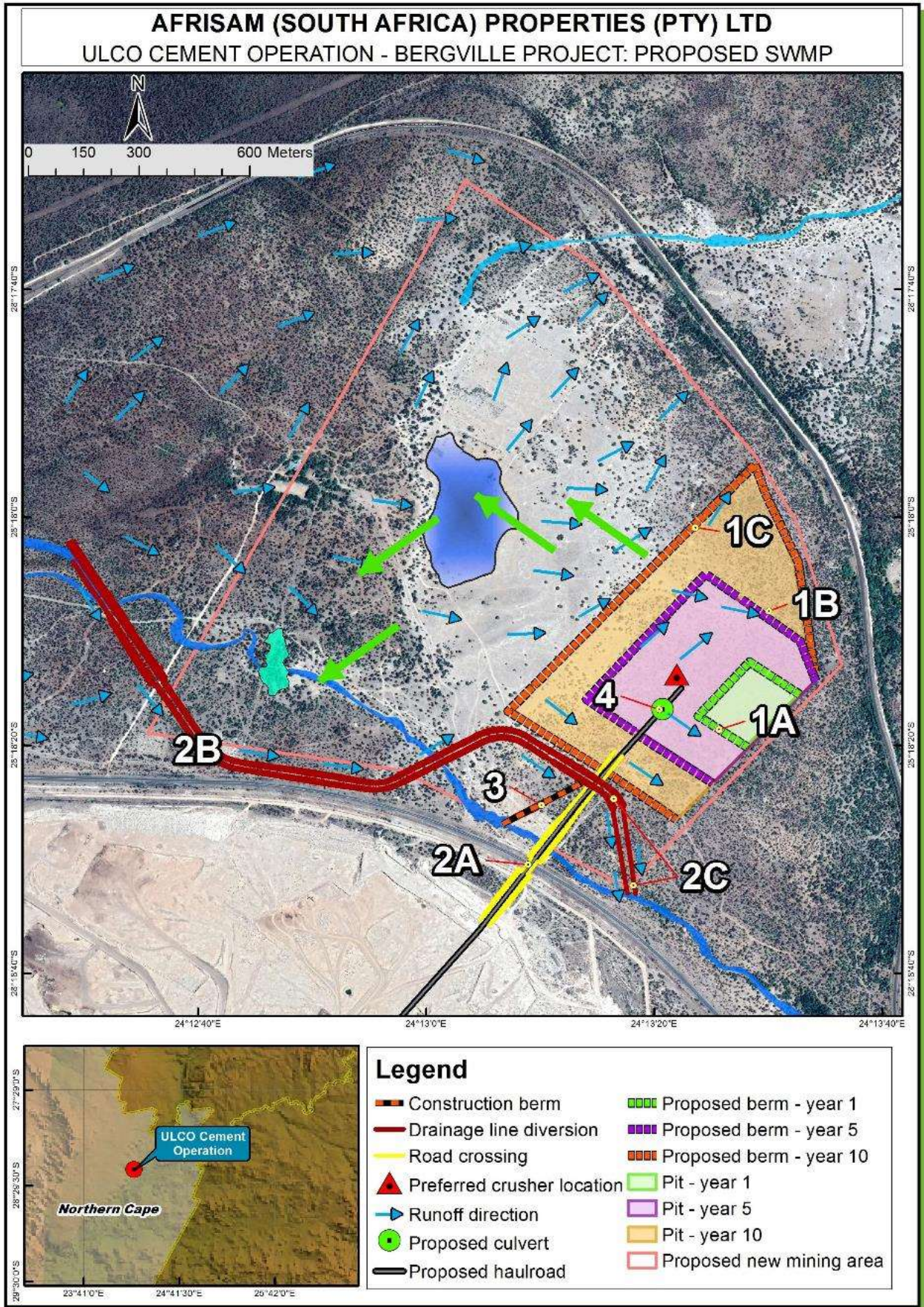


Figure 9: Proposed Bergville Project Proposed Storm Water Management Plan.

4.3. Description of the existing main mining activities and processes

As mentioned previously in addition to limestone, shale and dolerite, are also mined on-site. The limestone and secondary components are all mined in multi-bench opencast quarries. Primary and secondary limestone is blended together through a selective mining and crushing operations to ensure the correct chemical mix of limestone for cement production. Crushed limestone, shale, dolerite and corrective raw materials are stockpiled on blending beds and reclaimed for further processing through the cement kiln and cement mills, as required. Dolerite is sold as an aggregate product from time to time. The clinker, aggregate and cement product generated at Ulco operations is dispatched from site via road and rail both in bulk and in bags.

The following information on the existing main mining activities and processes has been obtained from the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* compiled Umhlaba Environmental Consulting Cc. 2005.

The descriptions of the activities are linked to the organisational flow of the mine. The organisational flow includes the core processes which are:

- Mining
- Production
- Packaging and Dispatch

In addition to the core processes Ulco operations have the following supporting processes:

- Quality Assurance
- Maintenance & Engineering
- Administration & Stores
- Human Resources
- Safety Health and Environmental

The description of the activities has been provided in a chronological order from the mining of the mineral resources through to the dispatch of the clinker and cement from the plant followed by a description of the supporting services to ensure the smooth operation of the mine. Where practical, photographs have been used in the description.

The following figures have been provided to assist in the readers understanding of the description of the activities that take place on the site;



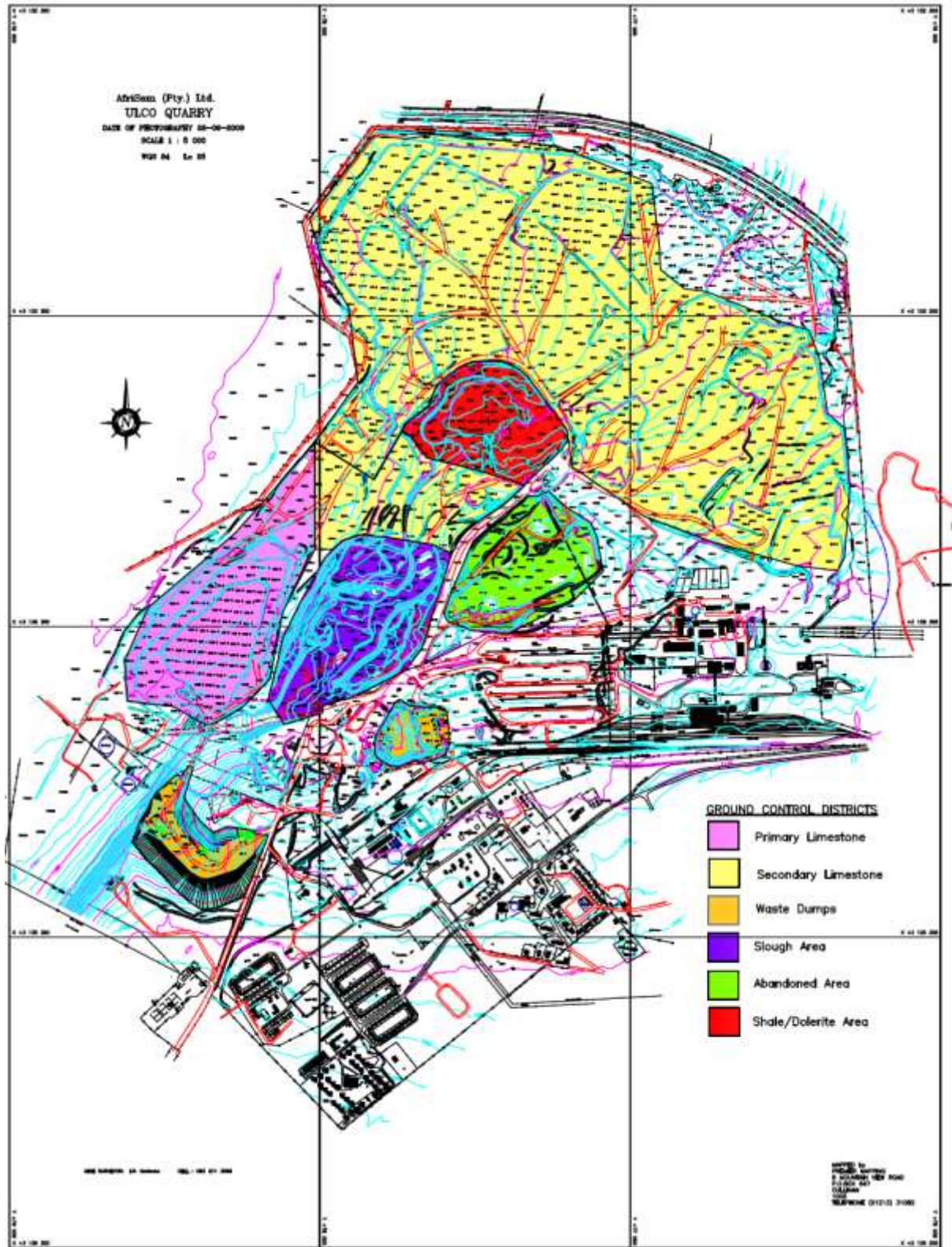


Figure 10 provides a general site layout plan of the existing mine and a copy of the latest life of mine plan.

- Figure 11 provides a diagrammatic indication of the overall process that take place on the site. This diagram is interlinked into the organisational flow at the Ulco operations.



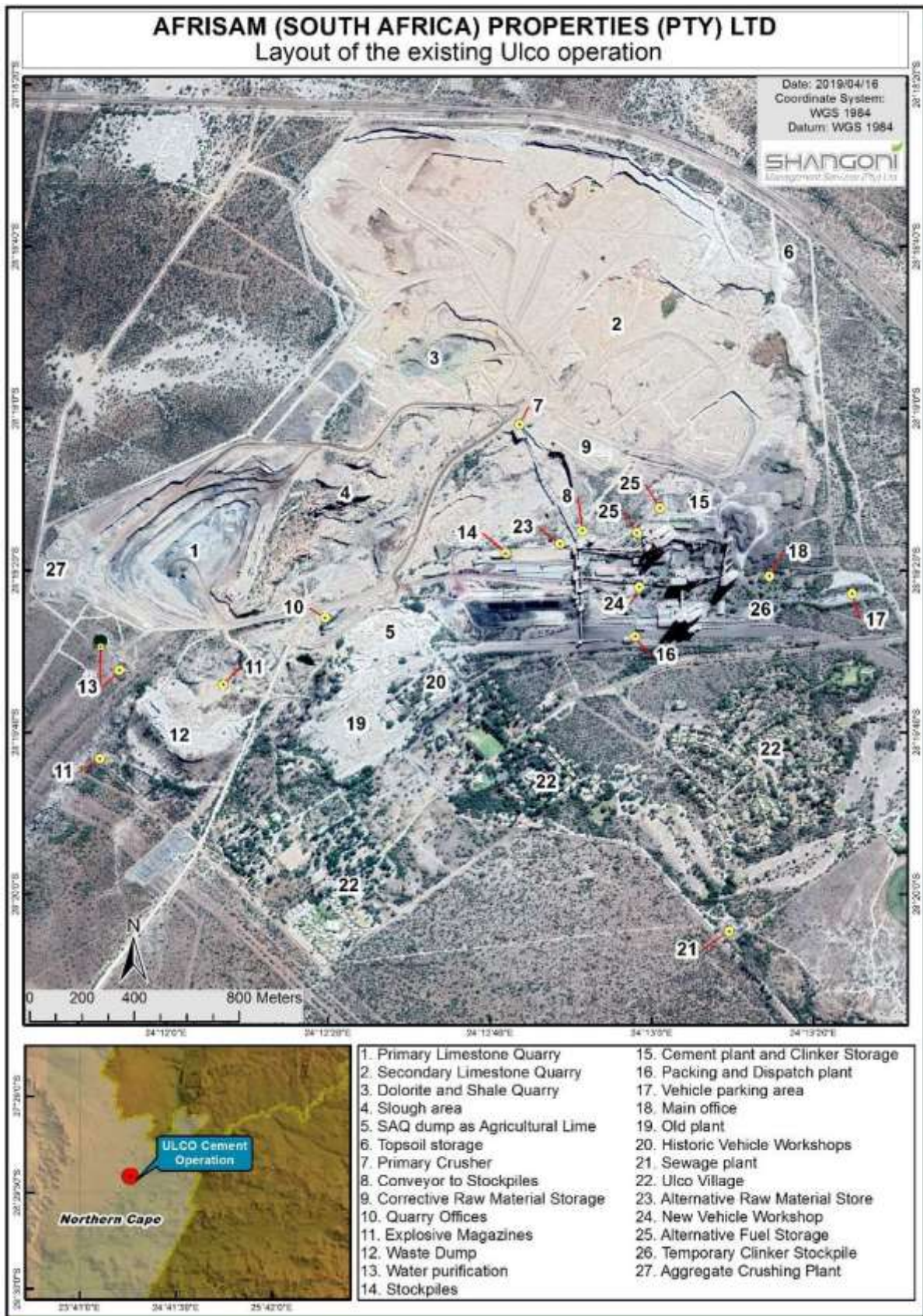


Figure 12 provides an aerial photograph of the whole site which shows the various quarries used by the mine, the crushing plant, the limestone stockpiles and the plant. The above mentioned figures should be consulted when reading the description of the activities taking place at the Ulco operations.



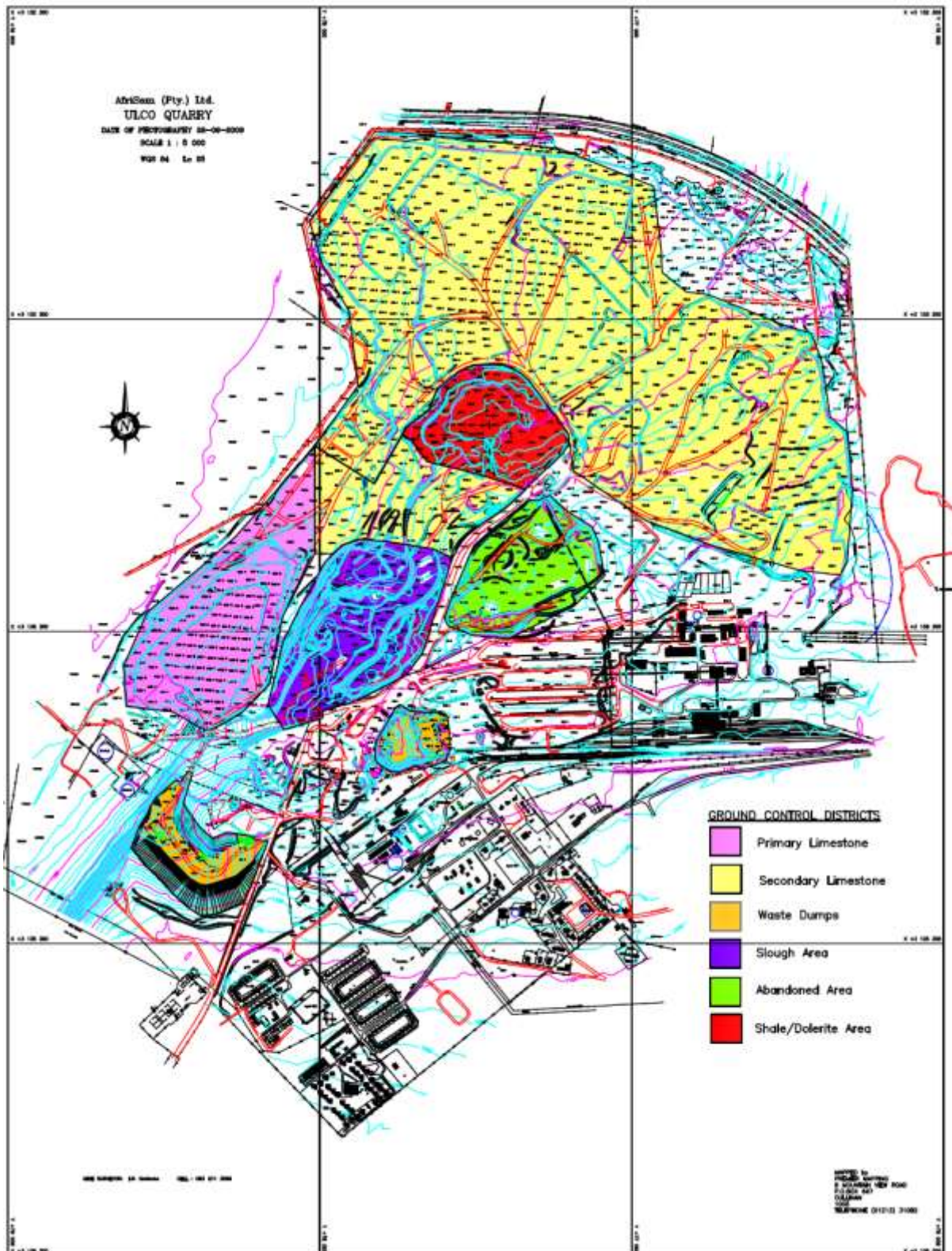


Figure 10: General site layout plan of the mine



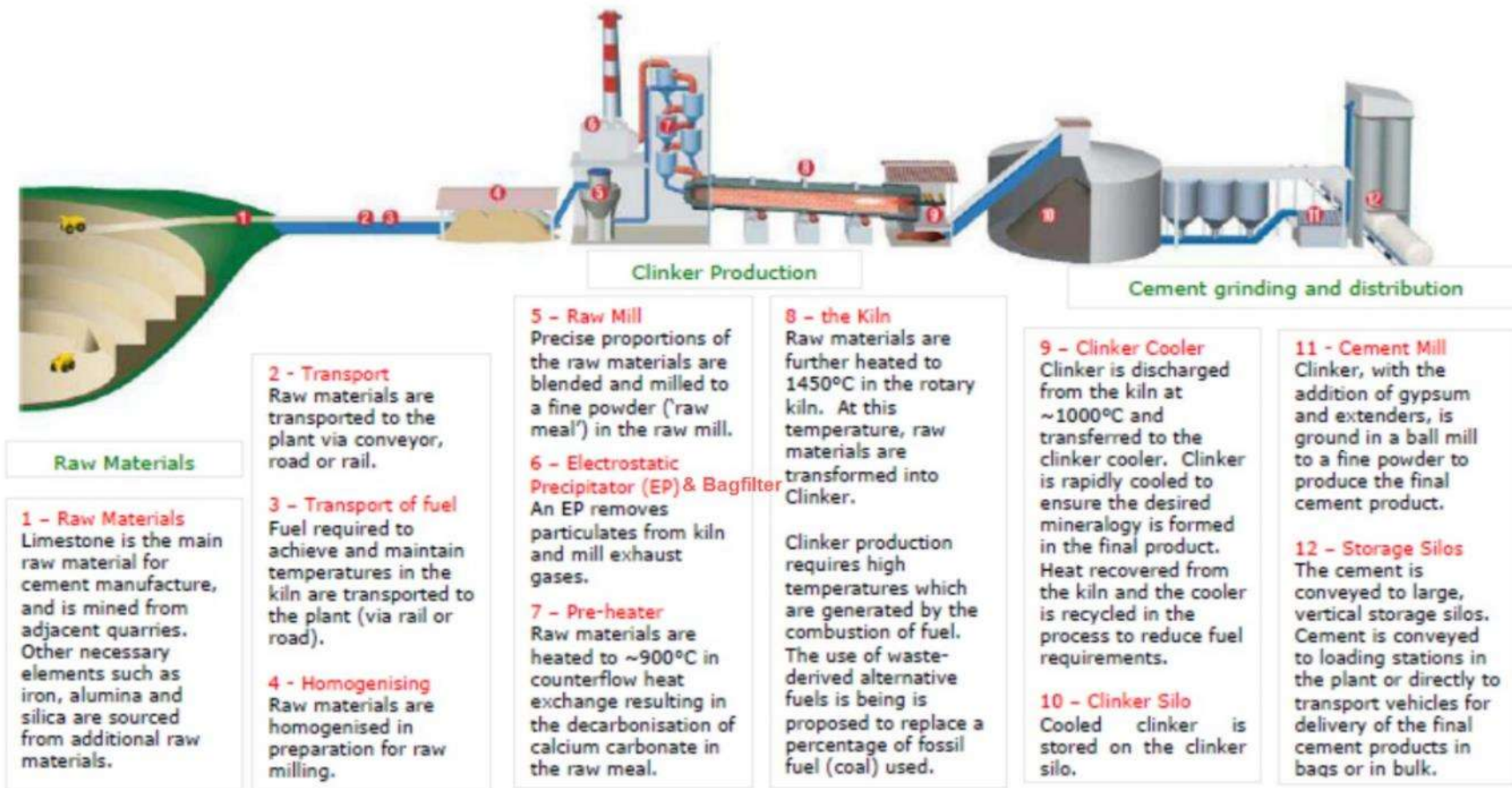


Figure 11: Process flow and organisation structure at Ulco operations



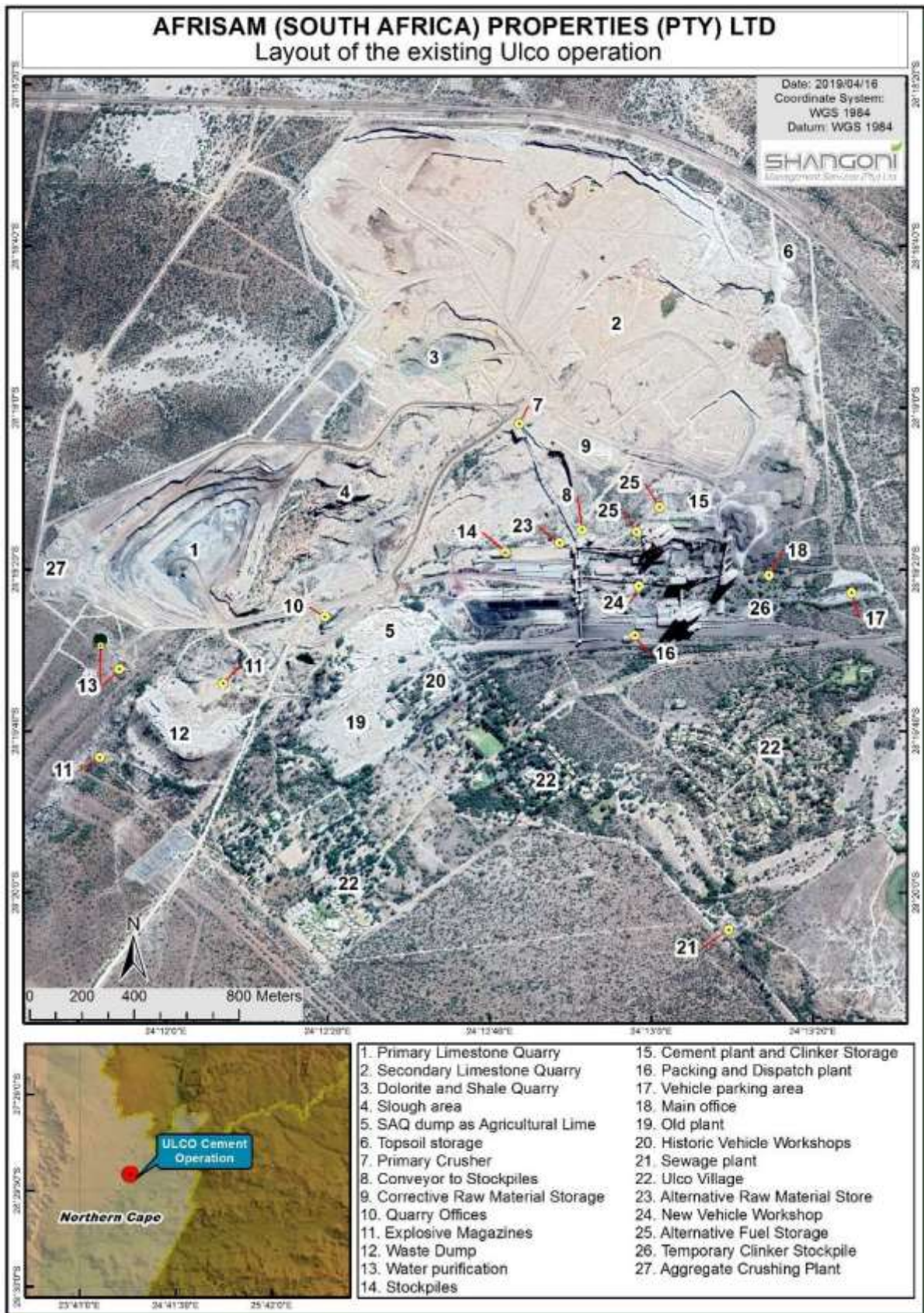


Figure 12: Layout of the existing Ulco operation



4.3.1 Mining Process Description

4.3.1.1 Mine and Resource Planning

Once the limestone distribution, depth and quality of the deposit have been established by means of an in-depth prospecting programme, a mining strategy is developed. The main objective is the economic extraction of chemically consistent limestone. This means working different quarry faces simultaneously. Quarry planning meetings are held during the year to ensure that mine planning is a continuous part of the on-going life of mine. Before any blast, the Quarry manager can obtain the quality of the limestone of a particular face in the quarries, by taking a composite of the fines from the drill holes (required for blasting) and then sampling them as per the “drill hole sampling” works instruction. It is used by the quarry manager to ensure optimal ore body extraction and to ensure that suitable quality limestone is being stockpiled for clinker production.

4.3.1.2 Haul Road Construction

Haul roads are developed to ensure continued access to limestone reserves. Haul roads are developed both on the natural surface and on the quarry floors in order to access the various quarries and the quarry faces. Where haul roads are developed on the surface, topsoil and overburden is stripped from the areas planned for the surface haul road construction. Where necessary, storm water culverts are provided under haul roads to allow for the free flow of rain water. Planning of haul roads forms an integral part of long term mine planning, whereby the route of the haul roads is positioned with a view to access the required mineral reserves, in the shortest possible route and not to go through sensitive environmental features.

4.3.1.3 Stripping of Topsoil and Overburden

Vegetation and topsoil are stripped ahead of the mining face. This mix of topsoil and vegetation is moved to the designated topsoil dump. At the Ulco operation, there is little to no overburden over the mining area. Overburden material is usually dolomitic in nature. As and when overburden is encountered, it is stripped separately to the topsoil and used immediately as fill material for concurrent rehabilitation requirements on the mine, sold off as aggregate material or utilised for haul road berm construction.

4.3.1.4 Drilling, Blasting and Secondary Breaking

Mining at Ulco is undertaken through shallow open cast quarries using modern drilling and blasting techniques. There are 3 main quarries, namely the primary quarry, the secondary quarry and the dolerite / shale quarry. The drilling operations required for the blasting activity are currently subcontracted to a drilling company who make use of a drill rig fitted with a dust extraction unit. The current contractor delivers the explosives as and when required. Ulco has registered explosive magazines used to store accessories. Explosives are delivered on site on the day of the blast. Blasting takes place on average once a week depending on demand and the need to clear overburden, if demand increase the frequency could increase to more than once a week. Blasting notifications are



sent out to I&APs prior to any blast. The Ulco quarry will blast enough material to achieve a production rate of approximately 2.2 million tons of mineral resources per annum.

Only material less than 750 mm in diameter can be placed into the primary crusher. Larger boulders (which are few and far between) are moved aside of the mining face and broken up by a hydraulic hammer (secondary breaking) before been transferred to the crusher.

4.3.1.5. Loading and Hauling

The blasted material (less than 750 mm) is loaded by a front end loader (“FEL”) into a dumper truck. These transport the blasted / loosened material to the primary crusher. Prior to each shift the vehicle operators have a checklist to complete to ensure that their vehicles are in a suitable condition to carry out their intended activities. Dust suppression on active haul roads is achieved through the use of a water truck spraying the roads.

4.3.1.6. Crushing and Screening

Material, less than 750 mm, is loaded to the primary crusher from the haul vehicles and crushed to less than 75 mm. The dust generated during the tipping action is suppressed by manual mist sprays. The crushing plant is enclosed.

4.3.1.7. Conveying and Stockpiling

Crushed material is transported to the stockpile yard by means of an enclosed overland conveyor and deposited onto the respective stockpiles via a stacker. In order to minimise dust emissions during stacking of raw materials to stockpiles, all stackers are fitted with a sensor that prevents the conveyor (stacker) from lifting more than 1 m above the height of the stockpile, thereby, reducing the drop height. To avoid any interruptions to the manufacturing process, Ulco maintains emergency stockpiles of all raw materials, including a temporary clinker stockpile next to the shunting yard and intermediate products.



Figure 13: Crusher for materials less than 750 mm



4.3.1.8. Mining of the SAQ dump

The SAQ dump is mined by an excavator and placed in a screening plant to produce a product used as agricultural lime. There is a separate entrance through the Ulco village for the trucks used to dispatch the agricultural lime from the site.



Figure 14: Mining of the SAQ dump

4.3.1.9. Concurrent Rehabilitation

The mining department is responsible for concurrent rehabilitation of the mine. Aspects of the mine that are subjected to concurrent rehabilitation include:

- The old plant;
- The slough area;
- Gorrokop mining area;
- Alien vegetation removal;
- The waste dump; and
- Old limestone quarry

4.3.1.10. Mining Supporting Services

To successfully implement the mining activities and processes described above, there are several supporting services dedicated to the mining department that are described below:

- Vehicle parking: When not in operation, the quarry vehicles are parked in the parking bays next to the quarry offices.
- Fuel tank: There is an 80 000 litre diesel tank close to the vehicle parking area to provide the diesel needs of the haul trucks.



- Mining administration: All quarry administration requirements are performed from the quarry office.
- Waste Dump: The mining department is responsible for the access and management of the authorised waste dump. A contractor is appointed for the day to day running of the site including the sorting of waste and removal of recyclable wastes.
- Vehicle maintenance in the workshop: The mine is responsible for the vehicle workshop. The workshop is responsible for the maintenance of all mine vehicles. All vehicles are on a maintenance schedule and serviced every 250 hours of use. LDVs are maintained off site by the vehicle manufacturer according to the service schedule for the respective vehicles.

The workshop is concreted and has both a new oil store and an old oil store for oils drained from the vehicles. The old oil is recycled through the ROSE foundation. Wash bays and oil separation systems are established at the workshop.

4.3.2 Production Process Description

The production department is responsible for the handling of the raw material from the stockpiles, followed by the processing of the raw material through the kiln to generate clinker. The permit allocation for Ulco is the generation of 4 000 tons of clinker per normal day and 4400 tons of clinker per peak day.



Figure 15 below provides an overview of the processing activities that take place at Ulco.

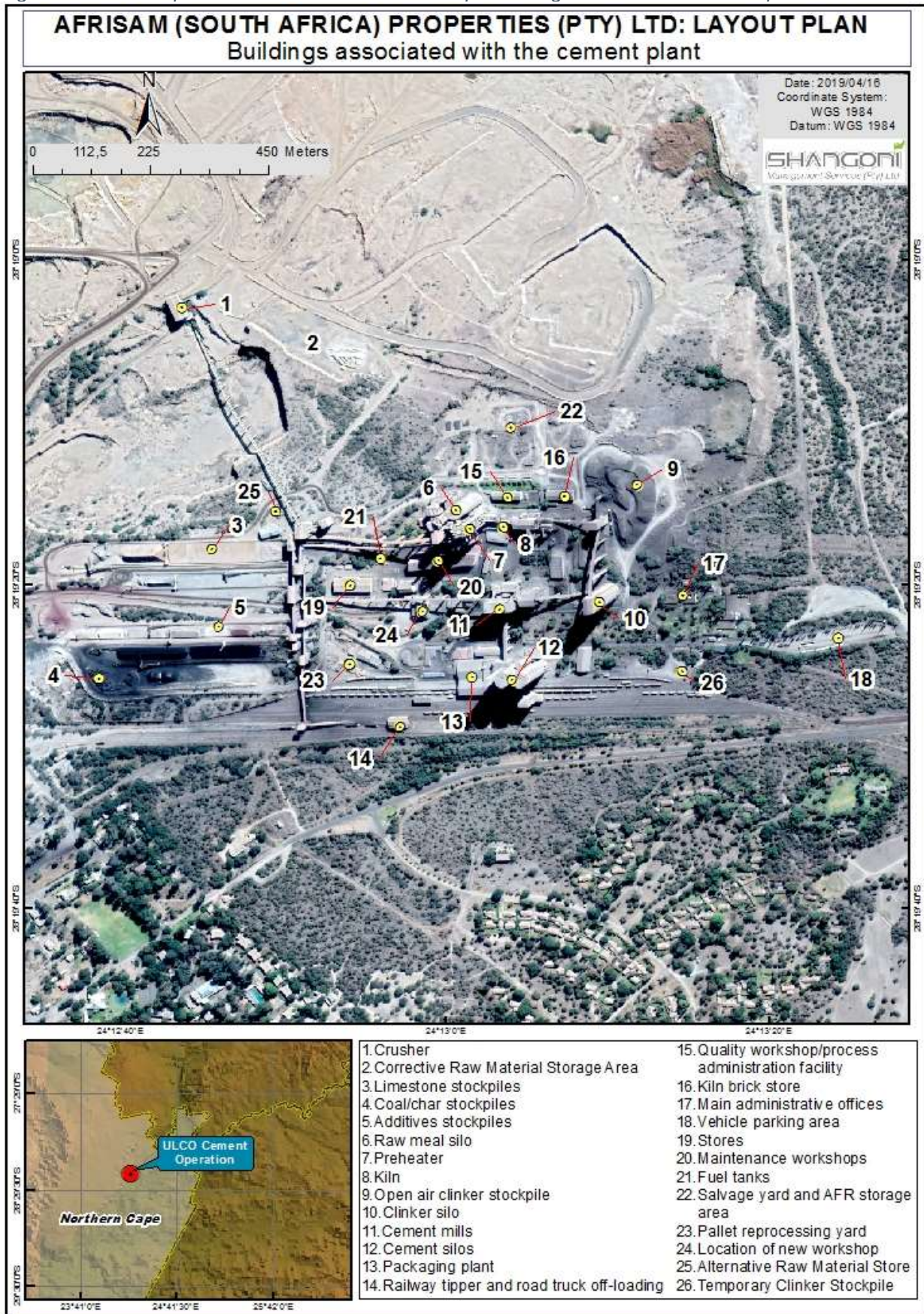


Figure 16 provides a visual indication of the various buildings associated with the cement plant.



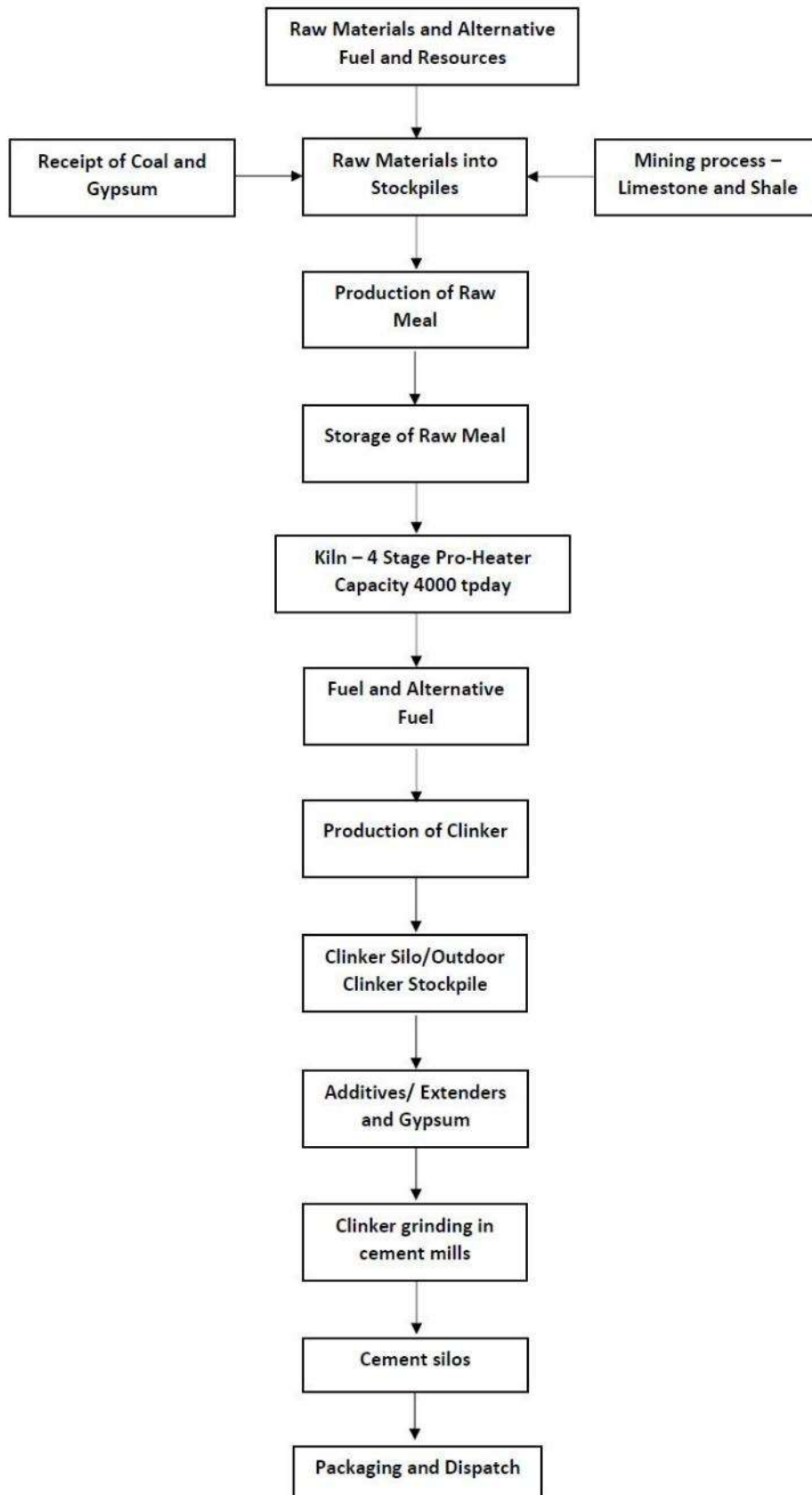


Figure 15: Production process at Ulco



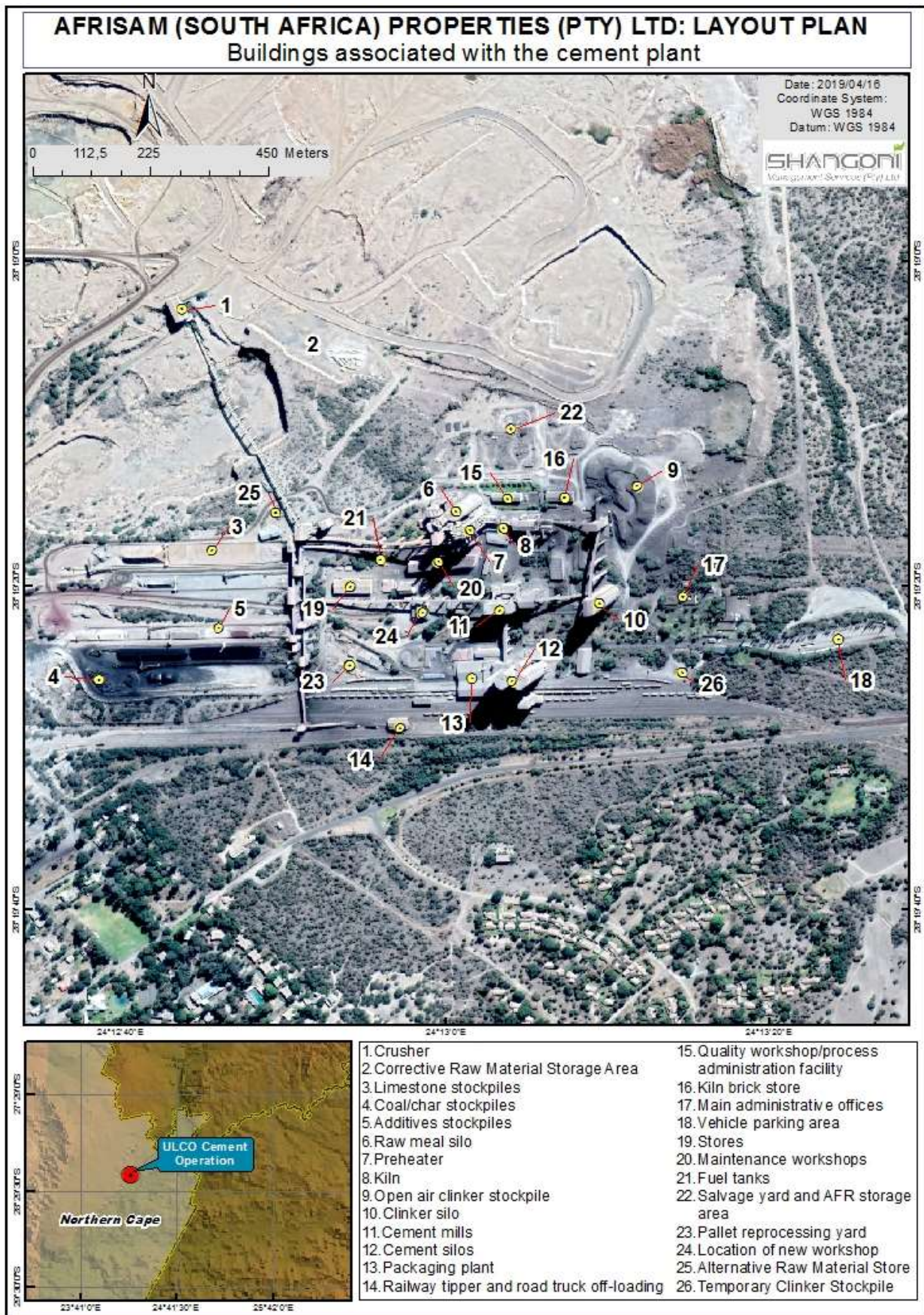


Figure 16: Buildings associated with the cement plant



4.3.2.1 Raw Material Deliveries and Stockpiles

Table 4 provides an indication of the raw material delivered and used in the cement manufacturing at Ulco. The table has been sub-divided into the material required for each aspect of the cement manufacturing process. Note that the processing department is specifically responsible for the receipt of the iron ore / magnetite and other Alternative Raw Materials. The raw materials are stored within respective open air stockpiles. Note that the processing department is specifically responsible for the receipt of alternative fuel and resources.

Table 4: Raw material used in cement manufacturing

RAW MATERIAL
Raw meal and clinker production
Secondary Limestone
Primary Limestone
Shale
Alternative Raw Materials
Iron Correctives
Alumina correctives
Coal / Low Grade Fuel (for the coal mill)
Alternative Fuels
Partially Calcined Materials
Cement Production
Clinker
Gypsum
Additives/Extenders
Strength Enhancer's

4.3.2.2 Raw Milling and Storage of Raw Meal

In the raw milling process, the input material (see Table 4 above) is ground to a fine powder to generate raw meal. The raw material is conveyed from the stockpile areas into a proportioning plant. Within the proportioning plant, the material is fed through bins equipped with weigh feeders to ensure that the correct weight of material is mixed for the generation of the raw meal. Once proportioned correctly the material is fed into the raw mill. The raw mill is a ball mill fitted with an electrostatic precipitator (“ESP”) as well as a bagfilter to control dust emissions.



The mill operates in a closed circuit, which means that the milled product is passed to a separator where the material, which is fine enough, is separated from the coarse particles. The latter is returned to the mill for further grinding whilst the product (fine material) is transferred to a silo as raw meal. The raw meal is stored within one raw meal silo.

The raw meal from the raw meal silo is transferred to the pre-heater tower of the kiln for the production of clinker.

4.3.2.3 Coal Milling

Coal and / or Low Grade Fuel is transferred from the stockpile by a conveyor to a coal mill. The milled coal is drawn off in an air-stream through a dust filter (de-dusting system) to a pulverised coal silo. The dust created as a by-product of the coal milling is controlled through use of the bag filter.

The fine coal is then fed into the kiln where it is burnt to give the necessary heat for the kiln. The coal mill is constantly measured for temperature and is fitted with an explosive disc that would restrict the impact in the unlikely event of an explosion of the coal in the coal mill. This is covered as an emergency procedure.

4.3.2.4 Alternative Fuel and Alternative Resources

Ulco have permission to make use of the following materials as an alternative fuel and resources;

- Alternative Fuel;
 - Hydrocarbon waste, this may include Waste oil / sludge, Spent solvents / Sewage sludge
 - Biomass / Waste Wood
 - Tyres and rubber waste
 - Waste Plastics (excluding PVC)
 - Waste Oils
 - Coal contaminated waste
 - Refuse derived fuel
 - Alternative Raw Materials
- Alternative Resources:
 - Alternative Raw Materials
 - Lime kiln dust
 - Alumina based waste.

4.3.2.5 Clinker Production

Ulco has one operating kiln, Kiln 5 (UK5). This kiln line has a 4-stage preheater and is 72 m long. The kiln can produce a nominal 4 000 tons of clinker per normal day (4400 tons of clinker per peak day). It is fitted with a multichannel burner. Its emissions are drawn through an electrostatic precipitator ("ESP") that is fitted with a water injection system and bag filter to further reduce the emissions levels.



Preheaters use hot kiln exhaust gases to preheat the raw meal entering the kiln. This makes effective use of the kilns' energy.

The raw meal from the raw meal silo is fed into the preheater towers. While the material passes through the preheater, the raw meal is dried and partial calcinations takes place at approximately 900°C. During calcination, limestone (predominantly CaCO₃) breaks down and releases carbon dioxide (CO₂):



The heated material is then passed through the coal fired rotating kiln, where the temperature is raised to 1 400°C. At this temperature, various minerals start to fuse together to form calcium silicate crystals, known as clinker. The coal / fuel is introduced to the kiln through a multi-channel burner.

Clinker Cooling

Once clinker has been formed and leaves the kiln, it must be cooled. The kiln has a grate cooler that is fitted with a bag filter for reducing dust emissions. The clinker is broken into a manageable size for storage and cement milling by use of a roller crusher. Clinker is discharged from the kiln at ~1000°C and transferred to the clinker cooler. Clinker is rapidly cooled to ensure the desired minerology is formed in the final product. Heat recovered from the kiln and the cooler is recycled in the process to reduce fuel requirements. By using this heated air, energy efficiency is maximised. Cooled clinker is then conveyed via a conveyor to either the clinker silo (50 000 tons) or the open-air clinker storage area. Clinker is then further processed via cement mills to produce cement.

4.3.2.6 Clinker Milling and Cement Storage

Ulco can generate "all purpose", "high strength" and "rapid hard" cement. The raw materials required to make cement (clinker, limestone extender), gypsum and a strength enhancer (liquid grinding media) are fed into one of 2 cement mills. Cement mills are ball mills, consisting steel balls and cylindrical grinding media that rotate around an axes. On entering the mill, the steel balls first crush the clinker particles and then, by attrition, the cylindrical grinding media grinds the clinker to a fine powder. The closed-circuit mill provides full control over the particle size distribution of the cement.

Particulate emissions from the cement mills are controlled through the use of a bagfilter and an ESP.

The purpose of gypsum is to retard the setting of the cement and the purpose of the strength enhancer is to improve grinding efficiency and strength development of the cement.

The cement is conveyed to the three cement silos to store the different cement products (building cement, all-purpose cement and high strength cement). After entering the various silos, the continued responsibility of the cement shifts to the Packaging and Dispatch Department.



4.3.2.7 Processing Supporting Services

Fuel tank: The production department has a diesel / oil tank with a capacity of 30 000 litres that is required for the initial start-up of the kiln flame after a shutdown event.

Grinding aid: The production process has a designated area adjacent to the cement mills for the offloading and storage of grinding aid.

Kiln Shutdown / maintenance: During maintenance of the kilns, sections of the lining of the kilns (kiln bricks) need to be replaced. There is a store for the new kiln bricks and old kiln bricks are crushed and used into the process. There is one planned stop for each kiln for maintenance per year.

Electricity usage: Cement manufacturing is an energy intensive process specifically the various mills and the kiln. Electricity is obtained from an Eskom dedicated line to Ulco. Ulco measures their energy use for each major energy utilizing equipment.

Water requirements: Water is used for cooling purposes of the equipment

4.3.3 Packaging and Dispatching

As and when the cement enters the various cement silos, it becomes the responsibility of the Packaging and Dispatch Department for the dispatch in either bulk or in bags. For an indication of the various



buildings associated with this department

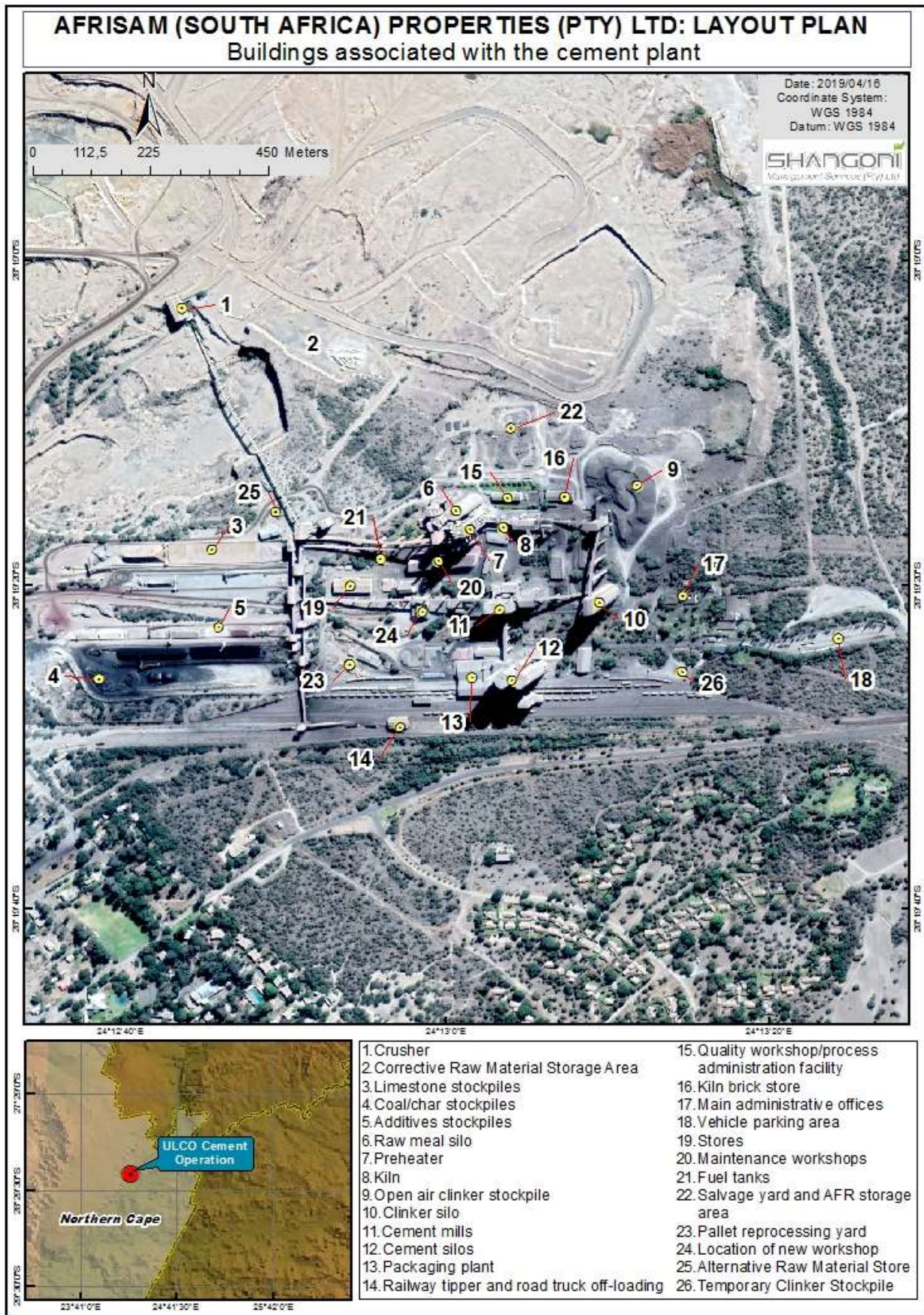


Figure 16 must be viewed. The cement is transferred from silos through air slides, screw conveyors and elevators for both packaging and final dispatch. Below is a brief description of the activities associated with the packaging and dispatch department.

4.3.3.1 Raw Material and Fuel via the tippler

The packaging and dispatch department is responsible for the receipt of certain raw materials and fuels that are off-loaded via the tippler installation. The tippler system has been modified to be able to off-load rail wagons, but also to off-load side-tipper road trucks. The operators has to ensure that the material off-loaded are conveyed to the appropriate stockpiles.

4.3.3.2 Bulk Loading

Bulk loading is where cement is loaded into bulk tankers for distribution. Trucks have up to two bulk containers and trains can transport numerous bulk containers. Bulk loading is controlled by weighers and sensors to ensure that when the bulk container has either reached its correct weight or full, bulk loading automatically stops to reduce the chance of spillage. All scales are calibrated on an on-going schedule to ensure the correct weight is dispatched into bulk containers. Clinker can be sold or transferred to another AfriSam plant for further processing. Clinker is despatched in road or rail trucks. Road trucks are loaded at the clinker stockpile area, and rail trucks are loaded by moving clinker from the clinker storage to a temporary clinker stockpile next to the shunting yard prior to loading into the rail wagons.

4.3.3.3 Packing / Palletising Plant – Loading of bags

Cement from the storage silos is transported to the packing plant. Cement is packed into bags via one of three automated rotary packing machines. The packing plant is SANS 1841 certified which aims to guarantee the correct weight within the bags. This is achieved through daily checks of all scales, ongoing in house calibration and every 24 months external calibration of all scales. Any bag of a weight of 49.5 kg or less is classified as underweight. From the packer, the bags of cement are transferred via conveyor belts to a palletising plant that stacks 40 bags of cement onto one pallet. Some of the pallets are shrink or stretch wrapped with stretch plastic to be able to allow customers to store the product outside. Pallets of cement bags are stored within the holding bays until they are loaded by a forklift onto haulage trucks or train wagons for final dispatch. The packing plant is an enclosed building fitted with extractor fans, removing the dust generated during the packing process. Broken bags are collected, recorded and taken to the Ulco waste dump site where they are disposed with the domestic waste.

4.3.3.4 Railway Activities

Ulco has a private rail siding that services the plant. Cement and clinker are distributed from the siding from where freight diesel or electrical locomotives are used to distribute around Southern Africa. The railway activities are audited by the railway safety regulator against the SANS 3000-1 standard. Cement comes from the storage silos and clinker comes from the clinker silo, the outside clinker stockpile or the temporary clinker stockpile next to the shunting yard.



Some of the raw materials such as coal and gypsum are brought to the site by rail. Off-loading of rail containers takes place via a tippler. Train carriages that have offloaded raw materials are loaded with clinker and/or cement for the return trip to another AfriSam plant.

4.3.3.5 Road Activities

All road transport vehicles have to report to the security gate before being allowed onto the Ulco premises. Vehicle numbers and movement within the plant are controlled. Vehicles are weighed prior to being loaded with bulk cement or clinker and on exiting the site to ensure that the correct amount of cement or clinker is being sold. Clinker is also loaded on road trucks for transportation to other plants. The vehicles transporting incoming material are also weighed prior to off-loading and on exiting to ensure accounting of materials received.

4.3.3.6 Vehicle Parking Area

Ulco has a dedicated vehicle parking area outside the main security gate for vehicles to wait prior to entering the plant area.

4.3.3.7 Supporting Services

The following supporting activities are associated with packaging and dispatch:

Pallet repair & Wood chipper: Ulco has an area set aside for the repair and repainting of broken pallets. Irreparable pallets are disposed of through a wood chipper.

Waste Pit: There is a waste pit available to capture the waste arriving on the rail wagons before they can be loaded with pallets of cement. Waste from the wagons is temporarily stored within the waste pit before being disposed of at the Ulco waste site.

Forklift maintenance: Forklifts are on a maintenance plan through the supplier of the forklifts. Servicing by an external service provider takes place on site.

Bag Store: There is a bag store available for the storage of the cement bags.

4.3.4 Quality Assurance

The quality assurance department is responsible to ensure that the quality of the clinker / cement manufactured by Ulco complies with the relevant standards and specification. This involves the taking of samples through the entire cement manufacturing process, testing them and providing information for quality and process control. Samples are forwarded to the quality assurance laboratory for inspection and testing. The most frequently used chemicals in the analysis process are Ethylene Glycol, Methanol and general acids. All chemicals are stored in a locked chemical store and the bulk chemicals are stored in a Flammable Store. Pellets are generated during the sampling preparation process, which are then analysed by an XRF machine to determine chemical composition. The analysed pallets get disposed into the cement manufacturing process in a controlled manner. The Ulco cement plant is ISO 9001 certified.



4.3.5 Engineering/ Maintenance

The engineering department is responsible for all maintenance at Ulco including, the infrastructure at the quarry, the cement plant, the packaging and dispatch department, the laboratory, the village and the water management systems. Ulco has an extensive computerised scheduled maintenance system which is implemented to manage all maintenance activities to ensure overall equipment efficiency. Scheduled maintenance is vital to reduce and control incidents causing environmental impacts such as oil spills or uncontrolled dust emission etc. The maintenance process also reduces or prevents the risk to man or machine regarding safety. Maintenance activities can be broken down into the following:

4.3.5.1 Maintenance – Preventative / planning

All maintenance is scheduled through detailed planning. A detailed description of the maintenance required on each piece of equipment, are in place for equipment at Ulco. The planning department directs all the maintenance needs of the operation and they produce short term schedules for on-going maintenance. The scheduling of plant maintenance is based on risk of equipment failure. This includes the planning requirements for kiln shut downs.

4.3.5.2 Maintenance – Support

The support sub-department is responsible for the maintenance of the on-site locomotives and rail lines. Ulco have a dedicated workshop for the maintenance of the diesel locomotives used on the Ulco private rail line. Maintenance of the railway lines includes maintaining the ballast and the rail lines.

The support sub-department is also responsible for maintenance associated with large projects and setting applicable maintenance standards.

4.3.5.3 Maintenance – Mechanical

The mechanical sub-department is responsible for all the fitting and boiler making requirements of the plant and the railway line. This includes aspects such as conveyor systems, mill liners etc.

4.3.5.4 Maintenance – Electrical

The electrical sub-department is responsible for all maintenance activities on all electrical and control equipment from the Eskom connection point for the complete plant including transformers.

It is also responsible for the managing of the radioactive sources located on the mine.

4.3.5.5 Maintenance – Civil

The civil sub-department is responsible for the maintenance and upkeep of all infrastructure including services (e.g. sewage, water reticulation, storm water control structures, air conditioners etc.).

4.3.6 Administration Department

Administration department is responsible for the following:

- Finance.
- Information Services (“IS”).



- Ordering of spares and parts.
- The storage of spares.
- The management of diesel and paraffin requirements.

Ulco has a dedicated section within the administration department responsible for the buying, receiving, storage and issuing of all stock items required for the on-going maintenance / running of the operation.

The materials management section manages and stores oils, lubricants, gas cylinders, chemicals and spares used for the mining, plant, packaging and dispatch operations. These substances are all stored behind a locked fence and in accordance with the requirements stipulated in each product's Material Safety Data Sheets ("MSDS"). All oils and chemical are stored within bunded concrete covered areas.

As and when new stock items are delivered by suppliers, such are captured on a financial system and then moved to the appropriate bin location within the stores for storage. Hazardous chemicals are labelled when received. The storage area has enough capacity to handle the chemicals required for scheduled shut down maintenance events. The materials management section has access to all the MSDS for all chemicals used by the operation. All items issued are signed for by the person receiving the item. All ordering of the petrol and diesel requirements for Ulco is managed by the administration department. There is an underground fuel storage facility opposite the stores.

4.3.7 Human Resource Management

The human resource department is responsible for the aspects described below.

4.3.7.1 Training Requirements

Each employee is subjected to training requirements and one of the functions of the HR department is the coordinating of the training requirements for each of the employees. Detail of environmental training is provided in the Environmental Awareness Training section for this report.

4.3.7.2 Socio-Economic Benefits

Ulco has compiled a social and labour plan ("SLP") that details the socio-economic activities which will be implemented by the mine. The HR department is responsible for the implementation of the SLP.

4.3.7.3 Village:

The Ulco village is specifically associated with the mine. The upkeep requirement for the village is managed through the HR department. This includes the gardens and the guest house. The following infrastructure / amenities and services are available in the Ulco Village:

Ulco East:

- Ulco East is the residential area for employee level H5 and upwards.
- The sewage plant is in the southern section of Ulco East.
- The Ulco golf course borders onto the Ulco East.
- Church.



- All houses have electrical connection, potable water and a flush toilet. At minimum, these houses are 2-bedroom, bathroom, kitchen, dining room and garage.

Ulco Central:

The main purpose of Ulco central is to provide amenities to residents of Ulco and the surrounding areas. Although there are a number of houses in the area, these houses are no longer used for residential purposes but for contractors and quarters. The following amenities are in Ulco central:

- Crèche for pre-primary children.
- Ulco Academy School from pre-primary to Grade 12.
- Ulco recreational hall / bar.
- Sports fields.
- Swimming pools.
- Library and internet café.
- Guest house for guests of Ulco.
- Restaurant for guests of Ulco.
- Offices for Custoda (an NGO).
- Churches.
- Gardening services company.
- Security company.
- A petrol station is located in Ulco for use by all employees.
- A small supermarket (café) which provides essential household items, a post office, butcher shop, a liquor store, a hardware store and an ATM.
- A clinic that is open 4 times a week.

Ulco West:

Ulco West is the main residential area for employees level H4 and downwards. This includes housing for contractors.

- All houses have electrical connection, potable water, stoves and a flush toilet. At minimum these houses have a bedroom, bathroom, kitchen and living room.
- Hostels used in the past are in the process of been converted to family houses.
- Ulco pre-school.
- The Ulco primary school is situated in Ulco West.
- Churches.
- Sports fields.
- All roads in Ulco village are paved with appropriate storm water control along the road sides.
- All domestic waste is collected and recycled at the waste separation site on the general waste landfill.
- All gardens are maintained by gardener contractors.
- All garden refuse is collected and used for concurrent rehabilitation of the dumps.
- Potable water is available at all times to all the houses.



- All houses have electrical connections.
- All houses have flush toilets which are linked to the Ulco sewage plant. All houses are renovated / painted in a 10 year cycle.
- Ulco maintain all infrastructures in houses for a nominal fee.

4.3.8 Safety, Health and Environmental Department

The Safety Health and Environmental Department (“SHE”) at Ulco is responsible to ensure that the health, safety and environmental requirements for the mine are implemented. This section of the report focuses on the environmental aspects that fall under the control of the SHE Department.

Some of the activities described below are not the sole responsibility for the SHE Department to manage, but have been placed in this section in order to ensure that the flow / structure of the document. An example is that all the water aspects of the mine have been described in this section; however, the responsibility for the upkeep of storm water structures falls under the Engineering Department.

4.3.8.1 Health, Safety & Environmental Training & Occupational Monitoring

Each employee and sub-contractor whom works for and on behalf of Ulco is subjected to appropriate health and safety training. The SHE Department is responsible for the implementation of the health and safety training.

In order to ensure that occupational exposure limits are not exceeded, occupational health and safety monitoring is implemented by the SHE department. Monitoring includes:

- Noise induced hearing loss;
- Heat stress;
- Personal dust monitoring;
- Ventilation; and
- Illumination.

4.3.8.2 Risk assessments:

As and when a new activity is implemented at Ulco or there is a change to an existing activity, the SHE Department ensures a risk assessment is completed for that activity. Part of the risk assessment includes environmental risks and environmental legal requirements.

4.3.8.3 Documentation Control / Environmental Legal Compliance

All environmentally required documentation such as environment applications, permits, permissions and result of monitoring campaigns are reviewed and maintained by the SHE Department.

The SHE Department resumes the responsibility for the implementation of ISO 14001, ISO 45001, ISO 9001 management systems.

4.3.8.4 Water Management

The SHE department resumes overall responsibility for water management issues that include;



Legal requirements: Ensuring that all water use on the mine is legal. For an indication of the current legal requirements the integrated water use license should be reviewed.

Potable and Process water: The water supply at Ulco is provided from two sources; i) water from the Vaal River is used as industrial and potable water, and ii) borehole water is used to irrigate the gardens and sports fields. A description of the extraction of water from each source and the water purification plant is given below.

River Water Supply and Water Purification Plant: Both domestic and industrial water are obtained from the Vaal River, located approximately 9 km south-west from the mine. There is a pipe line between the Vaal River pump station and the mine.

River water is pumped from the Vaal River into a settling reservoir by two river pumps. From the settling reservoir, the water is pumped into two intermediate pump stations. These stations can act as an emergency storage facility of water. From the intermediate reservoirs, the water is then transferred to the Ulco Water Treatment Works.

Ulco Water Treatment Plant: This water treatment works has been permitted as a Class E Works. Water is initially pumped to the raw water reservoir. From here, the purification process begins by passing the water through two classifier tanks, with an automatic flush system. The water is then fed through two sand filters with an automatic backwash system. The backwash water, containing suspended solids removed from the river water, is used for dust suppression on the quarry roads, to irrigate fields as well as to irrigate the golf course. The filtered water is then treated with chlorine gas and finally flows through the clean treated water system.

Using the force of gravity, potable water flows from the clean water reservoir to the Ulco Township and the plant.

Borehole Water Supply: Borehole water is obtained from three boreholes located on the farm Bergville and used to provide water for the township gardens, sports fields and to supplement the backwash water for road dust suppression.

Water for dust suppression: Water for dust suppression purposes can be obtained from either raw water from the Vaal River, backwash water from water purification plant or water captured in sumps within the quarries.

Future Water Supply Options: Ulco Mine currently relies on water from the Vaal River for its operation, however, the supply capacity of the Vaal River has declined due to increased abstraction upstream of the mining operation and persistent drought conditions in recent years.

MojaTerre (Pty) Ltd was appointed by AfriSam (South Africa) (Pty) Ltd, in December 2016, to undertake a Phase 1 Hydrological Investigation to determine the potential and reliability of groundwater resources as a sustainable future water resource. To determine whether groundwater could be used to meet the demand for the operations the following activities are required to be completed:



Step 1 – Identify the current yield and performance of the aquifer(s) present through recording existing groundwater abstraction patterns by private groundwater users within the study area.

Step 2 – Describe the subsurface terrain in terms of major water bearing structures, which may have the potential for long term sustainable groundwater abstraction.

Step 3 – Drill suitable pumping and observation boreholes through major water bearing structures identified for the study area.

Step 4 – Undertake suitable tests that would provide data required to characterise the aquifers and their characteristics.

Step 5 – Undertake predictive numerical modelling testing various scenarios to determine the requirements that would optimise sustainable groundwater use for the operations.

Step 6 – Develop a Groundwater Abstraction Management Plan that would ensure the sustainable long term use of groundwater at the operations.

The Phase 1 Hydrological Investigation addressed Steps 1 and 2 above.

Water is abstracted from the Vaal River for water supply to the operations. A 9 km pipeline is used to transfer water from the river to the mine. The water is purified and used for mineral processing and domestic use. The operations are permitted to abstract 946 669 m³/a from the Vaal River.

Groundwater is abstracted from three boreholes on the Bergville farm for use at the operations. The mine is permitted to abstract 192 796 m³/a from the boreholes, which is equivalent to 528 m³/d. The water is pumped to a storage reservoir located at the old plant area. Groundwater is used for gardening and dust suppression and not for domestic purposes, as it is hard and has elevated EC concentrations.

If the water extracted from the Vaal River is to be replaced with groundwater, the volume of water to be abstracted is equivalent to approximately 2 600 m³/d. The most suitable targets for groundwater abstraction in order of preference, based on the available dataset, are:

- The Ulco Member;
- The Kneukel and Weltevreden dykes;
- The Vryburg Formation; and
- Alluvium or paleochannels associated with the Vaal River.

If it is assumed the groundwater will be abstracted from the Ulco Member limestones and dolomites, the average yield of boreholes drilled could be around 470 m³/d. To match the volume of water abstracted from the Vaal River, 5-6 boreholes would be required.

Geophysical methods, such as magnetic, electromagnetic, resistivity or gravity methods, would be used to identify fractures, faults, intrusions and contact zones in the limestone, dolomites and quartzites that may act as preferential flow paths to groundwater and as such enhance yield. The Ulco Member is present over most of the land that covers the Ulco operations, for this reason, the location of the well field would be determined by the practical requirements of the mine.



Groundwater abstraction by Ulco would not compete with private boreholes and additional groundwater abstraction boreholes would be drilled away from existing abstraction boreholes, especially where the groundwater is the sole source of water available for the user.

Prior to any additional abstraction taking place the mine commits to completing Steps 3 to 6, detailed above, to determine the viable and sustainable use of groundwater at the operations.

Upkeep of the Water balance diagram: The SHE Department is responsible for the upkeep of the water balance diagram as provided below for an indication of the water flow throughout the mine.

Storm water: Overall planning and implementation of storm water management controls falls under the responsibility of the SHE department

Oil traps: It is the responsibility of the SHE Department to ensure that all oil traps are working effectively and oily water is not released into the environment.

Sewage works: The sewage treatment facility at Ulco is registered as a Class C Works. All houses, recreation buildings, offices and factory facilities are connected to the domestic sewage treatment plant capable of handling 540 m³ of domestic sewage per day. The sewage plant consists of:

- A primary settling tank,
- A secondary settling tank,
- Two bio-filters,
- An anaerobic sludge digester (new digester was built and commissioned in June 2003),
- A sand filter, and
- A chlorinator.

The location of the sewage plant was selected to ensure that the domestic drains and sewage system from the factory and the majority of the township are drained to the sewage plant by gravity. Only one intermediate sewage pump station is required for the western part of the township.

The discharge water from the sewage plant is used by the neighbouring farmer as irrigation water and will in future also be used for irrigation of the golf course. The E. coli and coliform content of this water are tested on a monthly basis, with full chemical tests being undertaken quarterly.

Waste sludge is pumped to one of three drying ponds at the sewage treatment plant. Once the sludge has dried, it is either:

- Mixed with garden refuse and re-used as compost for rehabilitation, or
- Given to a local nursery for use as part of a compost mix.



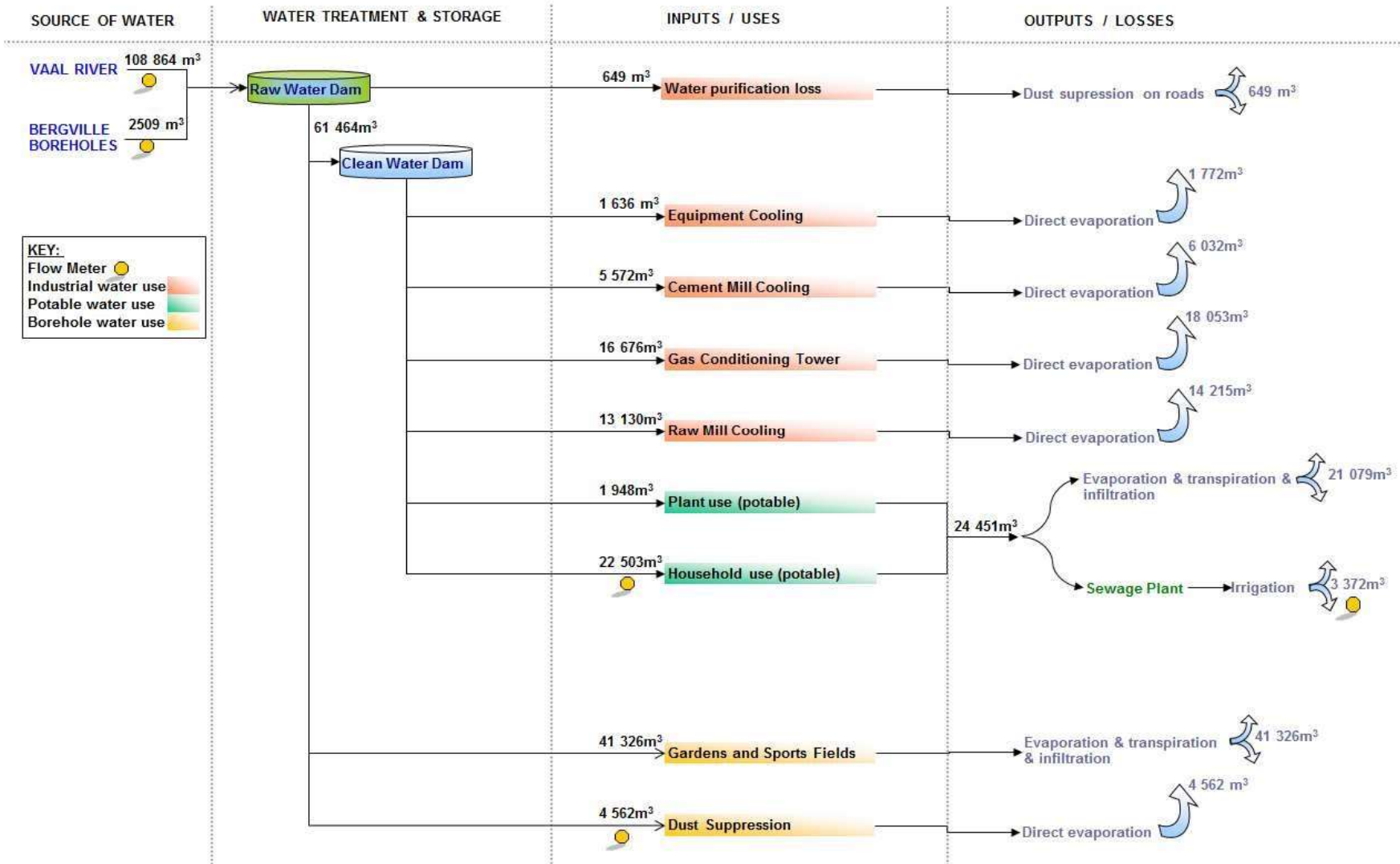


Figure 17: Water flow throughout the mine



4.3.8.5 Waste Management

The SHE Department is responsible for the implementation of effective waste management measures throughout the operation.

Quarry Waste

Very little waste is generated during mining operations in the quarry and includes wood, paper, packing and sawdust contaminated with hydrocarbons. The sawdust is used to clean up hydrocarbon spills and is therefore generated in very small quantities. Any overburden created during mining activities is used in concurrent rehabilitation processes.

Plant Waste

The unshaped refractory are bricks used to line the kiln. The shaped refractory bricks are sold to a refractory supplier for recycling. All spillages of cement and clinker are recycled back into the process.

Scrap metal – Stored next to the salvage yard and sold when sufficient scrap metal (metal that cannot be salvaged for any purpose) has been collected.

Conveyor belting – Stored in a scrap conveyor belt yard and sold once sufficient quantities have accumulated.



Figure 18: Salvage yard

Waste Disposal Site

Domestic waste and garden refuse generated from Ulco township and sports fields are collected separately by a contractor, on a weekly basis.



Domestic waste. Since 2005, the mine has initiated a recycling programme for its domestic waste. All domestic waste is collected and brought to the waste dump. At the waste dump, glass, tins, paper and plastic are separated into separate storage areas. As and when the storage areas are full of the individual waste streams, the material is transported to a recycling depot in Bloemfontein. All waste left after separation is covered on a weekly basis. The pit where waste is tipped and covered is fenced on all sides, with a single gate entrance. Although this means the enclosure does not prevent scavenging by animals such as baboons, it does minimise such activities.

Garden refuse. Garden refuse may be put through a wood chipper prior to be placed on the surface should the need arise. At present the garden refuse is being used to cover the surface of the waste dump to aid in the rehabilitation process. The garden refuse is spread over the sides of the waste dump to reduce erosion and provide nutrients to the soil. To ensure that the garden refuse does not inadvertently pollute the waste dump, Ulco employs a contractor to shift through the garden refuse and remove non-vegetable matter. This refuse is then disposed of in the waste tip with the domestic waste from the Township.

4.3.8.6 The Clinic

The mine has a small clinic that is open for consultation four mornings a week. Only minor medical conditions or emergencies are treated at this clinic, with more serious cases being referred to the clinic in Delportshoop or ZK Mathews hospital in Barkly West. Medical waste generated from the clinic primarily includes syringes and bandages, which are disposed of as medical waste.

4.3.8.7 Security

Twenty-four-hour security regulates entry and exit from the mine and the factory. Security guards also patrol the property.

4.3.8.8 Sub-contractors

Like all mines, Ulco makes use of a number of sub-contractors to fulfil certain roles of the mining operation. The SHE Department resumes responsibility for the completion and endorsements of contracts between contractors and the mine, which include details pertaining to safety, health and environmental requirements. Current examples of contractors include:

- Drilling and Blasting contractors
- Cleaning contractors
- Security contractors
- Civils contractors
- Mechanical support contractors
- Catering contractors

4.3.8.9 Air conditioners

Ulco has a number of air conditioners throughout the mine. Ulco is in the process of replacing old air conditioners with newly installed units that use CFC free gases.



5. Policy and Legislative Context

The following table is a summary of the policy and legislative context applicable to the proposed development.

Table 5: Policy and legislative context

Applicable Legislation and Guidelines used to compile the Report (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	Reference where applied (i.e. Where in this document has it been explained how the development complies with and responds to the legislative and policy context)
The Constitution of the Republic of South Africa, 1996.	Throughout this report.
The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002, as amended).	
The Mineral and Petroleum Resources Development Regulations (GN R527 dated 2004).	
The National Environmental Management Act (Act No. 107 of 1998 as amended).	
The Environmental Impact Assessment Regulations (GN R982 dated 2014, as amended).	
Mine Health and Safety Act (Act No.29 of 1996).	Ulco operations will apply for written consent/approval from the Chief Inspector of Mines to carry out mining operations within a horizontal distance of 100 (one hundred) meters from buildings, structures and the R31 road.
The Environmental Impact Assessment Regulation. Listing Notice 1. (GN R983 dated 2014, as amended).	Section 4.1 of Part A of this report.
The Environmental Impact Assessment Regulation. Listing Notice 2. (GN R984 dated 2014, as amended).	
The Environmental Impact Assessment Regulation. Listing Notice 3. (GN R985 dated 2014, as amended).	
Integrated Environmental Management Guideline: Guideline on Need and Desirability (2017).	Part A Section 6.1 of this report.
Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector.	Chapters E, F and L of Part A Section 7.4.1; and 7.4.4 of this report.



<p>Applicable Legislation and Guidelines used to compile the Report</p> <p>(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)</p>	<p>Reference where applied</p> <p>(i.e. Where in this document has it been explained how the development complies with and responds to the legislative and policy context)</p>
<p>The National Water Act (Act No. 36 of 1998, as amended).</p>	<p>Part B Section 1.4.7 of this report.</p>
<p>Regulations on use of water for mining and related activities aimed at the protection of water resources published in terms of the National Water Act under Government Notice 704 of 4 June 1999 (GN R704).</p>	<p>Part A Section 4.3.2.3 of this report.</p>
<p>The National Environmental Management: Biodiversity (Act 10 of 2004, as amended).</p>	<p>Chapter E, F and L of Part A Section 7.4.1</p>
<p>National Forests Act (Act No.84 of 1998).</p>	
<p>Alien and Invasive Species Regulations (GN R598 dated 2014).</p>	
<p>Conservation of Agricultural Resources (Act 43 of 1983).</p>	
<p>The National Environmental Management: Air Quality (Act 39 of 2004, as amended).</p>	<p>Chapter I of Part A Section 7.4.1</p>
<p>SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments.</p>	<p>Chapter J of Part A Section 7.4.1.</p>
<p>National Environmental Management: Waste Act (Act No. 59 of 2008, as amended).</p>	<p>Section 4.1 of Part A of this report.</p>
<p>National Heritage Resources Act (Act No. 25 of 1999, as amended).</p>	<p>Chapter K of Part A Section 7.4.1.</p>
<p>DMR Guideline for Consultation with communities and Interested and Affected Parties. As required in terms of Sections 16(4)(b) or 27(5)(b) of the MPRDA, and in accordance with the standard directive for the compilation thereof as published on the official website of the Department of Mineral Resources.</p>	<p>Part A Section 7.2.</p>
<p>Government Gazette 39425. Government Notice R.1147 dated 2015, “Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations”</p>	<p>Section 19 (Part A) and Sections 1.4.1 and 1.7 (Part B) of this EIAR / EMPr, as well as Annexure F.</p>



Applicable Legislation and Guidelines used to compile the Report (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	Reference where applied (i.e. Where in this document has it been explained how the development complies with and responds to the legislative and policy context)
Integrated Environmental Management Information Series. Criteria for determining alternatives in EIA.	Part A Section 7 and Par B Section 13 of this report.

6. Need and Desirability of the Proposed Activities

6.1. Need and desirability in terms of the Guideline on Need and Desirability, 2017

In 2017, the Department of Environmental Affairs published an Integrated Environmental Management Guideline, the Guideline on Need and Desirability. The following table indicates on how the guideline requirement were considered in this EIA Report.

Table 6: Need and Desirability of the project

Requirement	Part where requirement is addressed/ response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?¹	The project area falls within an ESA and will have a high impact on the ecological integrity of the area. Refer to Chapters E, F and L of Part A Section 7.4.1 and Part A Section 7.5 for impacts.
1.1 How were the following ecological integrity considerations taken into account?	
1.1.1 <i>Threatened Ecosystems²</i>	
1.1.2 <i>Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure³</i>	

¹ Section 24 of the Constitution and section 2(4)(a)(vi) of NEMA refer.

² Must consider the latest information including the notice published on 9 December 2011 (Government Notice No. 1002 in Government Gazette No. 34809 of 9 December 2011 refers) listing threatened ecosystems in terms of Section 52 of National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

³ Section 2(4)(r) of NEMA refers.



Requirement	Part where requirement is addressed/ response
1.1.3 <i>Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs").</i>	
1.1.4 <i>Conservation targets</i>	
1.1.5 <i>Ecological drivers of the ecosystem.</i>	
1.1.6 <i>Environmental Management Framework.</i>	
1.1.7 <i>Spatial Development Framework.</i>	<p>There are no protected areas within the direct vicinity of the Ulco operation.</p> <p>The Ulco operation mining area has been impacted by existing mining activities on site, extensive agricultural activities (especially the cultivation of maize) as well as impacts associated with infrastructure (e.g. roads and railways) and urbanisation. All of these activities have resulted in the extensive transformation of the natural habitats within the study area (refer to Chapter M of Section 7.4.1 of part A below).</p>
1.1.8 <i>Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)⁴</i>	<p>AfriSam is committed to the development, implementation and maintenance of globally acceptable standards and procedures that are embedded in the supply chain process. AfriSam has developed Principles and Policy, an Environmental Management System ("EMS"), a number of Environmental Performance Standards that cover key management areas (e.g. water, air, biodiversity, etc.). These standards are mandatory, high-level requirements set at corporate level. They support the AfriSam Environmental Vision, Principles and Policy, and outline the required approach to avoiding or minimising the potential adverse environmental impacts associated with their activities. The standards are supported by detailed procedures and guidelines. These standards will also apply to any future activities that AfriSam propose to undertake.</p>
1.2 How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the	<p>The impacts and their associated risks have been discussed in Part A Section 7.5 of this document.</p>

⁴ Section 2(4)(n) of NEMA refers



Requirement	Part where requirement is addressed/ response
<p>impacts? What measures were explored to enhance positive impacts?⁵</p>	
<p>1.3 How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?⁶</p>	
<p>1.4 What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?⁷</p>	<p>No new waste streams will be generated by this project and all waste will be managed in accordance to the existing waste management activities at the Ulco operation.</p>
<p>1.5 How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?⁸</p>	<p>The Phase I Heritage Impact Assessment study (“HIA”) for the study area revealed no sign of either Stone Age or Iron Age remains located in the study area. Some of the remains associated with the farmyard on the property may be considered as important. The structural remains to be considered are the well, the reservoir, the milking shed and the various forms of flood irrigation canals. The structural remains mentioned above can be considered to be of high significance and are protected by the National Heritage Resources Act (Act No 25 of 1999). If the mine eventually becomes a reality, and these heritage remains become an impediment, second phase studies may be undertaken, and demolition applications could be made at the provincial Heritage Authorities in Kimberley.</p> <p>In the same way the white pioneer graves and the other 20 unmarked graves may be treated similarly. These graves may be relocated to the most suitable position. All graveyards and graves can be considered to be of high significance and</p>

⁵ Section 24 of the Constitution and Sections 2(4)(a)(i) and 2(4)(b) of NEMA refer.

⁶ Section 24 of the Constitution and Sections 2(4)(a)(ii) and 2(4)(b) of NEMA refer

⁷ Section 24 of the Constitution and Sections 2(4)(a)(iv) and 2(4)(b) of NEMA refer

⁸ Section 24 of the Constitution and Sections 2(4)(a)(iii) and 2(4)(b) of NEMA refer.



Requirement	Part where requirement is addressed/ response
	<p>are protected by various laws Legislation with regard to graves includes Section 36 of the National Heritage Resources Act (Act No 25 of 1999) whenever graves are older than sixty years. It seems as if both graveyards are older than sixty years. Other legislation with regard to graves includes those which apply when graves are exhumed and relocated, namely the Ordinance on Exhumations (No 12 of 1980) and the Human Tissues Act (No 65 of 1983 as amended). Refer to Chapter K. Refer to Part A Section 7.5 for the impacts on the different aspects of the environment.</p>
<p>1.6 How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?⁹</p>	<p>The mining and removal of minerals (non-renewable resources) at the proposed project area will result in the localised destruction of the geological strata, which is a consequence of mining.</p>
<p>1.7 How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?¹⁰</p>	<p>Groundwater from boreholes will be pumped to the existing operation to supplement the abstraction of water from the Vaal-</p> <p>The impacts that may occur as a result of the proposed activity have been identified and discussed in Part A Section 7.5.</p>
<p>1.7.1 Does the proposed development exacerbate the increased dependency on increased use</p>	

⁹ Section 24 of the Constitution and Sections 2(4)(a)(v) and 2(4)(b) of NEMA refer

¹⁰ Section 24 of the Constitution and Sections 2(4)(a)(vi) and 2(4)(b) of NEMA refer



Requirement	Part where requirement is addressed/ response
<i>of resources to maintain economic growth or does it reduce resource dependency (i.e. dematerialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)</i>	
1.7.2 <i>Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)</i>	The mining of the limestone reserves will maximise the utilisation of the mineral resources within the existing Mining Right.
1.7.3 <i>Do the proposed location, type and scale of development promote a reduced dependency on resources?</i>	
1.8 How were a risk-averse and cautious approach applied in terms of ecological impacts? ¹¹	<p>The project will have a high impact on the ecological integrity of the area. Refer to Chapters E, F and L of Part A Section 7.4.1 of this and Part A Section 7.5 for the impacts.</p> <p>A conservative approach has been followed in terms of the identification and assessing of environmental impacts associated with the proposed project during the EIAR / EMPr phase.</p>
1.8.1 <i>What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</i>	Refer also to Part A Section 15.
1.8.2 <i>What is the level of risk associated with the limits of current knowledge?</i>	The level of risk associated with the limits of current knowledge can be considered low in terms of the overall area associated with the Mining Right. The potential risks have been identified in Part A Section 7.5.
1.8.3 <i>Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</i>	
1.9 How will the ecological impacts resulting from this development impact on people's environmental right in terms following: ¹²	

¹¹ Section 24 of the Constitution and Section 2(4)(a)(vii) of NEMA refer.

¹² Section 24 of the Constitution and Sections 2(4)(a)(viii) and 2(4)(b) of NEMA refer



Requirement	Part where requirement is addressed/ response
<p>1.9.1 <i>Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</i></p>	<p>All potential negative and positive impacts associated with the proposed activity have been identified and discussed in Part A Section 7.5 below.</p>
<p>1.9.2 <i>Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</i></p>	
<p>1.10 Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?</p>	
<p>1.11 Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?</p>	
<p>1.12 Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?¹³</p>	<p>Refer to Part A Section 7 of this report for an assessment of the alternatives identified.</p>
<p>1.13 Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?¹⁴</p>	<p>The impacts associated with the proposed activity has been included in Part A Section 7.5 of this document.</p>

¹³ Section 2(4)(b) of NEMA refer

¹⁴ Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer



Requirement	Part where requirement is addressed/ response	
<p>2. “Promoting justifiable economic and social development”¹⁵</p>		
<p>2.1 What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?</p>		
<p>2.1.1 <i>The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,</i></p>	<p>The Dikgatlong Local Municipality IDP 2016-2017, which indicates Frances Baard District Municipality is the strongest economic region in the province, accounting for 36% of the Provincial Gross Domestic Product (“PGDP”). According to a 2007 Quantec Research report, within Frances Baard District Municipality, contribution to the regional GDP is dominated by Sol Plaatje (74%), Phokwane (15%), Dikgatlong (8%), Magareng (2%). The economy of the district consists of the primary (agriculture and mining), secondary (manufacturing, electricity and construction) and tertiary (trade, transport, financial and social services) sectors.</p> <p>This application relates to extension of the existing mining and will continue to contribute to the socio-economy in the area.</p>	
<p>2.1.2 <i>Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),</i></p>		
<p>2.1.3 <i>Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and</i></p>		
<p>2.1.4 <i>Municipal Economic Development Strategy (“LED Strategy”).</i></p>		
<p>2.2 Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</p>		
<p>2.2.1 <i>Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?</i></p>		
<p>2.3 How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?¹⁶</p>		
<p>2.4 Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?¹⁷ Will the impact be socially and economically sustainable in the short- and long-term?</p>		

¹⁵ Section 24 of the Constitution refers.

¹⁶ Section 2(2) of NEMA refers

¹⁷ Sections 2(2) and 2(4)(c) of NEMA refers.



Requirement	Part where requirement is addressed/ response
<p>In terms of location, describe how the placement of the proposed development will:¹⁸</p>	
<p>2.4.1 result in the creation of residential and employment opportunities in close proximity to or integrated with each other,</p>	
<p>2.4.2 reduce the need for transport of people and goods,</p>	
<p>2.4.3 result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),</p>	
<p>2.4.4 compliment other uses in the area,</p>	
<p>2.4.5 be in line with the planning for the area,</p>	
<p>2.4.6 for urban related development, make use of underutilised land available with the urban edge,</p>	<p>This application relates to extension of the mining activities and will continue to contribute to the socio-economy in the area.</p>
<p>2.4.7 optimise the use of existing resources and infrastructure,</p>	
<p>2.4.8 opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),</p>	
<p>2.4.9 discourage "urban sprawl" and contribute to compaction/densification,</p>	
<p>2.4.10 contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,</p>	
<p>2.4.11 encourage environmentally sustainable land development practices and processes,</p>	<p>Refer to Part A Section 7.5 for detailed management and mitigation measures.</p>
<p>2.4.12 take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral</p>	<p>The location of the proposed project area was determined based on the location of the mineral reserve.</p>

¹⁸ Section 3 of the Development Facilitation Act, 1995 (Act No. 67 of 1995) ("DFA") and the National Development Plan refer



Requirement	Part where requirement is addressed/ response
<i>resource, access to the port, access to rail, etc.),</i>	
2.4.13 <i>the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),</i>	This application relates to extension of the mining and will continue to contribute to the socio-economy in the area.
2.4.14 <i>impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and</i>	
2.4.15 <i>in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?</i>	
2.5 How were a risk-averse and cautious approach applied in terms of socio-economic impacts? ¹⁹	A conservative approach has been followed in terms of the identification and assessing of environmental impacts associated with the proposed project.
2.5.1 <i>What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?²⁰</i>	The limits of current knowledge is considered to be low.
2.5.2 <i>What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?</i>	
2.5.3 <i>Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</i>	
2.6 How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following	
2.6.1 <i>Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</i>	As mentioned previously, this application relates to continuation of the Ulco operation mining and will continue to contribute to the socio-economy in the area

¹⁹ Section 2(4)(a)(vii) of NEMA refers

²⁰ Section 24(4) of NEMA refers



Requirement	Part where requirement is addressed/ response
2.6.2 <i>Positive impacts. What measures were taken to enhance positive impacts?</i>	Refer to Part A Section 7.7 of this report for an identification of the positive impacts.
2.7 Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	The impacts of the proposed activities are presented in Part A Section 7.5 of this document.
2.8 What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations? ²¹	
2.9 What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? ²² Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	Refer to Part A Section 7 of this report for an assessment of the alternatives identified and their potential impacts on the social environment.
2.10 What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination? ²³	Refer to point 2.6 (of this table) above.
2.11 What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the	The impacts has been assessed in detail and are presented in Part A Section 7.5 below. Mitigation measures are also provided for each potential impact that may occur.

²¹ Section 2(4)(b) of NEMA refers.

²² Section 2(4)(c) of NEMA refers.

²³ Section 2(4)(d) of NEMA refers.



Requirement	Part where requirement is addressed/ response
development has been addressed throughout the development's life cycle? ²⁴	
2.12 What measures were taken to:	
2.12.1 <i>ensure the participation of all interested and affected parties,</i>	
2.12.2 <i>provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,</i> ²⁵	
2.12.3 <i>ensure participation by vulnerable and disadvantaged persons,</i> ²⁶	
2.12.4 <i>promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,</i> ²⁷	Refer to the Public Participation Report attached hereto as Annexure E.
2.12.5 <i>ensure openness and transparency, and access to information in terms of the process,</i> ²⁸	
2.12.6 <i>ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge</i> ²⁹ , and	
2.12.7 <i>ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were being promoted?</i> ³⁰	Refer to the Public Participation Report attached hereto as Annexure E. The Public Participation Report presents the details of all Interested and Affected Parties ("I&APs") that were identified, how the I&APs were notified and involved in the process, any issues and concerns raised by the
2.13 Considering the interests, needs and values of all the interested and affected parties,	

²⁴ Section 2(4)(e) of NEMA refers.

²⁵ Section 2(4)(f) of NEMA refers

²⁶ Section 2(4)(f) of NEMA refers.

²⁷ Section 2(4)(h) of NEMA refers.

²⁸ Section 2(4)(k) of NEMA refers.

²⁹ Section 2(4)(g) of NEMA refers.

³⁰ Section 2(4)(q) of NEMA refers.



Requirement	Part where requirement is addressed/ response
describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)? ³¹	I&APs and the final results of the Public Participation Process.
2.14 What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected? ³²	All contractors, sub-contractors and workers will attend compulsory environmental awareness training and inductions. This training will highlight the dangers associated with the workplace. Procedures relating to environmental risks will also be put in place and will be regularly updated.
2.15 Describe how the development will impact on job creation in terms of, amongst other aspects	
2.15.1 <i>the number of temporary versus permanent jobs that will be created,</i>	As mentioned previously, this application relates to extension of the existing Ulco operation and will continue to contribute to the socio-economy in the area.
2.15.2 <i>whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),</i>	
2.15.3 <i>the distance from where labourers will have to travel,</i>	
2.15.4 <i>the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and</i>	
2.15.5 <i>the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).</i>	
2.16 What measures were taken to ensure:	
2.16.1 <i>that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and</i>	Refer to the Public Participation Report attached hereto as Annexure E. Other government departments are included on the list of I&APs and stakeholders and received the notifications of the

³¹ Section 2(4)(g) of NEMA refers.

³² Section 2(4)(j) of NEMA refers



Requirement	Part where requirement is addressed/ response
2.16.2 <i>that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?</i>	proposed activity as well as notifications on the availability of the report for review. All applicable environmental legislation was considered during the process.
2.17 What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage? ³³	During the initial Public Participation Process, all issues and concerns raised by the I&APs, stakeholders and the Organs of State are taken into account and responses provided.
2.18 Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left? ³⁴	Mitigation measures for each of the identified impacts have been described in detail in this report. The proposed mitigation measures are aimed to be realistic to protect both the bio-physical and socio-economic environment in both the short- and long-term.
2.19 What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment? ³⁵	The applicant will be responsible for the costs of any remediation of pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects. The Financial Provisioning for the proposed project has been included in Part A Section 19
2.20 Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations? ³⁶	<p>The alternatives for the proposed project are described in Part A Section 13 below and assessed in terms of the following four categories:</p> <ul style="list-style-type: none"> • Environmental; • Technical/Engineering; • Economical; and • Social.
2.21 Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its	The impacts have been presented in Part A Section 7.5 below.

³³ Section 2(4)(o) of NEMA refers.

³⁴ Section 240(1)(b)(iii) of NEMA and the National Development Plan refer.

³⁵ Section 2(4)(p) of NEMA refers.

³⁶ Section 2(4)(b) of NEMA refers.



Requirement	Part where requirement is addressed/ response
location and other planned developments in the area? ³⁷	

7. Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site.

Ulco operations includes an existing mine that has been in operation since 1936. Ulco has an approved mining right and an approved EMPr. This EIR / EMPr has been compiled to amend the existing EMPr to include for the proposed Bergville project. The intent of this section of the report is to determine if there are alternatives for the proposed Bergville project, and is not applicable to the existing Ulco operations.

7.1. Details of alternatives considered as part of the proposed Bergville Project

7.1.1 Mining layout alternative

Two alternatives in terms of mining layout have been identified, refer to Figure 27. After the Ground Penetrating Radar study was completed, more limestone reserves were found south east of the original mine layout. Both the mining layouts will have a similar environmental impact, however, from a mining perspective the preferred layout is ideal.

7.1.2 Site alternatives for the crusher

It had initially been indicated on earlier versions of the surface infrastructure plans that the crusher will be located close to the existing farmhouse. Subsequent to further exploration of the feasible mineral reserve area, and taking altitude, climb and better mining practice into consideration, a new mine plan was developed and an alternative location for the crusher, closer to the existing Ulco operation was considered.

7.1.3 Site alternatives for the road and conveyor crossing point

Two alternative locations have been proposed for the crossing point (refer Figure 27 below). Alternative 1 is located further from the crusher location and is considered an unsuitable location from an

³⁷ Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer.



economical perspective. Alternative 2, located closer to the crusher location and is considered the preferred location due to less climb (and associated fuel consumption and lower CO₂ emission).

7.1.4 Layout alternatives for the stream diversion

Two options were considered for the horizontal alignment at the upstream end of the canal, over approximately the first 800 m. From this point onwards, the horizontal alignment is influenced by the options for crossing the proposed haul road. The first option avoids encroachment on the mining extent at the proposed quarry. The canal would start approximately 300 m to the west of the proposed mining boundary and re-direct the watercourse around the southwest corner of this boundary. This alignment involves relatively sharp direction changes for the water in the canal at the start point and at the southwest corner of the mine boundary. In addition, the southwest corner is located on a topographical high point, through which this canal alignment would need to cut.

The second option involves cutting through the southwest corner of the mining area. This option, although sterilising some of the Limestone reserves, is preferred, as it avoids the aforementioned topographical high point, while at the same time allowing for gentler direction changes in the diverted watercourse. In addition, this option would shorten the length of the proposed river diversion.

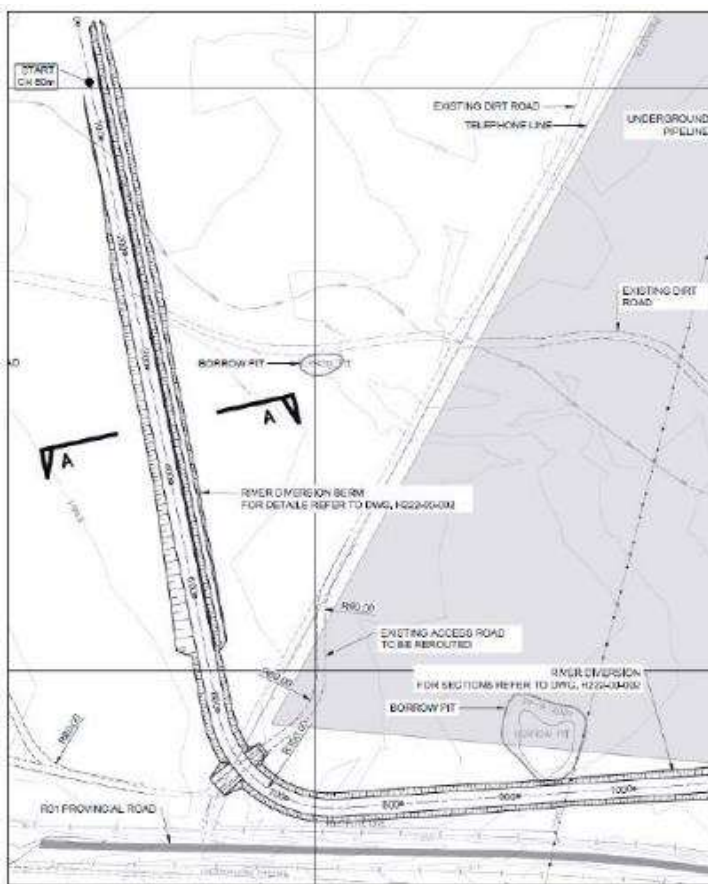


Figure 19: Stream diversion option 1



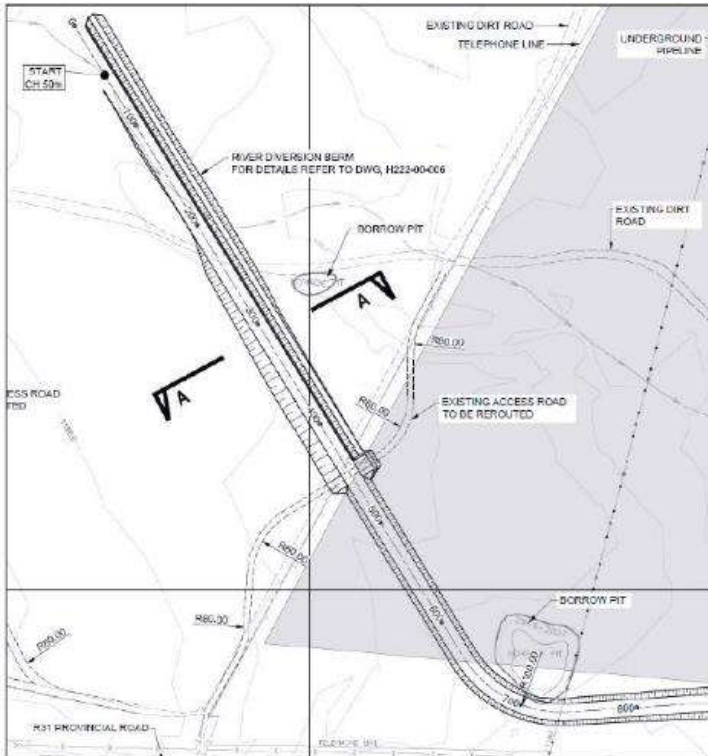


Figure 20: Stream diversion option 2

7.1.5 Design alternatives for the R31 crossing

Three options for crossing the road have been considered:

- A bridge over the road;
- A cut and cover tunnel under the road; or
- A tunnel constructed away from the road and then jacked underneath it.

An underpass beneath the road, created by jacking a preconstructed culvert beneath the road is the preferred option as it will minimise disruption of the R31 road during the construction phase. The depth of quarries (up to 20 m) that are located on either side of the road, also influences this decision. In the future, the tunnel system may be easily adapted, into a conveyor system.

The original intention was to consider jacking the pre constructed culverts under the R31, but pending final designs, timing and cost considerations, as an alternative a conventional cut and cover operation for the tunnel insertion was investigated. The final preferred option is a hybrid of the two to optimise cost and reduce the time that the R31 would be affected.

The tunnel will comprise two separate culvert sections, each having internal dimensions of approximately 5 m x 5 m. The floor of the culverts will be approximately 11 m below the overhead Kimberley-Postmasberg Road. This depth of tunnel will provide ± 5 m of cover above the culverts. The culverts would be separated by a gap to avoid passing current traffic in the tunnels. The length of the culverts is dictated by the steepness of the embankment that may be created on either side of the road, the width of the pipe servitude (15 m) and the road reserve (32 m). Assuming 8 m encroachment into the pipe servitude, the culvert length will be ± 50 m.



7.1.6 Design alternatives for the proposed haul/access road stream crossing

Three options are currently being considered for the long term stream diversion canal to cross the proposed haul road, all options requiring a temporary diversion berm during the construction and initial mining period to defer the diversion as long as possible:

- Option 1: Stream diversion crossing at access road level.
- Option 2: Stream crossing over access road by means of an aqueduct / bridge structure.
- Option 3: Stream crossing by means of a canal built on the fill embankment placed above an in-situ constructed access road tunnel.

Option 1: Stream diversion crossing at access road level: This option involves the construction of a concrete lined chute to bring the stream flow down to the level of the access road tunnel, at a depth below surface of approximately 11 m. At the toe of the chute, and immediately upstream of the access road, a stilling basin would be provided to dissipate the energy in the water before crossing the access road. At the stilling basin outlet, culverts would be provided underneath the haul road, sized to convey flows up to the 1 in 20-year event. Larger events would overtop the road which would be designed to withstand these larger flow events. The road elevation at the culverts would be lower than the tunnel invert and the access road into the quarry, to provide sufficient freeboard to prevent the design event from flooding the quarries to the south and north of the road. This would be achieved by means of approach ramps on either side of the culvert structure.

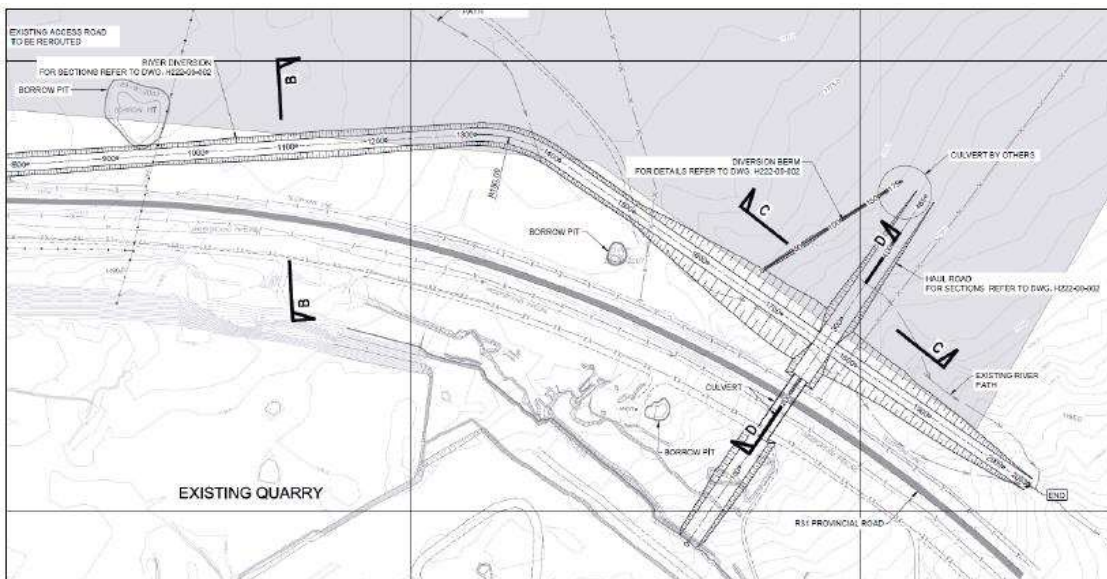


Figure 21: Option 1 layout Plan



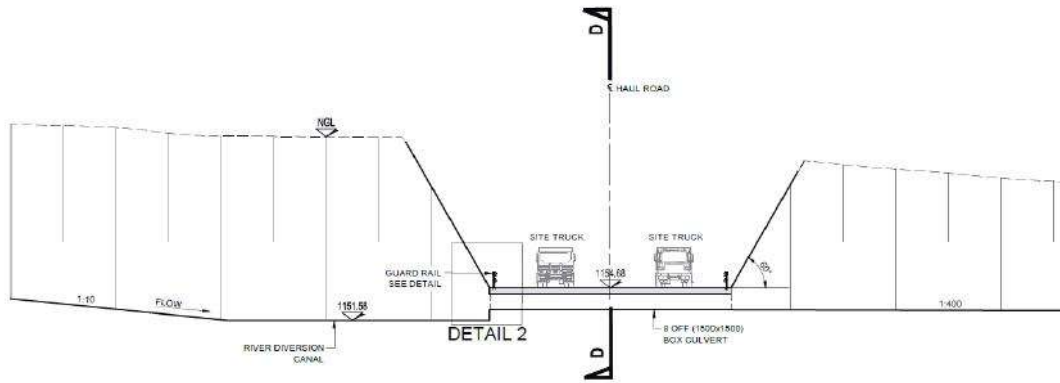


Figure 22: Details showing Option 1 properties i.e. the 1:10 cut slope, stilling basin and the culverts underneath the haul road

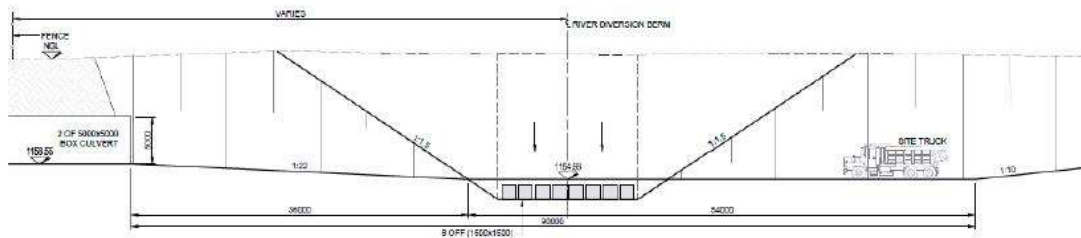


Figure 23: Details of Option 1 along the proposed haul road

Option 2: Stream crossing over access road by means of an aqueduct structure: This option involves the construction of an aqueduct supported by concrete columns over the access road. This aqueduct would convey the design flow over the access road. The aqueduct would have a rectangular cross section. Preliminary calculations indicate a required width of 10 m with side walls 2.5 m high.

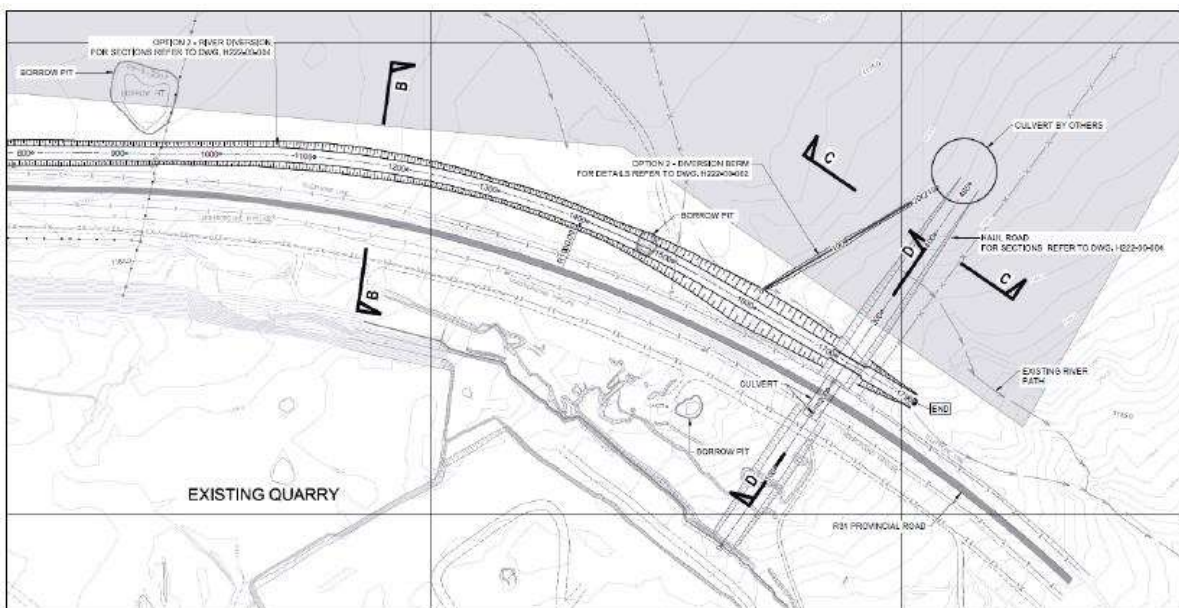


Figure 24: Option 2 and 3 Layout Plan



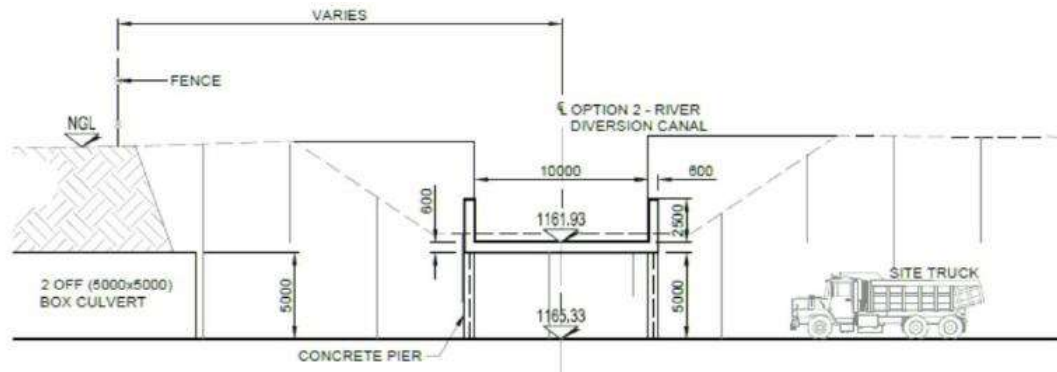
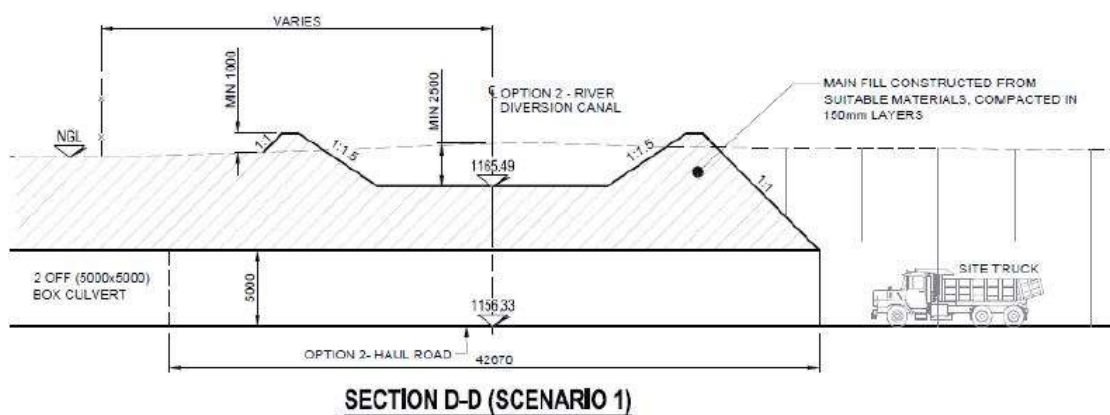


Figure 25: Details of Option 2 along the proposed haul road

Option 3: Stream crossing over access road by means of cut-and-cover access road tunnel: This option would involve the construction of an additional cut-and-cover tunnel for the access road, enabling the stream diversion channel to pass over the access road. This would require the proposed tunnel under the R31 road to be extended by approximately 50 m, or the construction of a second tunnel approximately 50 m in length. Being constructed in fill over the access road, the canal would likely require an erosion protection lining over this section.



SECTION D-D (SCENARIO 1)

Figure 26: Details of Option 3 along the proposed haul road

A decision to select a preferred option to cross the proposed access road is largely dependent on the factors which include, but are not limited to, the construction cost, operational and maintenance considerations, safety and closure considerations. At present, option 2 (stream crossing over access road by means of an aqueduct structure) is preferred.

7.1.7 No-go option

If the project area reserves are not mined, the status quo environmental conditions within the mining right area will continue for the next few years and then the Ulco operation would potentially close due to lack of suitable raw material.

Physical and biophysical environment – Although the proposed project is expected to create significant negative environmental impacts, the proposed project, from all the specialists' opinions, is not



considered a fatal flaw to the environment should the alternatives be considered, and the mitigation measures implemented

Socio-economic –A number of positive socio-economic impacts will arise and continue as a result of the proposed project, such as skills development, local economic development and job opportunities. As per the Social and Labour Plan, the operation (at full production) employs 232 permanent staff.



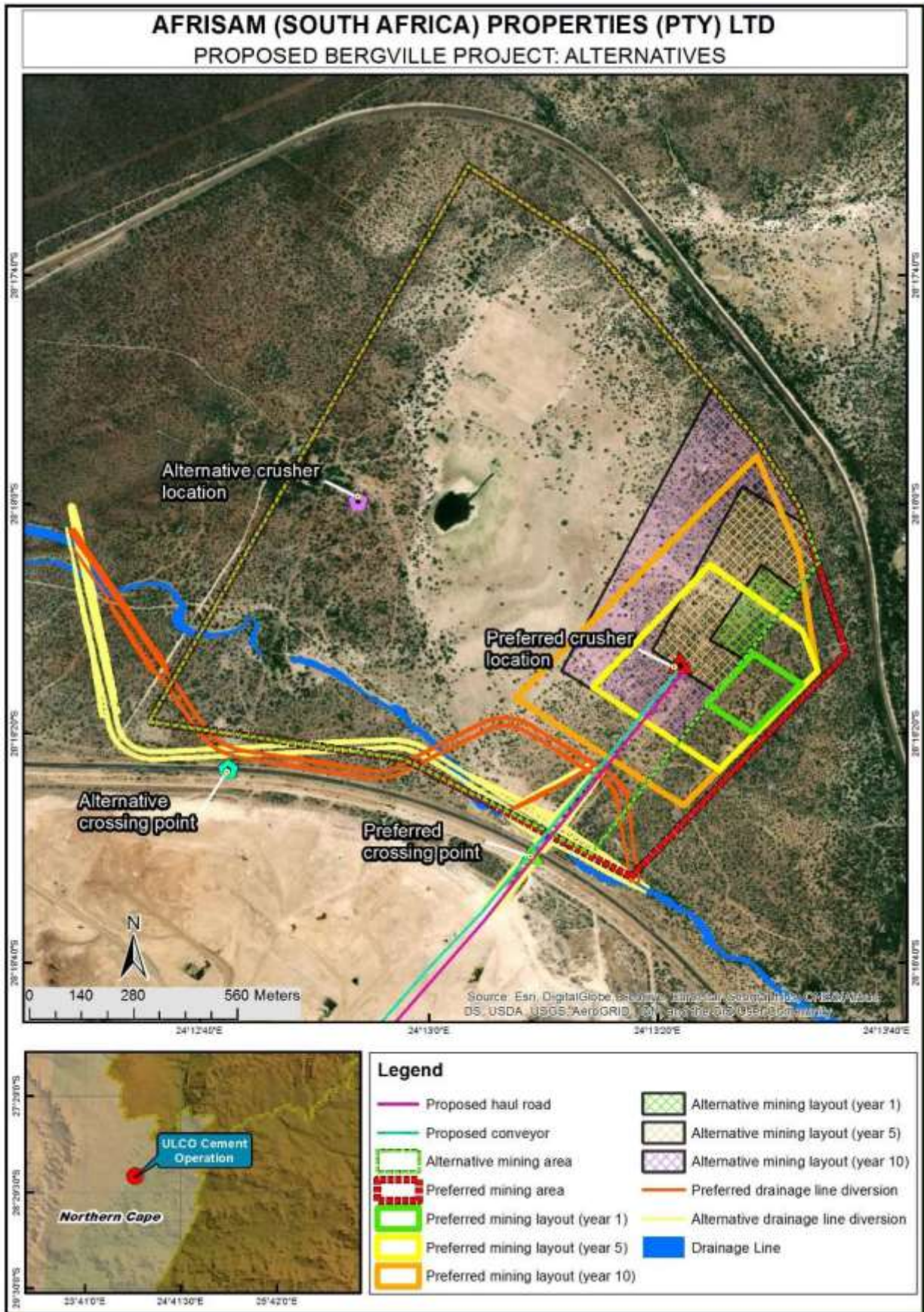


Figure 27: Alternatives identified



7.2. Details of the Public Participation Process Followed

A detailed public participation process was undertaken as part of the initial application, scoping and EIAR/EMPr phases for the proposed project. The following has been conducted as part of the Environmental Authorisation Application (proof hereof is included in the Public Participation Report submitted to the DMR along with this Draft Environmental Impact Assessment Report) (attached as Annexure E to this report):

- Advertisements.
 - A Newspaper advertisement was placed in the Noord Kaap Newspaper on the 27 of February 2019.
- Site notices.
 - Five (5) site notices were placed around the proposed project site as well as at the existing Ulco operation.
- Written notices.
 - Written notices (including BIDs) were distributed to Interested and Affected Parties (I&APs).
- Availability of Scoping Report for public review
 - The Scoping Report was made available for public and stakeholder review for a period of at least 30 days (from 01 March 2019 to 31 March 2019). Notices providing the detail of the public viewing station and review period, were sent to registered I&APs via e-mail. This notification also formed part of the above-mentioned advertisement and site notices.

7.3. Summary of Issues Raised by I&APs

Table 7 below has been completed with the comments and issues raised during the Scoping Report and prior to completion of the draft EIR. Any comments received hereafter will be included in the final EIR.



Table 7: Summary of the issues raised by the I&Aps

Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
Francois Botha	08 March 2019	<p>QUESTION ON BERGVILL PROPOSED MINING ACTIVITY'S</p> <p>From the draft scoping report (for public comment)</p> <p>1) 8.5 Impacts and risks identified Surface water/Opencast Mining</p> <p>There will be a decrease in clean water runoff reporting to the catchment and potential impact on the availability of water to downstream users.</p> <p>Deterioration of water quality is expected, affecting the use of surface water as a natural resource. You know about it what are you going to do to minimize this problem?</p> <p>2) 8.6.2 Bullet point 7 says The ecological assessment is confined to the study area and does not include the neighbouring and adjacent properties; these were however, consider as part of the desktop assessment Why not ? If no assessment is done there is no baseline to check the influence of quarry impact on the adjacent properties.</p> <p>3) 8.7 Positive and negatives implications Under Development versus no-go alternative</p> <p>Environmental: The pan will be mined through and high impact on freshwater resource How will it affect adjacent properties?</p> <p>4) Table 20 Risk assessment table Groundwater/Opencast mining</p> <p>The localised dewatering of the aquifer on cannot be prevented. Since the water table is expected to be shallow, mining will occur below the static groundwater levels. Farmers' boreholes will have to be monitor to verify whether the dewatering will impact on their boreholes' yields. If long-term monitoring does indeed indicate such, they must be compensated for the loss.</p> <p>Given the nature of the limestone/dolomitic aquifer, aquifer hydraulic properties may vary considerably. Where the aquifer and preferential flow paths (fractures) are well developed, the cone of depression may impact a large area</p> <p>When are Afrisam going to start doing the monitoring of adjacent properties borehole limits to get a base line?</p>	<p>RE: QUESTION ON BERGVILL PROPOSED MINING ACTIVITY'S</p> <p>We would like to thank you for your comments received on the 08 of March 2019 on the proposed AfriSam Ulco Bergville Project. Herewith a response to your queries/comments submitted on the draft Scoping report:</p> <p>1) 8.5 Impacts and risks identified Surface water/Opencast Mining</p> <p><i>There will be a decrease in clean water runoff reporting to the catchment and potential impact on the availability of water to downstream users. Deterioration of water quality is expected, affecting the use of surface water as a natural resource. You know about it what are you going to do to minimize this problem?</i></p> <p>The draft Scoping Report contains preliminary potential impacts that have been identified for the activities described as part of the proposed project. A detailed risk assessment will be undertaken as part of the Environmental Impact Assessment ("EIA") and Environmental Management programme ("EMPr"), in which the duration, probability, magnitude and reversibility of the impacts will be determined and the significance of the impact calculated. The EIA and EMPr will further provide for an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.</p> <p>2) 8.6.2 Bullet point 7 says <i>The ecological assessment is confined to the study area and does not include the neighbouring and adjacent properties; these were however, consider as part of the desktop assessment. Why not ? If no assessment is done there is no baseline to check the influence of quarry impact on the adjacent properties.</i></p> <p>The ecological assessment was conducted for the study area, however the impact of the proposed project on the ecology of the area (i.e. neighbouring and adjacent properties) will be included as part of the final ecological assessment in which the risks and mitigation measures for these risks will be addressed. As part of the impacts and risks identified, this will not only cover the study area but will</p>	<p>Refer to Annexure E for a copy of the correspondence and Part A Section 7.5.</p>



Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
			<p>identify and address the cumulative impacts the proposed project will have on the ecology of the area. This will form part of the EIA and EMPr.</p> <p>3) <i>8.7 Positive and negatives implications Under Development versus no-go alternative</i> <i>Environmental: The pan will be mined through and high impact on freshwater resource</i> <i>How will it affect adjacent properties?</i></p> <p>The draft Scoping Report contains preliminary potential impacts that have been identified for the activities described as part of the proposed project. A detailed risk assessment will be undertaken as part of the Environmental Impact Assessment (“EIA”) and Environmental Management programme (“EMPr”), in which the duration, probability, magnitude and reversibility of the impacts will be determined and the significance of the impact calculated. The EIA and EMPr will further provide for an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. As part of the impacts and risks identified, this will not only cover the study area but will identify and address the cumulative impacts the proposed project will have on all aspects of the environment (including freshwater resources). This will form part of the EIA and EMPr.</p> <p>4) <i>Table 20 Risk assessment table Groundwater/Opencast mining</i> <i>The localised dewatering of the aquifer on cannot be prevented. Since the water table is expected to be shallow, mining will occur below the static groundwater levels. Farmers’ boreholes will have to be monitor to verify whether the dewatering will impact on their boreholes’ yields. If long-term monitoring does indeed indicate such, they must be compensated for the loss.</i> <i>Given the nature of the limestone/dolomitic aquifer, aquifer hydraulic properties may vary considerably. Where the aquifer and preferential flow paths (fractures) are well developed, the cone of depression may impact a large area</i></p>	



Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
			<p><i>When are Afrisam going to start doing the monitoring of adjacent properties borehole limits to get a base line?</i></p> <p>AfriSam has appointed a water specialist to identify a monitoring programme for the area. This monitoring programme will be implemented prior to commencement of the project and will be made available in the EIA and EMPr.</p> <p>Should you have any queries or require additional information, please do not hesitate to contact me.</p>	
<p>W.K. Shaw</p>	<p>29 March 2019</p>	<p>Hereby WK Shaw owner of Vogelfontein farm 176 registers as interested/affected party for the Bergville project.</p> <p>As landowner adjoining the mining area I note Page 85+86 study Shangoni already identifies potential impact water (open cast mining)</p> <p>My concerns:</p> <p>A. The farm 176 has free flowing fountain, half the livestock are dependent on fountain water. The same fountain has registered irrigation water for 4 ha.</p> <p>B. The seepage of water under rail line to another vlei land area can also be affected when mining below static ground water level.</p> <p>Input:</p> <ol style="list-style-type: none"> 1. The underground water tables will have to be maintained. 2. The water users association as Dept requires will have to be motivated. 	<p>RE: APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR THE AFRISAM (SOUTH AFRICA) PROPERTIES (PTY) LTD: PROPOSED BERGVILLE PROJECT</p> <p>We would like to thank you for your comments received on the 29 of March 2019 on the proposed AfriSam Ulco Bergville Project. Herewith a response to your concerns/comments submitted on the draft Scoping Report:</p> <p>Concerns:</p> <p><i>A. The farm 176 has free flowing fountain, half the livestock are dependent on fountain water. The same fountain has registered irrigation water for 4 ha.</i></p> <p>The impacts and risks associated with the surface water resources will be assessed as part of the detailed risk assessment in the Environmental Impact Assessment (“EIA”) and Environmental Management programme (“EMPr”), in which the duration, probability, magnitude and reversibility of the impacts will be determined and the significance of the impact calculated. The EIA and EMPr will further provide for an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. Attention will be given to the impacts on the fountain specifically, as per your concern.</p> <p><i>B. The seepage of water under rail line to another vlei land area can also be affected when mining below static ground water level.</i></p> <p>As part of the EIA and EMPr the risks on the vlei area adjacent to the proposed site will be identified and should any impacts occur the necessary mitigation measures will be provided for.</p>	<p>Refer to Annexure E for a copy of the correspondence and Part A Section 7.5.</p>



Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
			<p>Input:</p> <p>1. The underground water tables will have to be maintained.</p> <p>Please refer to the response in B above.</p> <p>2. The water users association as Dept requires will have to be motivated.</p> <p>A water use licence application (“WULA”) will be submitted for all water uses as part of the proposed project. The Water User Association will also be involved during the WULA and the EIA/EMPr process.</p> <p>Should you have any queries or require additional information, please do not hesitate to contact me</p>	
<p>Mr. Livhuwani Wilson Ndou Transnet Freight Rail</p>	<p>28 March 2019</p>	<p>Dear Ms Minnette Le Roux</p> <p>NOTICE OF THE APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR THE AFRISAM (SOUTH AFRICA) PROPERTIES (PTY) LTD: PROPOSED BERGVILLE PROJECT.</p> <p>The aforesaid matter refers.</p> <p>On 28 February 2019, Transnet, SOC, Limited, received a notification from Shangani Management Services identifying the organization as a potential Interested and Affected Party (I&AP) with respect to the abovementioned activity.</p> <p>In reviewing the Notification, it was established that the proposed project will occur in close proximity to Transnet Property (railway line). Should your application for authorization be granted, please take note of the following:-</p> <p>No disturbance of any Transnet's cadastral boundaries will be allowed. In case of a disturbance of any of the boundary beacons by the activities associated with the proposed project, Transnet must be notified immediately to allow for prompt corrective action to be taken,</p> <p>Further, Transnet wishes to draw your attention to Section 48 (1) of the Minerals and Petroleum Resources Development Act, No. 28 of 2002, which stipulates as follows:-</p> <p>"48. (l) Subject to section 20 of the National Parks Act, 1976 (Act No. 57 of 1976), and subsection (2), no reconnaissance permission, prospecting right, mining right or mining permit may be issued in respect of — (a) land comprising a residential area;</p> <p>(b) any public road, railway or cemetery;</p> <p>(c) any land being used for public or government purposes or reserved in terms of any other law; or</p> <p>(d) areas identified by the Minister by notice in the Gazette in terms of section 49."</p>	<p>RE: NOTICE OF THE APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR THE AFRISAM (SOUTH AFRICA) PROPERTIES (PTY) LTD: PROPOSED BERGVILLE PROJECT</p> <p>We would like to thank you for your comments received on the 28th of March 2019 on the proposed AfriSam Ulco Bergville Project.</p> <p>The proposed project will be located outside of the Transnet Property (railway line). Furthermore, the proposed project will be located outside of the 100-meter buffer from the Transnet railway line. Although there is no intention to touch any of the boundary beacons, AfriSam takes note that should any disturbances of any of the boundary beacons by the activities associated with the proposed project take place, Transnet will be notified immediately.</p> <p>Your comments will be included and detailed in the final Scoping Report to be submitted to the Department of Mineral Resources (DMR).</p> <p>Should you have any queries or require additional information, please do not hesitate to contact me.</p>	<p>Refer to Annexure E for a copy of the correspondence and Part A Section 7.5.</p>



Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
		<p>Therefore, please note that under no circumstances will Transnet permit, grant permission or consent to any reconnaissance, prospecting or mining activities on its properties.</p> <p>With regard to the property adjacent to the railway line, your attention is drawn to Regulation 17 (6) (a) of the Mine Health and Safety Act, No, 29 of 1996 which determines that no mining operations may be carried out under or within a horizontal distance of 100 metres from buildings, roads, railways, reserves, etcetera.</p> <p>It is recommended that all issues raised herein be adequately detailed in the project's final Scoping Report (SR) to be furnished to the competent authority.</p> <p>Kindly send any feedback or queries regarding the content hereof to Mr. Livhuwani Wilson Ndou at 011 584 0553 or Livhuwani. Ndou @transnet.net or Mr Ezekiel Monyamane at 011 584 0547 or Ezekiel.Monyamane@transnet.net.</p>		
<p>Mr. V. Maharaj Transnet SOC Ltd</p>	<p>22 October 2019</p>	<p>KAMFERSDAM-HOTAZEL: NOTICE OF THE APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR THE AFRISAM PROPERTIES PTY LTD: PROPOSED BERGVILLE PROJECT.</p> <p>Your e-mail dated 28th February 2019 refers.</p> <p>Our ref: LS.BFX.25/3/49</p> <p>From a Geo-Spatial perspective, we would like to request that all TFR cadastral boundaries must be protected at all times. In case of a disturbance of any boundary beacons, this office must be notified immediately allowing for prompt corrective action to be taken.</p> <p>This office has no objection to the proposal. From the application the proposed area is adjacent to the Transnet land and we only hereby wishes to draw your attention to Section 48 (1) of the Minerals And Petroleum Resources Development Act, 2002 which stipulates as follow:</p> <p>"48. (1) Subject to section 20 of the National Parks Act, 1976 (Act No. 57 of 1976), and subsection (2), no reconnaissance permission, prospecting right, mining right or mining permit may be issued in respect of—</p> <ul style="list-style-type: none"> (a) land comprising a residential area; (b) any public road, railway and cemetery; (c) areas identified by the Minister by notice in the Gazette in terms of section 49" <p>Please note that under no circumstances will or do Transnet Limited permit, grant permission or consent to any prospecting or mining activities on its properties.</p> <p>As far as the adjacent properties to the railway line is concerned, your attention is drawn to Regulation 17 (6) (a) of the Mine Health and Safety Act, 1996 which determines that no mining operations may be carried out under or within</p>	<p>Dear Mr. V. Maharaj</p> <p>RE: KAMFERSDAM-HOTAZEL: NOTICE OF THE APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR THE AFRISAM PROPERTIES PTY LTD: PROPOSED BERGVILLE PROJECT.</p> <p>Thank you for your comments received in the letter dated 22 October 2019 with regards to the proposed AfriSam Ulco Bergville Project.</p> <p>The proposed project will be located outside of the Transnet Property (railway line). Furthermore, the proposed project will be located outside of the 100-meter buffer from the Transnet railway line. Although there is no intention to touch any of the boundary beacons, AfriSam takes note that should any disturbances of any of the boundary beacons by the activities associated with the proposed project take place, Transnet will be notified immediately.</p> <p>AfriSam is already in the possession of a Mining Right for the area and no new Mining Right application is associated with the proposed project. As mentioned above the proposed project will be located outside of the 100-meter buffer from the Transnet railway line. The track manual requirements will be adhere to. AfriSam confirms that no TFR level crossings will be used for mining purposes as part Bergville project . Dust will be mitigated by dust suppression.</p>	<p>Refer to Annexure E for a copy of the correspondence and Part A Section 7.5.</p>



Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
		<p>a horizontal distance of 100 metres from buildings, roads, railways, reserves etcetera's.</p> <p>Please also take note of Track Manual requirements within 500m of railway line, the necessary supervision from our department is required.</p> <p>Electrical:</p> <p>Requesting client, to provide written consent that NO TFR level crossings be used, and from the Environmental report received, it was not stipulated how the dust will be controlled. Please provide TFR with the abovementioned requests.</p> <p>Should you have any queries regarding this communication you are welcome to consult this office. Technically speaking, from a Civil point of view, we foresee no objections to the proposal.</p> <p>Transnet Freight Rail would however, like the opportunity to re-evaluate our position with regards to this proposal once final plans have been prepared.</p>	<p>Should you have any queries or require additional information, please do not hesitate to contact me.</p>	
<p>Karen Clark (on behalf of Minnie Zondi)</p>	<p>04 March 2019</p>	<p>Please could you kindly add me to the list of I&APs, and if you could please send me the BID when you have a moment.</p> <p>Regarding my email below, please add Minnie Zondi (copied) and not myself as originally requested. Please could you send the BID to her.</p>	<p>Good day Karen and Minnie, Kindly find attached the BID as requested. I will add Minnie as the registered I&AP. Thank you.</p>	<p>Refer to Annexure E for a copy of the correspondence and Part A Section 7.5.</p>



7.4. The Environmental Attributes Associated with the Development Footprint Alternatives. A Baseline Environment

7.4.1 The type of environment affected by the proposed activity

A baseline description or “*status quo*” of the present environmental situation is provided in this part of the document. The following attributes / aspects have been described in detail, in the following respective chapters:

- Chapter A: Geology;
- Chapter B: Climate;
- Chapter C: Topography;
- Chapter D: Soils, Land Use and Land Capability;
- Chapter E: Vegetation;
- Chapter F: Fauna;
- Chapter G: Surface water;
- Chapter H: Groundwater;
- Chapter I: Air Quality;
- Chapter J: Noise, blasting and vibration;
- Chapter K: Archaeology and cultural history;
- Chapter L: Sensitive landscapes;
- Chapter M: Visual aspects; and
- Chapter N: Regional socio-economic structure.

Section 7.4.1 provides both a summary of the baseline environment as applicable to the proposed and existing mining and related activities, informed by:

- Blasting Management and Consulting. 2019. *Blast Impact Assessment Proposed Bergville Mine Project*.
- EDL Consulting Engineers. 2019. *Proposed Expansion: Afrisam, Ulco, Northern Cape: Traffic Impact Assessment Report*.
- Fourie. H. 2019. *Palaeontological Impact Assessment: Desktop Study AfriSam (South Africa) Properties (Pty) Ltd: Ulco Cement Plant and Mining Operation: Proposed Bergville Project Dikgatlong Local Municipality, Frances Baard District Municipality, Northern Cape Province. Farm: Portion 3 (Bergville) of Hondefontein 216, Portion 2 of Vogelfontein 176, Portion of Erven 4 Delportshoop*.
- Miller. S. 2018. *1st phase H.I.A. of a study area that includes portion 3 (Bergville) of the farm Hondefontein 216, portion 2 of the farm Vogelfontein 176 and a portion of Erven 4 Delportshoop, Kimberley district Northern Cape for: AfriSam – Ulco. Northern Cape*.
- Scientific Aquatic Services CC. 2018. *Freshwater resource ecological assessment as part of the environmental assessment and authorisation process for the Ulco Afrisam mining operation, near Kimberley, Northern Cape Province*.



- Scientific Aquatic Services CC. 2019. *Freshwater resource ecological assessment as part of the environmental assessment and authorisation process for the Ulco Afrisam mining operation, near Kimberley, Northern Cape Province.*
- Scientific Terrestrial Services CC. 2019. *Terrestrial ecological habitat integrity investigation as part of the environmental authorisation process for the for the Ulco-Afrisam mining operation, near Kimberley, Northern Cape Province.*
- Shangoni Management Services (Pty) Ltd. 2019. *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Operation – Bergville Project Storm Water Management Plan.*
- Shangoni Management Services (Pty) Ltd. 2019. *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Operation – Proposed Bergville Project Air Quality Impact Assessment.*
- Shangoni Management Services (Pty) Ltd. 2019. *Geohydrological input as part of the Environmental Authorisation for the new mining area.*
- Umhlaba Environmental Consulting Cc. 2005. *Afrisam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme*

Chapter A: Geology

Existing mining operation and proposed Bergville Project

The following information was obtained from the report titled *Geohydrological input as part of the Environmental Authorisation for the new mining area*, compiled by Shangoni Management Services (Pty) Ltd in 2019.

Stratigraphically the area surrounding the study area is underlain by rocks of the Transvaal, Ventersdorp, and Karoo Supergroups which are tertiary to recent secondary deposits. Lithologically mainly carbonate rocks predominate together with surficial deposits, lavas, and sub-ordinate shales and dolerites. Dominating the western portion of the area under review is the Griqualand West Sequence of the Transvaal Supergroup which discordantly overlies the uneven paleofloor of the Ventersdorp lava. Two stratigraphic units, the Campbell Group and Vryburg Formation of the Griqualand West Sequence outcrop in the area in which AfriSam Ulco operation is located.

The Ulco Member (Ghaap Plateau of the Campbell Group) consist of fine-grained dolomite and limestone with thin layers of chert which occupies the largest area of the mining right area. To the east, dolomite is overlain by a calcrete layer of between 3 and >18 m thick. Several prominent dykes occur in the area, the most prominent being the Weltevrede dyke and the Kneukel dyke. These dykes and fault zones are important structural features from a groundwater exploration perspective. One fault has been recorded within the mining area. This fault follows the Ghaap Escarpment and intersects the quarry.



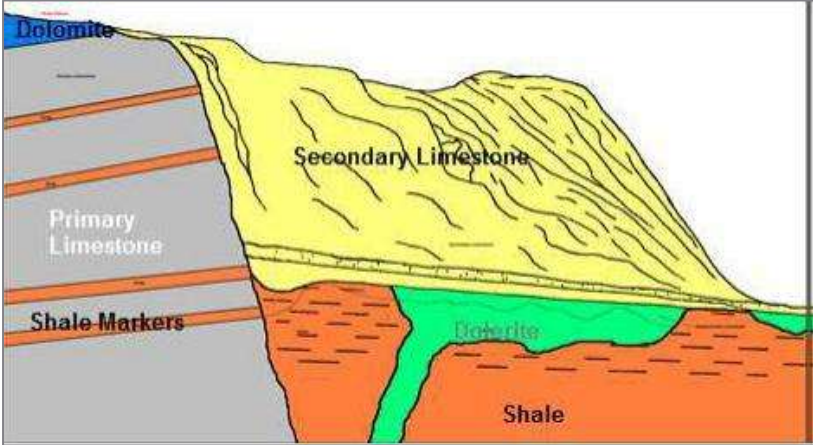


Figure 28: Simplified geological section through deposit



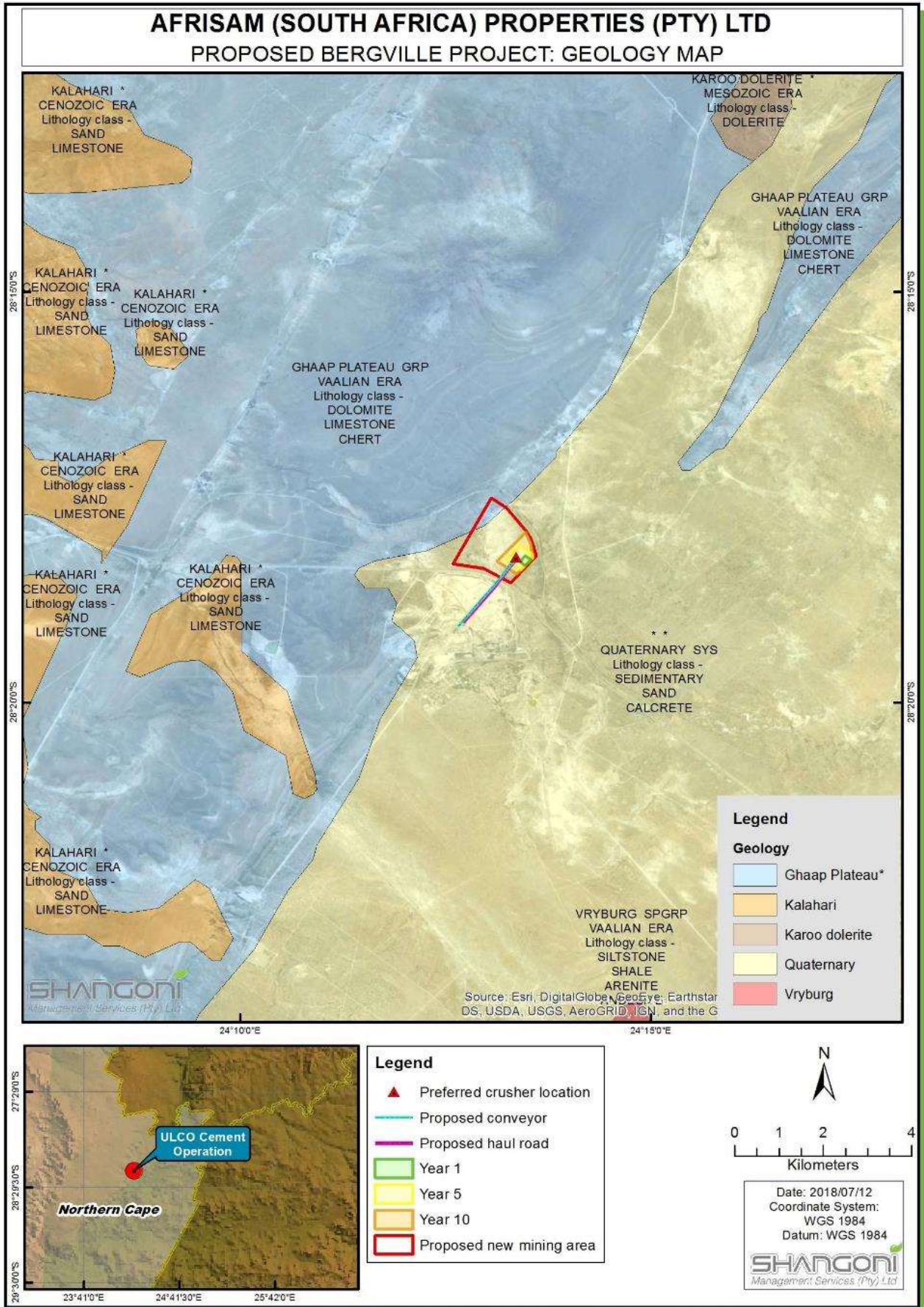


Figure 29: Geology associated with the Bergville Project

Chapter B: Climate

Existing mining operations and proposed Bergville project

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

The following climatic data presented below has been obtained from several different sources;

- The weather station at Ulco. This station has rainfall information dating back to 1940. Daily temperature and wind speed and direction has been recorded at this weather station since July 2003. Due to the short monitoring period of these parameters, additional weather information has been included to provide a comparison.
- Koopmansfontein AGR II Weather Station (Station No. 0323102 6). This is the closest weather station to Ulco, located approximately 20 km north-west of the mine. Historical data is available from 1961 to 1990. All data for this station has been obtained from BSES, 2002.
- Kimberley Weather Station. As no wind data were available from Koopmansfontein, information had been obtained from the South African Weather Services station in Kimberley. As the general topography between Ulco and Kimberley is flat, it is fair to presume that the wind data recorded at Kimberley will represent a similar pattern for Ulco. Wind field data recorded at since July 2003 has been compared with the Kimberley data.

Emphasis has been placed on presenting data that is useful to the mine when considering concurrent rehabilitation options. As the mine, has no major dams and is not intersected by any permanent streams or rivers, flooding at the mine is highly unlikely.

Regional Climate

The regional climatic conditions are representative of those of a typical Karoo climate, with a high daily maximum temperature throughout the year and a low minimum temperature at night during the winter months. The rainy period runs from November through to April with the months with the highest rain days being December through to March. As per figure below, it shows an indication of rainfall data from Ulco Weather Station. The monthly rainfall average has been generated from data collected from 1940 to 2005 (65 year period). The average number of rain-days per month is calculated using data from 1994 to 2005 (12 year period). The annual average rainfall (1940 to 2005) is 387 mm. The “rainy season” occurs from November through to April. Refer below for an indication of the rainfall patterns recorded at the Koopmansfontein Weather Station Data from this station has been gathered between 1961 and 1990. The annual average rainfall at this station is 457 mm per annum.

Both the annual average rainfall and the average number of rain-days are higher at the Koopmansfontein Weather Station. Although a similar weather pattern is obvious, Ulco receives less rain and over fewer rain-days than Koopmansfontein.



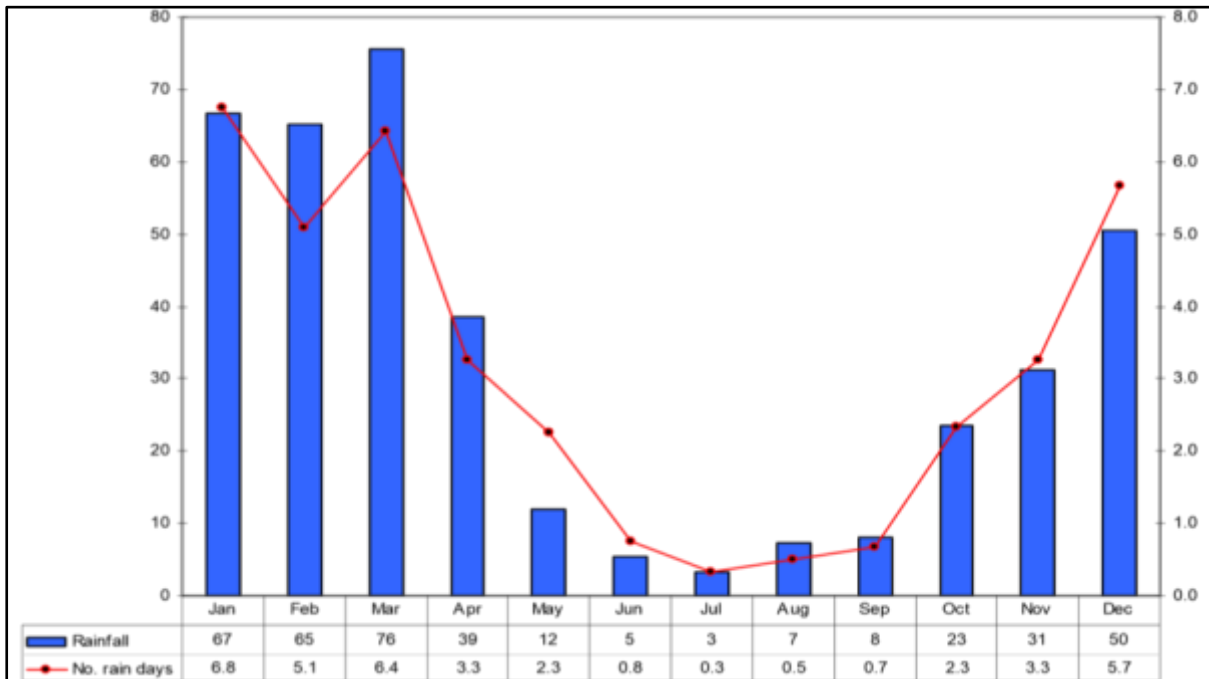


Figure 30: Rainfall data from Ulco weather Station

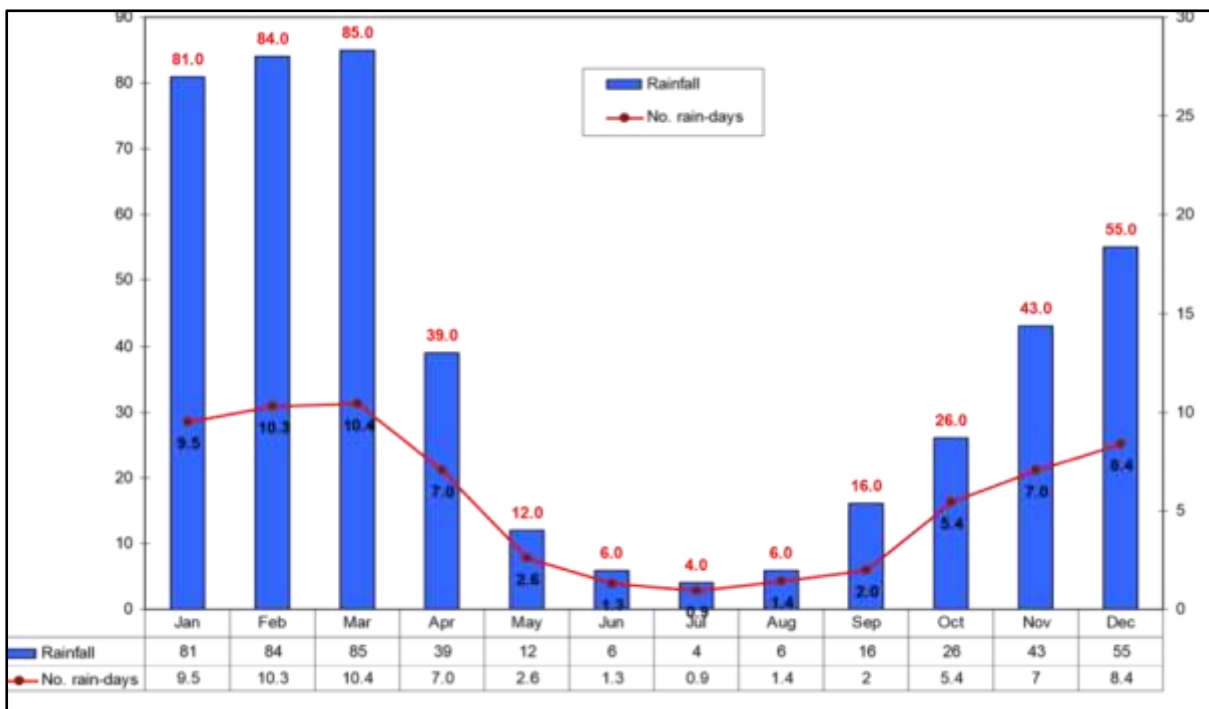


Figure 31: Rainfall data from Koopmanfontein Weather Station

Maximum Rainfall Intensities per Month

Information presented below provides the highest and lowest monthly rainfall records for Ulco, recorded between 1940 to 2004. Since the daily recording of rainfall from 1996 (when daily rainfall data was recorded), the three highest rainfall events within 24 hours include:

- January 19th 2005 – 69 mm; March 5th 1997 – 72mm; March 21st 2003 – 72mm



Table 8: Monthly rainfall records for Ulco weather station

Month	Highest monthly rainfall (mm)	Lowest monthly rainfall (mm)
Jan	263	2
Feb	320	0
Mar	332	0
Apr	162	0
May	74	0
Jun	66	0
Jul	49	0
Aug	108	0
Sep	90	0
Oct	128	0
Nov	117	0
Dec	264	0

The closest weather station, where the estimated maximum 24-hour rainfall to occur once within 100 years, 50 years and 20 years, is Kimberley.

- 1 in 100 years: 136mm; 1 in 50 years: 115mm; 1 in 20 years: 92 mm

Table 9: Monthly mean, minimum and maximum temperatures recorded at Koopmansfontein weather station

Month	Temperature (°C) - 1961 to 1990		
	Max	Min	Mean
Jan	31.6	15.7	23.7
Feb	30.0	15.1	22.6
Mar	27.9	13.1	20.5
Apr	24.5	8.8	16.7
May	21.3	3.8	12.6
Jun	18.1	0.3	9.2
Jul	18.6	-0.3	9.2
Aug	21.1	1.7	11.4
Sep	25.2	6.0	15.6
Oct	27.6	9.4	18.5
Nov	29.8	12.2	21.0



Month	Temperature (°C) - 1961 to 1990		
	Max	Min	Mean
Dec	31.4	14.2	22.8

According to Table 9, the hot summer months are between October and March and the cooler winter months between May and August.

Mean Monthly Evaporation

Monthly evaporation data has been obtained from Koopmansfontein weather station. Evaporation has been measured by the Class-A-Pan Evaporation method. The mean annual evaporation is 2 553 mm. This figure exceeds the mean annual rainfall from Koopmansfontein weather station (457 mm) by 2 096 mm; this indicates that the area is very dry.

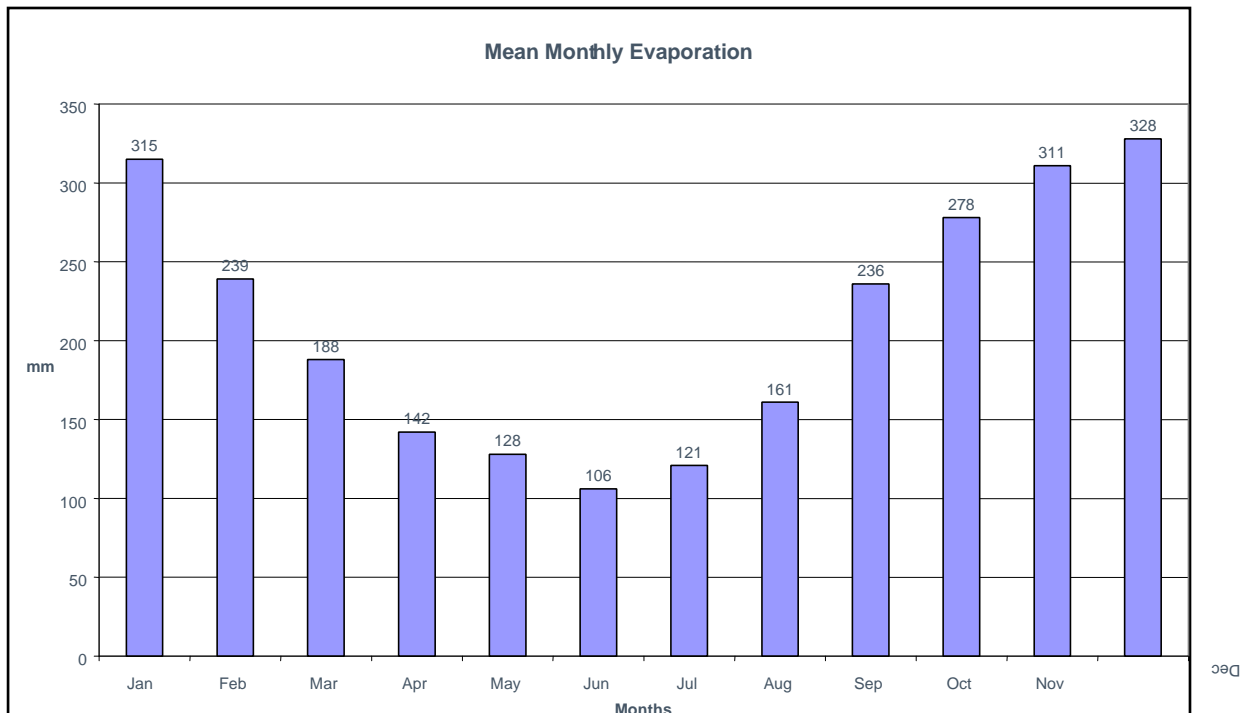


Figure 32: Mean monthly evaporation from Koopmansfontein weather station

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Cement Operation - Proposed Bergville Project Air Quality Impact Assessment*, dated 2019 compiled by Shangoni Management Services (Pty) Ltd.

Wind Field

The dispersion of pollution is largely a function of the wind speed and wind direction, in combination with surface roughness. WRPLOT View 9.5.0 was used to generate wind rose plots from the MM5 AERMET processed data. Wind rose plots graphically displays the frequency distribution of occurrence of winds in each of the defined direction sectors and wind speed classes for the specified date, year and period.



The annual wind rose plot shows the prevailing winds are from a north westerly direction, particularly north-northwesterly winds blowing towards the south-southeast. The average annual wind speed is 3.53 m/s. Wind of this speed can be described as a gentle breeze, observed by leaves and small twigs in constant motion. Calm winds are experienced 3.48% of the time. It is important to note that calm winds contribute to poor air quality scenarios, as it allows air pollutants to build up in the atmosphere (Refer to Table 10, Figure 33 and Figure 34).

During the day, wind is primarily experienced from the north and at night it is primarily experienced from a west north westerly direction. The average daily wind speeds (3.48 m/s) are only slightly lower than the average nightly wind speeds (3.58 m/s). During the day, the percentage (4.85 %) calm winds is greater than the percentage (2.14 %) calm winds experienced at night (Refer to Table 10 and Figure 34).

During summer and spring, the resultant wind direction is from a west north westerly direction and in the autumn and winter this changes to a more north westerly direction. The wind speeds in winter and spring are slightly higher than those in summer and autumn and the occurrence of calm winds is more prevalent in winter and summer (Refer to Table 10, and Figure 34).

Table 10: MM5 Wind speed and direction information.

Year	Average speed	Calm winds	Directions of resultant vector
Annual	3.53 m/s	3.48%	NW
Summer	3.30 m/s	4.27%	WNW
Spring	3.64 m/s	3.14%	WNW
Autumn	3.40 m/s	3.13%	NNW
Winter	3.77 m/s	3.38%	NNW
Day	3.48 m/s	4.85%	N
Night	3.58 m/s	2.14%	WNW

Table 11: Description of different wind speeds (SEPA, 2010).

Force	Description	Observation	m/s
0	Calm	Smoke rises vertically.	0
1	Light air	Direction of wind shown by smoke drift, but not wind vane.	0.2-1.4
2	Light breeze	Wind felt on face; leaves rustle, ordinary vane moved by wind.	1.4-3.0
3	Gentle breeze	Leaves and small twigs in constant motion.	3.0-5.3
4	Moderate breeze	Raises dust and loose paper; small branches are moved.	5.3-8.0
5	Fresh breeze	Small trees and leaves begin to sway; small branches are moved.	8.0-10.8
6	Strong breeze	Large branches in motion; umbrellas used with difficulty.	10.8-13.9



7	Near gale	Whole trees in motion; pressure felt when walking against wind.	13.9-16.9
---	-----------	---	-----------

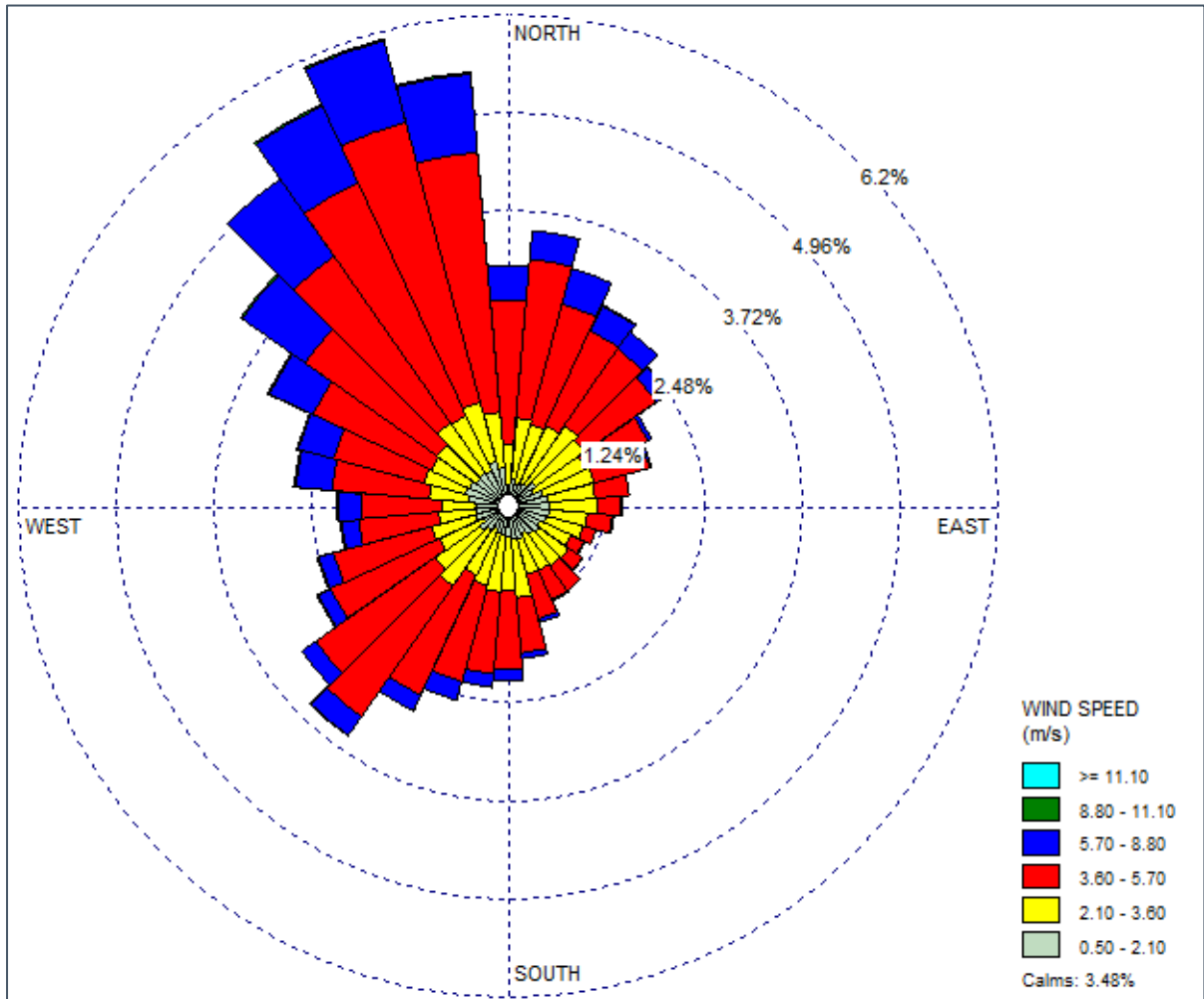


Figure 33: Annual wind rose plot.



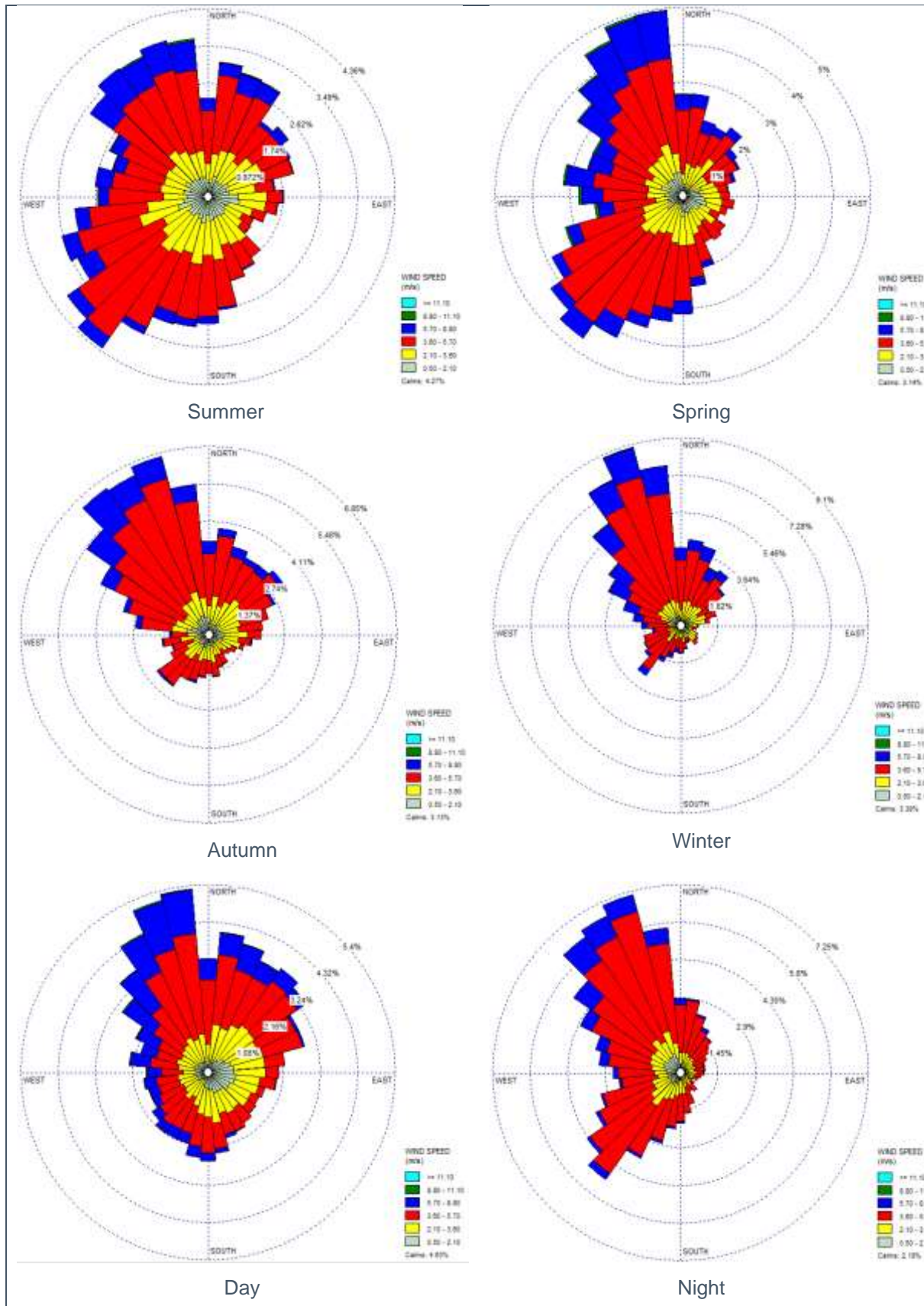


Figure 34: Seasonal and diurnal wind rose plots.



Temperature

Air temperature is an important indicator of the mixing and dissipation of air pollutants or their trapping by inversion layers.

A graph of the MM5 AERMET processed meteorological data shows a pattern in the temperature over a three-year period, from 2015 to 2017. Moderate temperatures of approximately 25 °C in the summer months (December to February) decreasing toward temperatures of approximately 11°C in the winter months (June to August) (Refer to Figure 35).

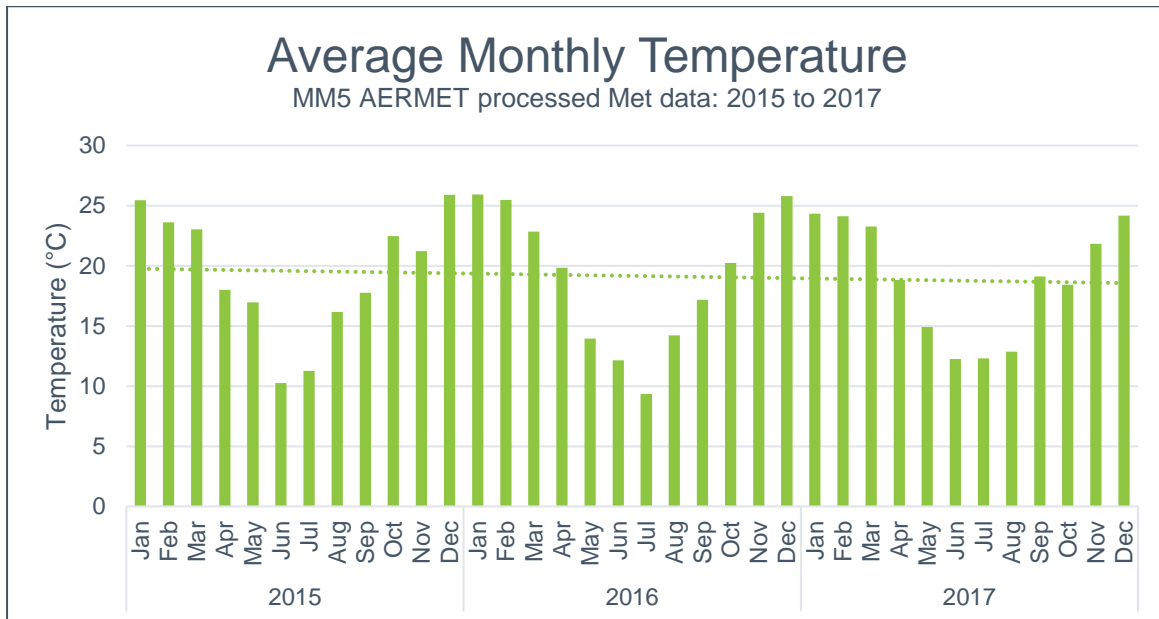


Figure 35: Depiction of annual temperature variation.

Rainfall represents an effective removal mechanism of atmospheric pollutants. A graph of the MM5 AERMET processed meteorological data shows most of the rainfall takes place during spring (September to November), summer (December to February) and the month of March. The total annual rainfall shows a decrease from 1 052.25 mm in 2015 to 816.77 mm in 2017



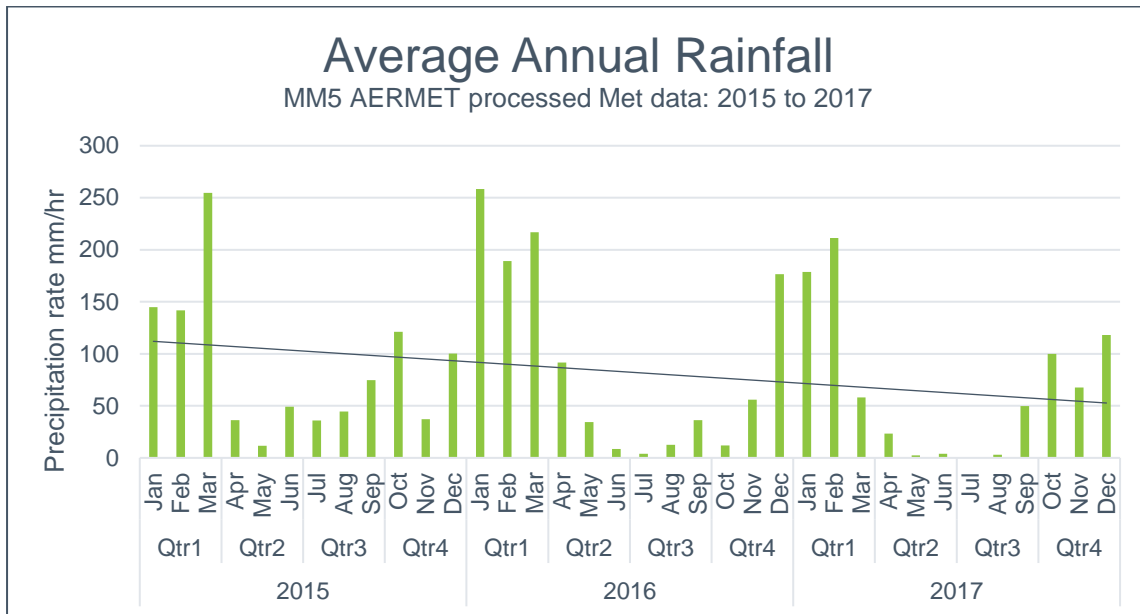


Figure 36: Depiction of annual rainfall.

Chapter C: Topography

Existing Mining operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

The area can be described as being essentially flat with two prominent base levels, one below the escarpment, which lies West of Ulco, and the Ghaap Plateau above. The edge of the scarp trends in a North-east South-westerly direction and reaches a maximum exposed height of 100 m some distance South of Ulco. At Ulco and its surroundings, the height of the scarp averages 75 to 80 m, being near vertical except where secondary limestone deposits drape over it such as the Bergville-Harrison quarry area and Gorrokok as well as North of the main tarred road traversing the area.

Beneath the escarpment, the land drops gently away from the Ulco township / factory area at a gradient of $\pm 1:110$ (i.e. 90 m over 10 km) eastwards down to the confluence of the Harts and Vaal Rivers. West of the Ghaap Plateau the land rises at an average gradient of 1:60 (122 m in 7 km) in a westerly direction. Small gently rounded hillocks of up to 15 m in height do occur on the escarpment which is incised by many intermittent streams, especially at the escarpment edge.



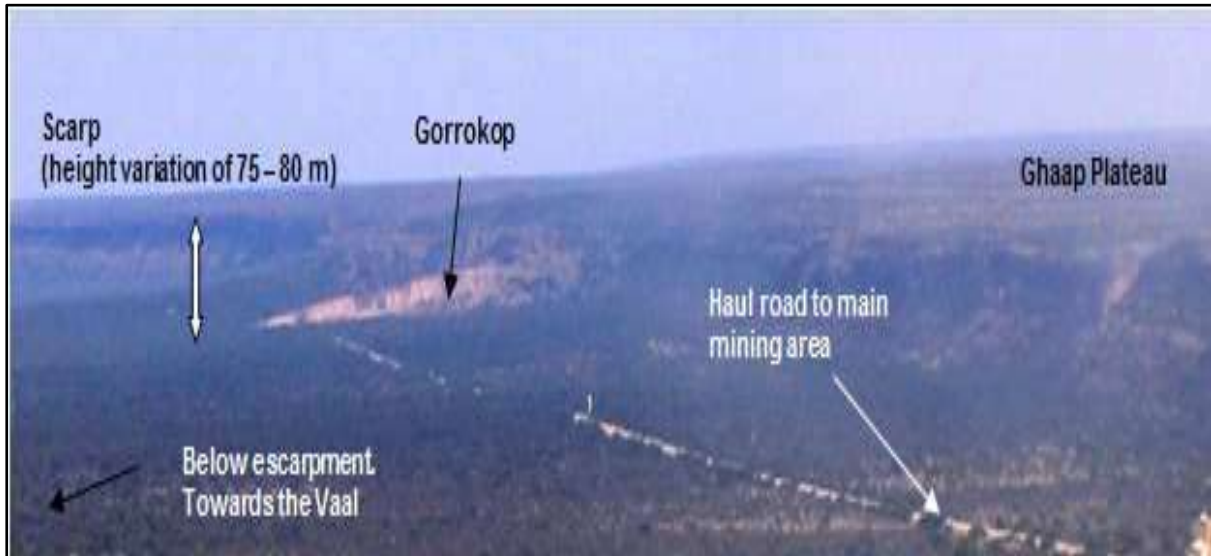


Figure 37: Natural topography of the area

Proposed Bergville Project

The following information was obtained from the report titled *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Operation – Bergville Project Draft Storm Water Management Plan.*, compiled by Shangoni Management Services (Pty) Ltd in 2019.

The area is essentially flat with two prominent base levels, one below the escarpment, which lies to the East of the proposed Bergville Project, and the Ghaap Plateau above. Beneath the escarpment, the land drops gently away from the project site area at a gradient of $\pm 1(V): 110 (H)$ eastwards down to the confluence of the Harts- and Vaal River. West of the Ghaap Plateau the land rises at an average gradient of $\pm 1(V):60(H)$. Small gently rounded hillocks of up to 15 m in height do occur on the escarpment which is incised by many intermittent streams, especially at the escarpment edge.

The natural topography of the area has been altered by the surface infrastructure associated with the mining operation. Surface water flow will be mostly towards the south-east towards the Vaal River and Harts River. Several seasonal stream beds are located near the mine. These intermittent streams only flow during the wet season and for a short period of time after heavy rainfall. Topography for the region can be viewed in Figure 38 (data visualised in mamsl).

During the freshwater study site assessment conducted as part of the environmental authorisations process (Scientific Aquatic Services, 2017), three freshwater resources were identified. A pan wetland is located within the central portion of the proposed mining area. Historically, the surrounding terrestrial area to this pan has been cultivated. More recently, these old abandoned fields and the pan were and are continued to being grazed and trampled by livestock. An ephemeral drainage line with riparian vegetation was identified within the southern portion of the proposed mining area. Located within the western portions of the drainage line is a depression wetland. The depression wetland is fed by the drainage line and water leaves the depression via the drainage line; this system is thus exoreic and considered linked to the adjacent drainage of the area. This drainage line has been affected by historic



farming activities and it is considered that this drainage line has been disturbed from its original natural state probably during the construction of the R31 before the 1980's.

It is anticipated that this drainage line will contribute a significant amount of surface water runoff to the proposed mining area during heavy rainfall events. The origin of this drainage line was determined to be located approximately 13 km to the west of the proposed mining area. The drainage line is fed by several smaller drainage lines and the water will flow in a south easterly direction towards the proposed Bergville Project. The natural flow path of this drainage line is influenced by various surface infrastructure, most notably, a small dirt road, the R31 and the railway line. Several culverts were also identified through which the water will pass. The largest of these culverts is associated with the railway and located west of the proposed mining area. The project site is located on a small, plateau that drops down away to the north, east and south south-east of the proposed mining right boundary. The topography associated with the project site is flat.



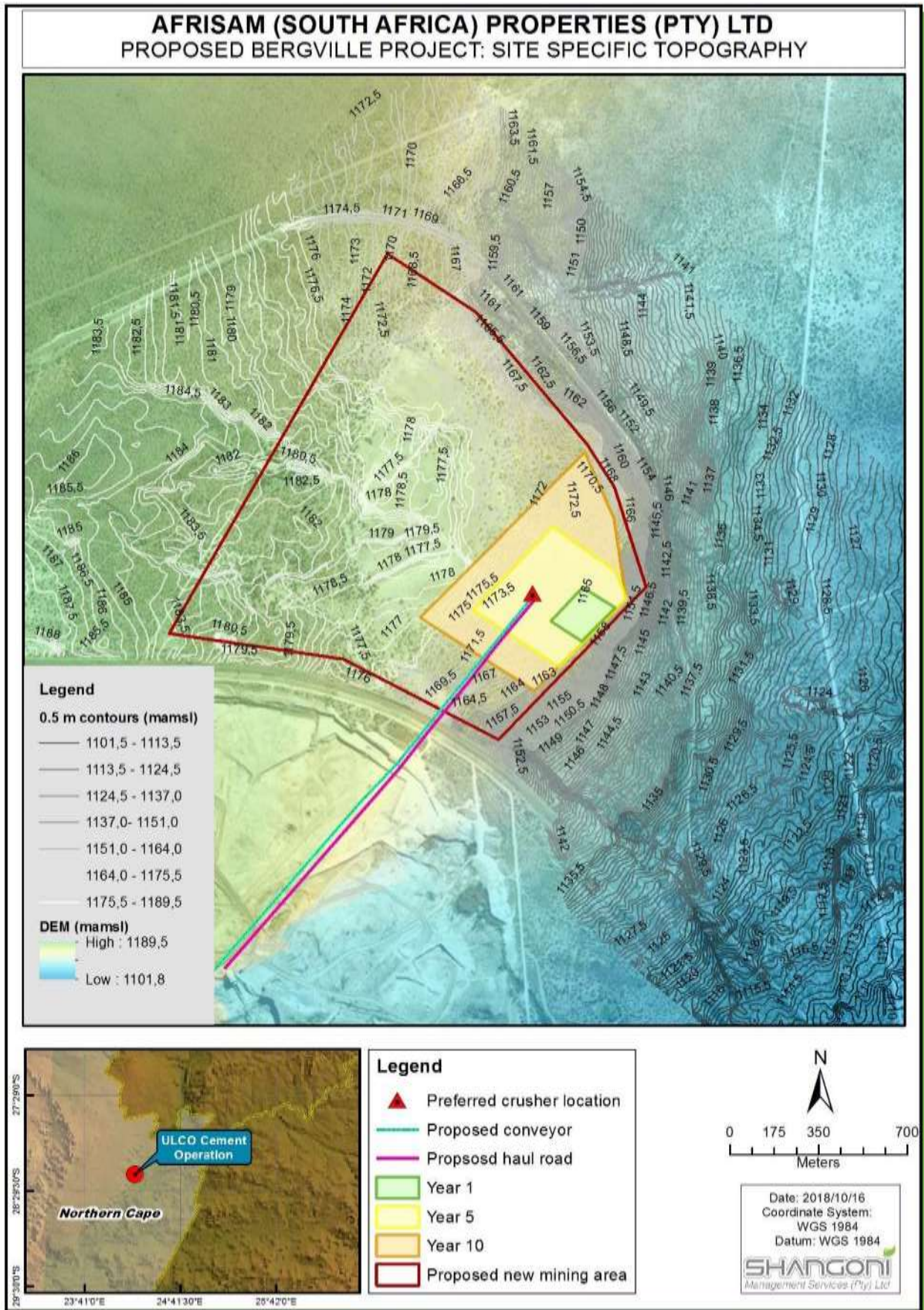


Figure 38: Topography associated with the Bergville Project

Chapter D: Soils, land use and land capability

Existing Mining Operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

Nowhere on the site or in the surrounding land is there an abundance of soil. The soil depth over the area varies from 0 cm to a maximum of 30 cm. Over the area of interest, pockets of wind-blown sand, sometimes with a limited amount of plant material, constitute the only soil. According to the regional soil map, the whole area falls under the soil type of Fc. Soils designated as Fc are described as “*lime generally present in the entire landscape*”.

Over the secondary limestone, the soil is often limited in occurrence to depressions caused by karst features. Soils forming over this area are from the Etosha Form and the Ulco family.

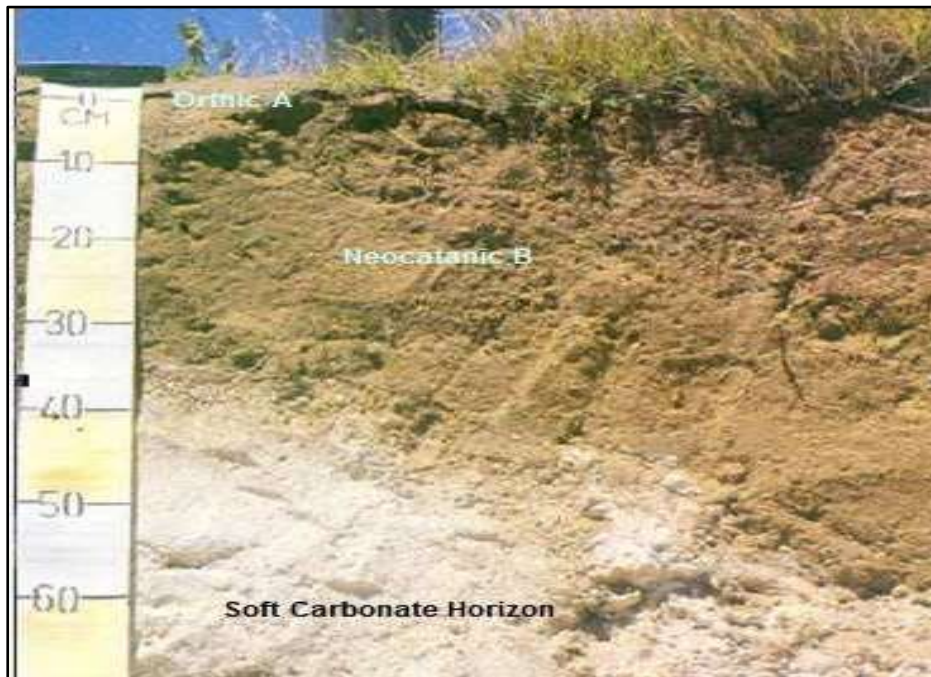


Figure 39: Etosha soil form

Over the primary limestone and dolomites comprising of the Ghaap Plateau and escarpment edge, where soil exists, the soils are mainly derived from Kalahari sands containing some humus. These soils are of Gamoep form and Ghaap family.





Figure 40: Gamoep soil form

The definitions of Orthic A, Neocutanic B and Soft Carbonate horizon are shown below.

The following definitions of the different soil layers has been extrapolated from the “Soil Classification – A taxonomic system for South Africa” 1991. By the soil classification working group.

Orthic A horizon:

A surface horizon that does not qualify as an organic, humic, melanic or vertic topsoil although it may have been darkened by organic matter.

Neocutanic B horizon:

Neocutanic character is recognized when soil formation in unconsolidated materials has not progressed sufficiently far to produce one or another distinctive diagnostic horizon but has brought about a certain amount of reorganization of the material (most frequently there is evidence of an incipient alluvial horizon), and obliterated any depositional stratifications that may originally have been present. Soil formation has been minimal and the horizon is marked by rather weak structural development, the presence of cutans indicating pedogenic reorganization of materials such as clay, aggregation of particles to the extent that the material is no longer single grained (presumably its condition at the time of deposition), or cementation by weathering products and the development of hardness or massiveness.

Soft carbonate horizon:

- Has a morphology which is largely that of the calcium and/or calcium-magnesium carbonates present, whether in powder (here the colour of the carbonates dominates the colour of any non-carbonates present), nodular, honeycomb, or boulder form;



- Unless exposed by erosion, occurs beneath a melanic or orthic A, a red apedal B, a yellow-brown appeal B, a neocutanic B or a neocarbonate B horizon;
- Does not qualify as a diagnostic neocarbonate B horizon, as diagnostic dorbank or as a diagnostic hardpan carbonate horizon.



Figure 41: Soil moved ahead of mining work face

A soil sample was taken of the soil removed ahead of the mining face of the secondary limestone quarry (refer to Figure 41). This sample was analysed by the Agricultural Research Council; the results of this analysis are presented below in Table 12.

Table 12: Soil analysis of the material removed ahead of the mining work face

Elements	
Sample number	S1
P mg/kg	0.61
K mg/kg	120
K me/100g	0.3069
Ca mg/kg	4407
Ca me/100g	21.99
Mg mg/kg	188
Mg me/100g	1.5473
Na mg/kg	51
Na me/100g	0.2218
R ohm	1600
Water pH	8.09



The results of the analysis indicate that the natural soil is very low in phosphorus, low in potassium and sodium, high in magnesium and very high in calcium. The water pH of the soil is alkaline. A copy of the results and the recommendation for improving the soil condition for the planting of grass is available at Ulco. It must be highlighted that natural soil of the area, which influence the vegetation type present on the soil, is of poor agricultural quality. Any attempts to alter the chemical and physical properties of the natural soil will encourage vegetation growth which is not endemic to the area.

Based on the analysis results, the report recommends treatment of any soil to be used in rehabilitation.

Proposed Bergville Project

The following information was obtained from the report titled *Geohydrological input as part of the Environmental Authorisation for the new mining area*, compiled by Shangoni Management Services (Pty) Ltd in 2019.

Surface limestone of Tertiary to Recent age, and dolomite and chert of the Campbell Group (Griqualand West Supergroup, Vaalian Erathem) support shallow soils (0.1–0.25 m) of Mispah and Hutton soil forms. The soil depth varies from 0cm to a maximum of 30cm. Over the area of interest, pockets of windblown sand, sometimes with a limited amount of plant material, constitute the only soil. According to the regional soil map the area falls under the soil type described “lime generally present in the entire landscape”. Over the secondary limestone, the soil is often limited in occurrence to depressions caused by karst features. Soils forming over this area are from the Etosha Form and the AfriSam Ulco family. These soils comprise an Orthic A horizon, overlying a Neocutanic B horizon, and soft Carbonate C horizon (Soil Classification Working Group, 1991). Where soil exists over the primary limestone and dolomites comprising the Ghaap Plateau and escarpment edge, the soils are of the Gamoep Form and the Ghaap family. These soils comprise an Orthic A horizon, overlying a Neocutanic B and Hardpan Carbonate C horizon (Soil Classification Working Group, 1991).

The land use within a 10 km radius of the proposed Bergville Project is largely dominated by natural areas (Ghaap Plateau bioregion and the greater Savanna Biome) and the Ulco’s existing cement operation with livestock grazing observed on the western boundary of the proposed site.

Since the start of mining in the area in 1936, the predominant use of the surrounding land (6 km radius) remains as grazing (\pm 85%) with the Ghaap plateau been demarcated as a wilderness area, which accounts for approximately 15% of the surrounding land.





Figure 42: Soil Classes associated with the Bergville Project

Chapter E: Vegetation

Existing Mining Operations

The information contained in the baseline environment for this section was informed by the AfriSam (South Africa) (Pty) Ltd - *Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

A detailed survey of the mine was conducted by the Botany Department of the McGregor Museum in August 2000 that identified 162 plant species at Ulco. A copy of this report is available at the mine. In February 2006, a flora specialist was commissioned to identify the protected plant species and the alien vegetation at Ulco. A copy of the 2006 report is available at the mine.

The following extracts have been taken from both the reports. For a complete understanding of the vegetation on the site and within the surrounding area, the reports must be read.

Dominant Species

Ulco lies on the boundary (transitional zone) between the Kimberley Thorn Bushveld (from the Ghaap escarpment Eastwards) and the Kalahari Plateau Bushveld (Ghaap escarpment and plateau). The Kalahari Plateau Bushveld covers 233 909 km², and is not represented in any conservation area. The Kimberley Thorn Bushveld, of which 3.1% is conserved covers 271 026 km². The summer rainfall for these vegetation types varies from 250 – 550 mm per annum, with Ulco experiencing an annual average rainfall of 385 mm. The Ghaap plateau and escarpment is physiographically and geomorphologically distinct from the plains, therefore flora composition of these areas is distinct.

Kalahari Plateau Bushveld

The vegetation of the Kalahari Plateau Bushveld of the Ghaap plateau grows on calcareous tufa, dark brown to red sands and acid gravels, underlain by dolomite. Calcareous pans or shallow depressions support plant species especially adapted to survive in pan habitats, a number of which are range restricted endemics such as *Ruschia lawsonii*.

The vegetation is composed of a fairly dense bushveld consisting of shrubs with some tall trees and tree clumps, in mixed grassland. The dominant shrubs are *Tarchonanthus camphorates* (Camphor Bush), *Grewia flava* (Raisin Bush), *Ehretia rigida* (Puzzle Bush) and *Gymnosporia buxifolia*. Common trees often growing together in thickets include *Rhus lancea* (Karee), *Ziziphus mucronata* (Buffalo Thorn) and *Olea europaea ssp. Africana* (Wild Olive). These thickets often include shrubs such as *Acacia mellifera ssp. Detinens* (Black Thorn), *Rhus ciliate* (Fringed Karee) and *Asparagus retrofractus*. Scattered trees of *Acacia tortilis* (Umbrella Thorn), *Boscia albitrunca* (Shephard's Tree) are found, with pure stands of *O. europaea ssp. Africana* (Wild Olive) occurring in places. Karoo dwarf shrubs are present. Mostly tall grasses predominate, such as *Themeda triandra* (Red Grass), *Aristida diffusa* (Copperwire Grass) and *Stipagrostis uniplumis* (Silky Bushman Grass).



Kalahari Plateau Bushveld to Kimberley Thorn Bushveld transition

Along the escarpment there is a transition from the Kalahari Plateau Bushveld of the Ghaap plateau to Kimberley Thorn Bushveld, with elements of both vegetation types present. The dominant trees and shrubs are *Acacia tortilis* (Umbrella Thorn), *Acacia mellifera ssp. detinens* (Black Thorn) and *Rhus burchelli* (Kuni Bush). The kloofs are composed of dense woodlands, with characteristic plant species associated with sheltered habitats. These include certain lichens and mosses, a number of herbs, and large shrubs and trees such as *Celtis Africana* (White Stinkwood), *Buddleja saligna* (False Olive), *Ficus cordata* (Namaqua Fig), *Plumbago zeylanica*, and *Melianthus comosus*. Dominant grasses are *Cenchrus ciliaris* (Blue Buffalo Grass), *Heteropogon contortus* (Spear Grass) and *Setaria verticillata* (Bur Bristle Grass).

Kimberley Thorn Bushveld

The vegetation of the Kimberley Thorn Bushveld of the plains is found on sandy to loamy sands underlain by calcrete. It is an open savannah to closed woodland dominated by *Acacia tortilis* (Umbrella Thorn), with *Acacia erioloba* (Camel Thorn Trees) occurring on deep red sands, and scattered individuals of *Boscia albitrunca* (Shepherd's Tree) and *Acacia karoo* (Sweet Thorn). Shrubs include *Acacia mellifera ssp. detinens* that forms dense stands in places, as well as *Grewia flava* (Raisin Bush) and *Lycium hirsutum* (Wolwedoring).

Common grasses of the fairly well developed grass layer are *Enneapogon cenchroides* (Nine-awn Grass), *Themeda triandra* (Red Grass), *Eragrostis sp.* (Love grasses) and *Cymbopogon plurinodis* (Turpentine Grass). Dwarf shrubs are common on the dolerite hills.

Endangered or Rare Species

The botanical survey completed in February 2006 concentrated on identifying sensitive species. The following information concerning the various areas surveyed has been extracted from the survey.

S1 - Gorrokop

Populations of three protected species were recorded at Gorrokop, on the escarpment above the quarry.

- Vleilelie, *Nerine laticoma* (family Amaryllidaceae) - S 28°22'24.1", E 24 °09'51.7"
- Gifbol, *Ammocharis coranica* (Amaryllidaceae) – S 28 °22'19.9", E 24 °09'46.5"
- Shepherd's tree *Boscia albitrunca* grow scattered along the escarpment and in the kloofs, and some individuals occur in the mapped sensitive habitat S1.
- The endemic *Rhus tridactyla* (endemic to the Ghaap plateau, Asbestos Hills and Langeberg mountain areas) grows on the top of the escarpment and individuals occur in S1.

S2 - Grootkloof

The Ghaap plateau escarpment kloofs and watercourses are sensitive habitats, as they comprise a small component of the escarpment and support species, such as White Stinkwood *Celtis africana*, mostly confined to these habitats in this region. These habitats form less than 10% of the transitional



zone (escarpment) between Kalahari Plateau Bushveld and Kimberley Thorn Bushveld. At a broader scale, if the kloofs are included as habitats of the Kalahari Plateau Bushveld or the Kimberley Thorn Bushveld, they only comprise approximately 0.05% of these vegetation types. These kloofs, with moderated climates, could provide a refuge for plant species during climate changes. Such refugia buffer regions against loss of species and act as isolating mechanisms, promoting the evolution of new species. Therefore, from an ecological perspective it is important to continue conserving the Grootkloof area, and it can form part of an offset area to compensate for habitat loss due to mining at Ulco.

Populations of the following species of conservation importance are present:

- *Adenia repanda* (Red data listed) - S 28°20'57.7", E 24 °10'51.8".
- *Boscia albitrunca* (scattered individuals).
- *Rhus tridactyla* (endemic) grows on the top of the escarpment.

S2 - Airfield

A small population of *Nerine laticoma* (vleilelie) was recorded on the northern side of the runway. This area needs to be protected from mowing or clearing to protect the species.

S4 – Water pipeline servitude

Approximately 3 km along the servitude a population of *Nerine laticoma* (vleilelie) grows between the fence and the water pipeline. A few *Aloe grandidentata* were recorded near this area. Other scarce species such as *Bulbine frutescens* also grow at intervals next to the pipeline. The servitude, running along a topographic gradient from the higher plains below the Ghaap escarpment to the Vaal River at the pump station, forms a reserve for sensitive plant species that may be lost due to overgrazing and habitat loss on either side of the servitude.

Veld next to church in village east

This patch of veld is in a good condition and supports a few protected species, namely:

- *Boscia albitrunca* (a few scattered individuals).
- A few individuals of *Sarcostemma viminale* (melktou).
- *Aloe grandidentata* – S 28 °19'35.9", E 24 °13'03.5". This aloe is also found in the open central areas of circles 2 and 4 in village east, as well as on the golf course. When the invaders such as *Opuntia* spp. are cleared in these areas, the teams must be made aware that these aloes are not to be removed or cleared and are not invaders.

Veld to north-east of village petrol station

A small population of *Aloe hereroensis* is present in this portion of natural veld, at S 28 °19'32.2", E 24 °12'49.2". If this area needs to be developed, these aloes can be relocated to other areas with identical habitat and soils.

Fortunately, none of the above areas are within the area demarcated for future mining.



To avoid or minimise the loss of biodiversity, it is recommended that sensitive habitats containing species of conservation importance are adequately protected and not impacted upon. However, if there is no alternative but to relocate or destroy the listed species, permits are necessary.

Invader or Exotic Species

Twenty three (23) invasive plant species were recorded at during the survey of which the dominant invaders include *Prosopis glandulosa* (Mesquite), *Salsola Kali* (Russian Tumble Weed), *Nicotiana glauca* (Wild Tobacco), *Pennisetum setaceum* (Fountain Grass), *Eucalyptus camaldulensis* (Red River Gum) and *Schinus molle* (Pepper Tree).

Proposed Bergville Project

The conservation characteristics and vegetation of the study area was identified by Scientific Terrestrial Services CC in the report titled: *Terrestrial ecological habitat integrity investigation as part of the environmental authorisation process for the Ulco AfriSam mining operation, near Kimberley, Northern Cape Province*, dated 2019.

The Ulco operation falls on the boundary (transitional zone) between the Kimberley Thorn Bushveld (from the Ghaap escarpment Eastwards) and the Kalahari Plateau Bushveld (Ghaap escarpment and plateau). The Ghaap plateau and escarpment is physiographically and geomorphologically distinct from the plains, therefore, flora composition of these areas is distinct.

The vegetation of the Kalahari Plateau Bushveld of the Ghaap plateau grows on calcareous tufa, dark brown to red sands and acid gravels, underlain by dolomite. Calcareous pans or shallow depressions support plant species especially adapted to survive in pan habitats, a number of which are range-restricted endemics such as *Ruschia lawsonii*. The vegetation is composed of a relatively dense bushveld consisting of shrubs with some tall trees and tree clumps, in mixed grassland.

Along the escarpment there is a transition from the Kalahari Plateau Bushveld of the Ghaap plateau to Kimberley Thorn Bushveld, with elements of both vegetation types present. The kloofs are composed of dense woodlands, with characteristic plant species associated with sheltered habitats. These include certain lichens and mosses, a number of herbs, and large shrubs and trees.

The vegetation of the Kimberley Thorn Bushveld of the plains is found on sandy to loamy sands underlain by calcrete. It is an open savannah to closed woodland dominated by *Acacia tortilis* (Umbrella Thorn), with *Acacia erioloba* (Camel Thorn Trees) occurring on deep red sands, and scattered individuals of *Boscia albitrunca* (Shepherd's Tree) and *Acacia karroo* (Sweet Thorn). Dwarf shrubs are common on the dolerite hills.

Most of the vegetation in the area surrounding the Ulco operation has been extensively disturbed as a result of agricultural and mining practices historically. As a result, no rare or endangered flora species are anticipated to occur within the immediate vicinity of the Ulco operation.

Invasive plant species have recently been recorded in the vicinity of the Ulco operation (Umhlaba Environmental Consulting, 2004), including Mesquite (*Prosopis glandulosa*), Russian Tumble Weed



(*Salsola Kali*), Wild Tobacco (*Nicotiana glauca*), Fountain Grass (*Pennisetum setaceum*), Red River Gum (*Eucalyptus camaldulensis*) and Pepper Tree (*Schinus molle*).

The following table contains a summary of the conservation characteristics of the study area.

Table 13: Summary of the conservation characteristics for the study area.

Conservation characteristics for the study area	
Details of the study area in terms of Mucina & Rutherford (2006)	
Biome	The study area is situated within the Savanna Biome
Bioregion	The study area is located within the Eastern Kalahari Bushveld Bioregion
Vegetation Type	The study area is situated within the Ghaap Plateau Vaalbosveld
Conservation details pertaining to the study area (Various databases)	
NBA (2011)	The study area falls within an area that is currently not protected
National Threatened Ecosystems (2011)	The study area falls within an area that is least threatened.
NPAES (2009), SACAD (2017) and SAPAD (2017)	The study area is not located within or near any protected or conservation areas (within a 10 km radius)
IBA (2015)	Not located within or near an IBA (within 10 km)
Mining and Biodiversity Guidelines (2013)	
According to the Mining and Biodiversity guidelines, the study area is not ranked as a priority area, however, it is situated approximately 650 m south of an area considered to be of Highest Biodiversity Importance.	
Northern Cape Critical Biodiversity Areas (2016) (Figure 43)	
Ecological Support Area	The outer portion of the study area falls within an area considered to be an ESA. According to the Technical Guidelines for CBA Maps document ESAs are areas which must retain their ecological processes in order to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas; meet biodiversity targets for representation of ecosystem types or Species of special concern when it's not possible to meet them in CBAs; support ecological functioning of protected areas or CBAs or a combination of these (SANBI, 2017)
Other Natural Areas	The central portion of the study area falls within an area considered to be other natural areas. According to the Technical Guidelines for CBA Maps document ONA consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017).
Northern Cape Provincial Spatial Development Framework (NPSDF, 2012)	
The study area is not situated within a Centre of Endemism nor an important corridor.	
Description of the vegetation type(s) relevant to the study area (Mucina & Rutherford 2006)	
Vegetation Type	Ghaap Plateau Vaalbosveld
Climate	Summer and autumn rainfall with very dry winters



Conservation characteristics for the study area	
Altitude (m)	1100–1500
MAP* (mm)	400
MAT* (°C)	17.1
MFD* (Days)	40
MAPE* (mm)	2700
MASMS* (%)	83
Distribution	Northern Cape and North-West Provinces
Geology & Soils	Surface limestone of Tertiary to Recent age, and dolomite and chert of the Campbell Group (Griqualand West Supergroup, Vaalian Erathem) support shallow soils (0.1–0.25 m) of Mispah and Hutton soil forms
Conservation	Least threatened. Target 16%. None conserved in statutory conservation areas
Vegetation & landscape features	Flat plateau with well-developed shrub layer with <i>Tarchonanthus camphoratus</i> and <i>Vachellia karroo</i> . Open tree layer has <i>Olea europaea</i> subsp. <i>africana</i> , <i>A. tortilis</i> , <i>Ziziphus mucronata</i> and <i>Rhus lancea</i> . <i>Olea</i> is more important in the southern parts of the unit, while <i>A. tortilis</i> , <i>A. hebeclada</i> and <i>A. mellifera</i> are more important in the north and part of the west of the unit. Much of the south-central part of this unit has remarkably low cover of <i>Acacia</i> species for an arid savanna and is dominated by the nonthorny <i>T. camphoratus</i> , <i>R. lancea</i> and <i>O. europaea</i> subsp. <i>africana</i>

NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SAPAD = South African Protected Areas Database; IBA = Important Bird Area; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply), (d) = dominant species; (k) Kalahari endemic



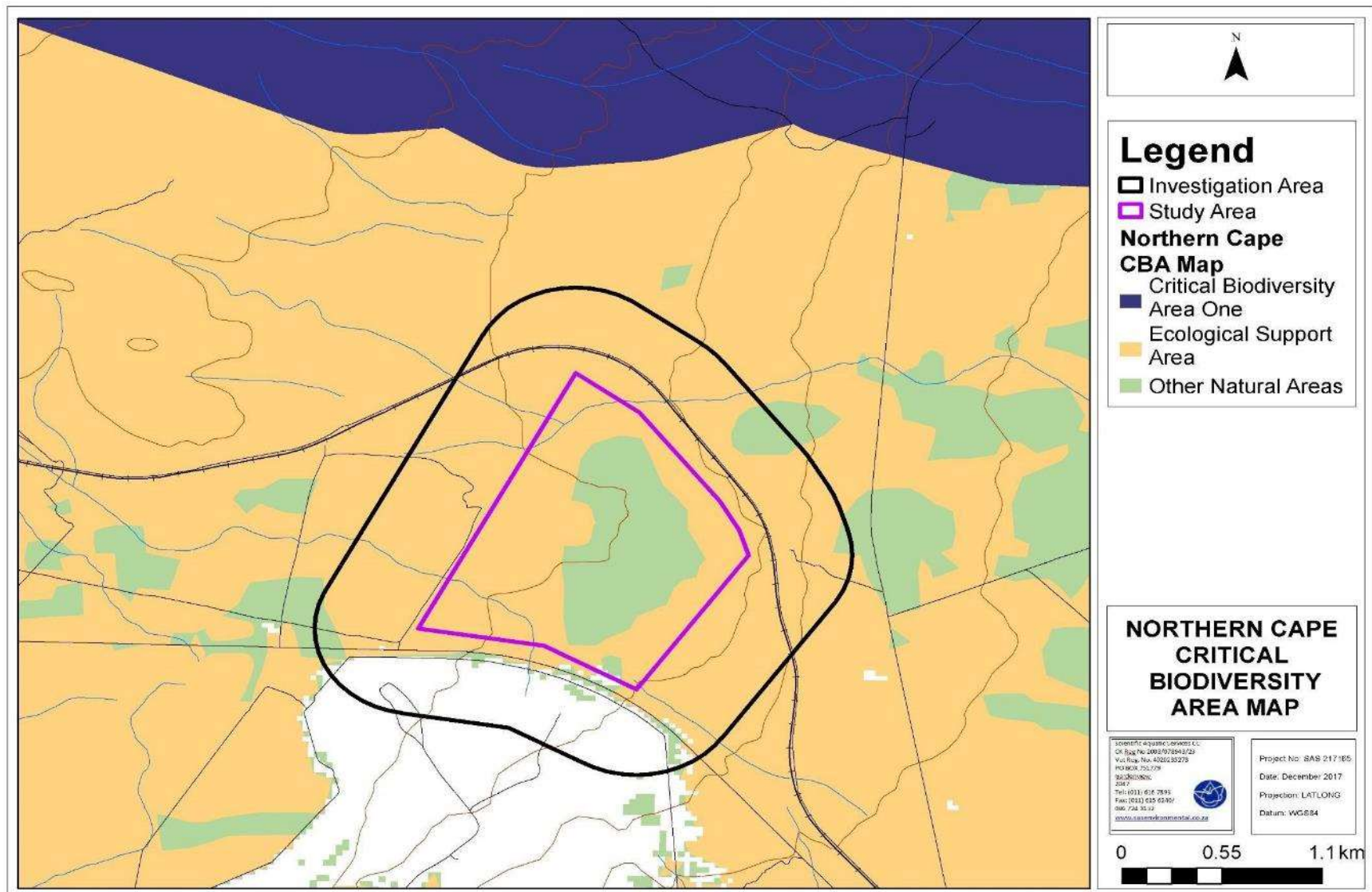


Figure 43: The study area falling within an Ecological Support Area (Northern Cape CBA Map, 2016)



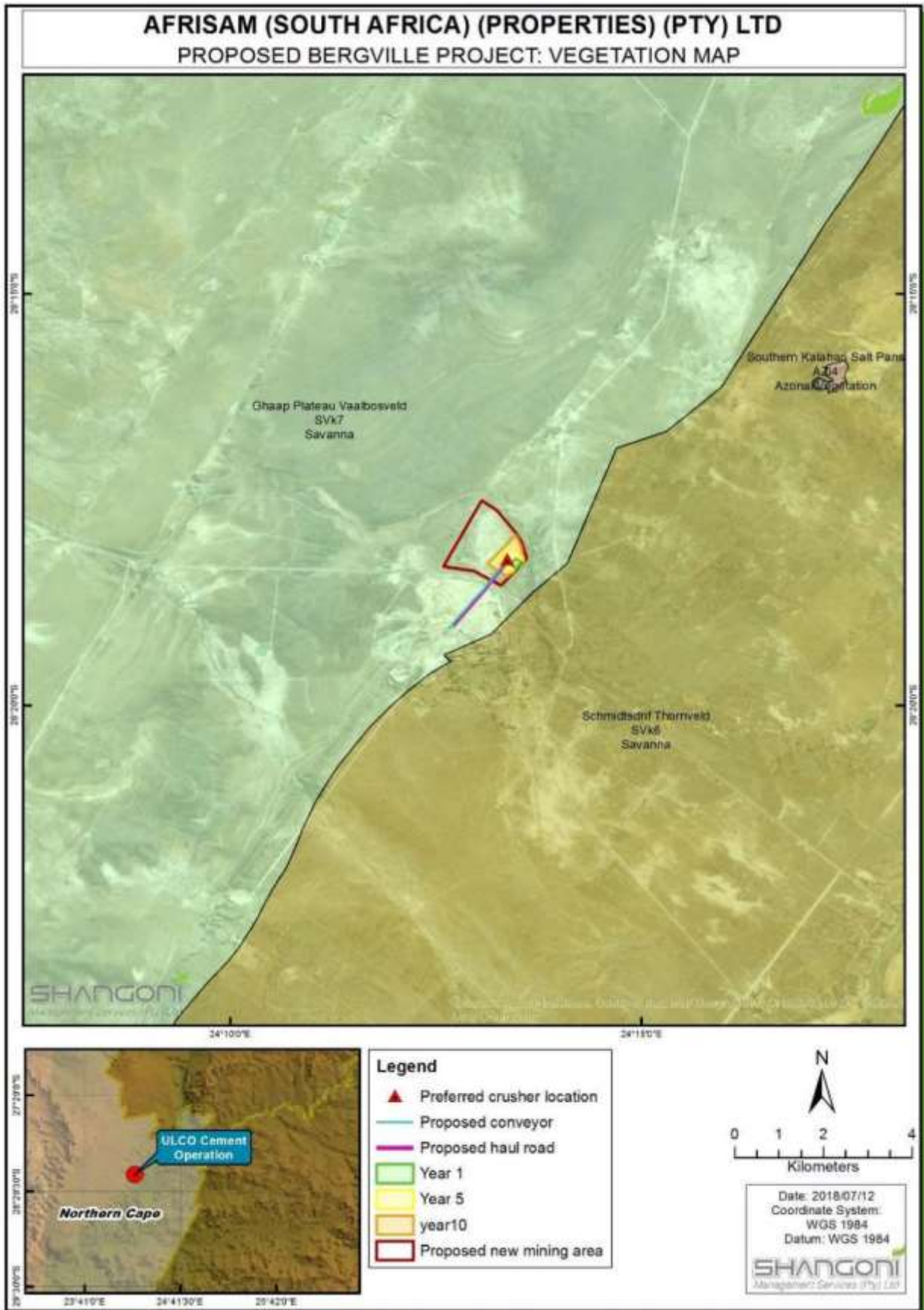


Figure 44: Vegetation associated with the Bergville Project



Chapter F: Fauna

Existing Mining Operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

In the ravines on the edge of the escarpment, extending to the actual active quarry areas, a diversity of fauna can still be found, such as Kudu and smaller buck such as duiker. Jackal also frequents this area and possibly caracal. These predators most probably live on the population of rodents that also live in this terrain. In, and adjacent to, the dumps there is a large population of dassies, while baboons are often seen frequenting the dumps. A great variety of birdlife is also encountered including raptors such as the Goshawk and Black Eagle. The common mammal species, occurring in the area, include:

- Kudu, (*Tragelaphus strepsiceros*)
- Steenbok, (*Raphicerus campestris*)
- Common Duiker, (*Sylivcapra grimmia*)
- Rock hyrax, (*Procavia capensis*)
- Cape Hare, (*Lepus capensis*)
- Scrub Hare, (*Lepus saxatilis*)
- Spring Hare, (*Pedetes capensis*)
- Porcupine, (*Hystrix africaeaustralis*)
- Suricate, (*Suricata suricatta*)
- Slender Mongoose, (*Galerella sanguinea*)
- Small Grey Mongoose, (*Galerella purverulenta*)
- Aardvark, (*Oryzomys afer*)
- Black-backed Jackal, (*Canis mesomelas*)
- Bat-eared Fox, (*Otocyon megalotis*)
- Ground Squirrel, (*Xerus inauris*)
- Chacma Baboon, (*Papio ursinus*)

A variety of rats, mice, gerbils, and bats are also found in the area.

The common reptile species, occurring in the area, include:

- Puff adder, (*Bitis arietans arietans*)
- Cape cobra, (*Naja nivea*)
- Boomslang, (*Dispholidus typus*)
- Geometric tortoise

A few of the common bird species, occurring in the area, are:

- Black Eagle, (*Aquila verreauxii*)
- Pale Chanting Goshawk, (*Melierax canorus*)
- Rock Kestrel, (*Falco tinnunculus*)



- African Hoopoe, (*Upupa africana*)

Many other bird species, such as Weavers, Bishops, Wagtails, Finches, Bulbuls, etc. also occur in vast numbers in the area.

Proposed Bergville Project

A fauna study was conducted for the study area by Scientific Terrestrial Services CC in 2019 titled: *Terrestrial ecological habitat integrity investigation as part of the environmental authorisation process for the Ulco AfriSam mining operation, near Kimberley, Northern Cape Province.*

Following the assessment of the study area and the associated habitat, it has been concluded that two habitat units will be impacted upon. The habitat units are described below:

Freshwater Habitat Unit

This habitat unit comprises all the freshwater habitats observed within the study area, and further discussed within the Freshwater report (SAS, 2017). The habitat unit includes the various drainage lines as well as the pan. Of these areas, only the pan contained water at the time of assessment, however, this is highly seasonal and rainfall dependant. The drainage lines did not contain water at the time of assessment, however, areas of increased soil moisture were observed in these systems. The pan is important primarily as a source of water, as well as habitat and breeding grounds for amphibians and water dependant invertebrates (dragonflies). The vegetation cover surrounding the pan was very short as a result of continuous grazing activities. The drainage lines can be considered important for less water dependant amphibian species, which will aestivate for long periods of time until sufficient rainfall is received for breeding purposes. A depression was observed within the southern drainage line which appeared to have increased water retention abilities, and as such is likely to provide additional habitat to water dependant species during periods of increased rainfall.

Although not observed, it is considered highly likely that floral SCC such as *Pentzia stellata* (NT), *Crinum macowanii* (NCNCA, 2009) and *Bulbine narcissifolia*. (NCNCA, 2009) may occur within this habitat unit, as suitable and sufficient habitat is available. Faunal SCC are likely to utilise the freshwater habitats for foraging, as these areas will have an increased source of food. Species such as *Pyxicephalus adspersus* (Giant bullfrog, NCNCA), *Ardeotis kori* (Kori Bustard, NT), *Sagittarius serpentarius* (Secretarybird, VU) *Python natalensis* (African Rock Python, NEMBA, NCNCA) and *Neotis ludwigii* (Ludwig's Bustard, EN) are likely to forage in this habitat.

Terrestrial species diversity of the study area is considered to be moderately high. The floral diversity of the study area was marginally higher than that of the surrounding habitat, largely as a result of the increased soil moisture and floral species associated with areas of increased soil moisture. The faunal diversity was similar to that of the surrounding Ghaap Plateau Vaalbosveld habitat, however, amphibian species are expected to occur within the freshwater habitats, unlike that of the surrounding Ghaap Plateau Vaalbosveld habitat. Amphibian species previously recorded in the QDS include *Breviceps adspersus* (Bushveld Rain Frog), *Amietia fuscigula* (Cape River Frog) and *Tomopterna cryptotis* (Tremelo Sand Frog).



Ghaap Plateau Vaalbosveld Habitat Unit

This terrestrial portion of the study area was solely comprised of this habitat unit. The habitat unit was predominated by shallow rocky soils, however, the central portion and northern pockets of the study area comprised of deeper soils. To the north and east of the pan there is evidence of historical crop cultivation. The study area at present is utilised for cattle farming, which was evident from the grazing intensity leading to a low herbaceous layer, notably around the pan. The shallow rocky areas naturally have a limited herbaceous layer; however, this has been further exacerbated by the grazing activities. The northern and far southern portions of the study area appeared to be less impacted by grazing, with notable increases in herbaceous material present, likely due to fences limiting cattle movement into these areas. Although there is an increased grazing pressure on the herbaceous layer, the woody component appeared to be largely intact, with many of the tree species observed being considered dominant and characteristic of this vegetation type, namely *Vachellia tortilis* subsp. *heteracantha*, *Olea europaea* subsp. *africana*, *Tarchonanthus camphoratus* and *Ziziphus mucronata*.

Although not observed, it is considered highly likely that floral SCC such as *Boopane disticha* and *Bulbine narcissifolia* (Both NCNCA, 2009) may occur within this habitat unit, as suitable and sufficient habitat is available. Faunal SCC likely to occur include *Ardeotis kori* (Kori Bustard, NT), *Sagittarius serpentarius* (Secretarybird, VU) *Python natalensis* (African Rock Python, NEMBA, NCNCA) and *Neotis ludwigii* (Ludwig's Bustard, EN). Furthermore, it is likely that baboon spiders from the genus *Ceratogyrus*, which are protected under NEMBA (Act 10 of 2004), and baboon spiders of the genus *Ceratogyrus*, *Harpactira* and *Pterinochilus* listed as specially protected species under the NCNCA (2009) may also occur within the study area.

Terrestrial species diversity of the study area is considered to be moderately high. The floral diversity of the study area is largely characteristic of the Ghaap Plateau Vaalbosveld, however, heavy grazing has impacted upon the herbaceous layer. The faunal diversity was mixed, with a good representation of insect, avifaunal and small to medium sized mammals, notably species such as *Lepus saxatilis* (Scrub Hare); *Raphicerus campestris* (Steenbok), *Sylvicapra grimmia* (Common Duiker) and *Cynictis penicillata* (Yellow Mongoose).

Chapter G: Surface Water

Existing Mining Operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

Catchment Characteristics

The main mining area (Ulco) lies 9 km North-west of the confluence of the Vaal and Harts Rivers and 3.5 km north of the non-perennial Steenbok River, which flows over the Ghaap escarpment at



Grootkloof. The Gorrokop mining area is approximately 2.5 km south-west of the Steenbok River and 9.2 km Northwest of the Vaal River.

There are several seasonal stream beds in the vicinity of the mine, which flow during the “rainy season” after a heavy downpour, but only for a short period of time.

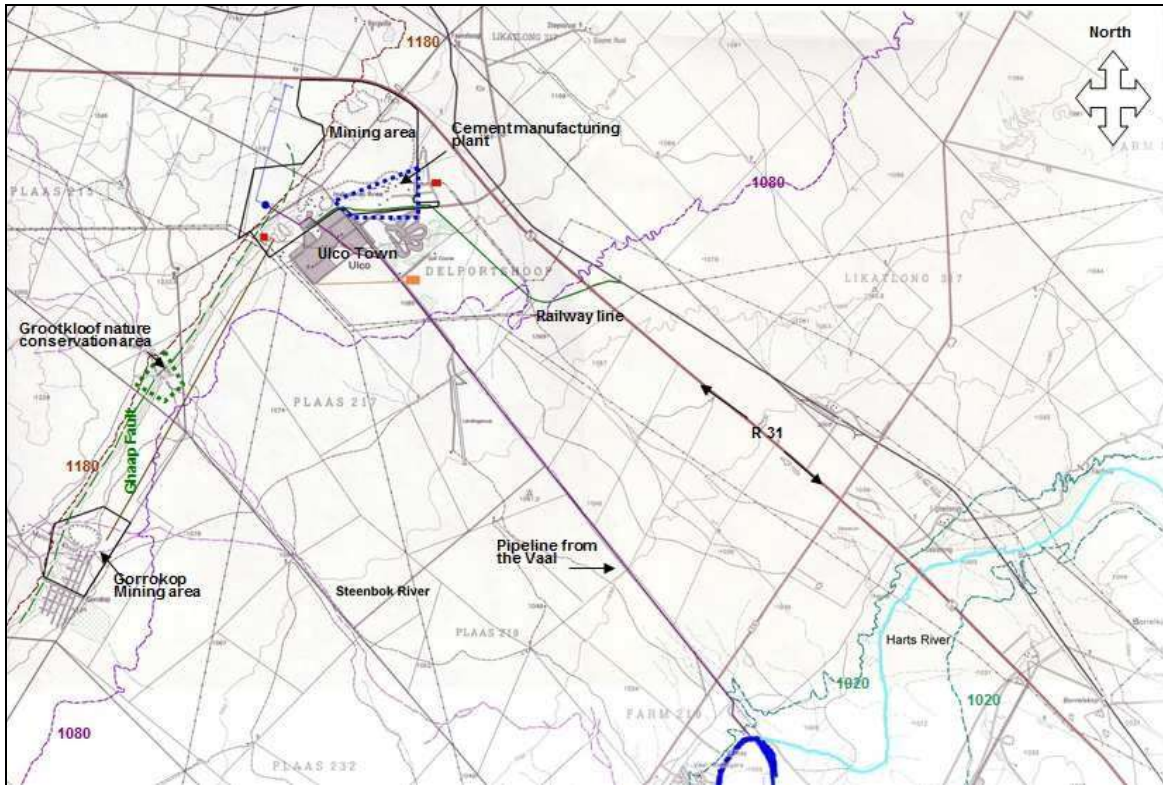


Figure 45: Seasonal rivers and pans in the vicinity of Ulco

Main mine sub-catchment characteristics:

Within the main mining area, all surface water is channelled either naturally or by storm water channels to one of two sumps. Sump 1 collects water in the old quarry below the conveyor belt from the primary crushers to the stockpiles. Sump 2 collects water in the south-western corner of the Harrison area.

A berm has been constructed close to sump 2 to ensure that no water from the mining area flows into the plant area. Water from the plant area is directed by a number of storm water drains off the site into the adjoining land. Visual inspection of the vegetation within and surrounding the storm water drains, as they leave the site, shows that the vegetation is comparable to off-site vegetation and has not been affected by the surface runoff from the plant area.

All of the water used by the mine comes from one of two permitted sources. The majority of the water comes from the Vaal River and is purified at the on-site water purification plant. The purified water is used for processing purposes and for portable use. Ground water is extracted from 3 boreholes and used for gardening and watering roads. All sewage is processed at the sewage plant and then the treated water is discharged to the adjacent landowner to use for irrigation purposes.

Storm water delineation



Rainfall on the property is allowed to flow freely from the property. In general, water flows in a north-west to south-east direction over the property. Three distinct areas can be identified, namely:

- Mainly old working areas that were previously rehabilitated. This area is considered to be clean, and all rainfall falling, and running over this area is allowed to run into the natural veldt.
- The active working quarry areas, including the subsided old quarry area. Due to the topographical layout, most of the rainfall on this area is collected within the one open quarry, or flows towards a sump known as the quarry dam (old quarry), where it is collected. This water is currently not used, and is allowed to evaporate. This water in general is relatively clean, but does contain suspended solids during flow conditions.
- The operational area. Rainfall in this area is canalised into a formal storm water system to remove it from the operational area. This water is mainly contaminated with suspended solids, and the water is allowed to run into the natural veldt.

Surface Water Quantity

The mine recognises that due to the removal of vegetation and geology over the mining area, the quantity of surface run-off from the mining area increases. For this reason, the mine has created berms along the perimeter of the mining area to ensure that all surface run-off from the mining area runs into one of 2 sumps as described above.

Mean Annual Runoff

Since water is not discharged into a river the mean annual run-off is not measured.

Normal Dry Weather Flow

During normal dry weather, Ulco has no permanent rivers or streams impacted by the mine. The closest river which flows throughout the year is the Vaal River which is situated approximately 9 km South-east of Ulco.

Flood peaks and volume

Not applicable. There are no permanent rivers in close proximity to the mine.

Drainage Density of Areas

The drainage density of the areas disturbed has not been measured. All storm water from the quarry areas is directed to and collected in 2 sump areas, which prevent the water from leaving the mining areas and allows silt and sediment to settle out of the water. Storm water from the plant area flows onto the land between the plant and the township. Storm water from the old plant and waste dump area flows out into the adjacent farm, De Puts.

Surface Water Quality

No analysis of the quality of water leaving the mining site has been conducted. The mine does however conduct the following water quality test:

Surface Water Use



Water for consumption by the mine comes mainly out of the Vaal River and partially from boreholes above the quarry. The operation is permitted to extract 946 669 m³ from the Vaal River and 20 900 m³ from the boreholes per annum.

Water Authority

The authority to abstract water from the Vaal River comes from the Lower Vaal Government Water Scheme, however the Vaal-Gamagara Government Water Scheme also abstract water from the Vaal River at a point approximately 1.5 km below the factory pump site.

Proposed Bergville Project

The following information was obtained from the *Freshwater resource ecological assessment a part of the environmental assessment and authorisation process for the Ulco AfriSam mining operation, near Kimberley, Northern Cape Province* report compiled by Scientific Aquatic Services CC dated 2019 and the *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Operation – Bergville Project Storm Water Management Plan* dated 2019 and compiled by Shangoni Management Services (Pty) Ltd.

The study area is located within the Vaal River primary catchment area and within quaternary catchment C33C. The proposed Bergville Project is situated within the Lower Vaal water management area and falls within the regional authority of the Department of Human Settlement, Water and Sanitation, Northern Cape regional office.

According to the National Freshwater Ecosystem Priority Area (“NFEPA”) database there is one natural wetland feature situated within the central portion of the study area. The wetland feature is classified as a depression feature and considered to be in a natural or good ecological condition (Class AB).

There are no rivers associated with the study area and investigation area. A tributary of the Harts River is situated approximately 1.7 km north of the study area and is considered largely modified according to the PES 1999, however, according to NFEPA the river is in a natural or good ecological condition.

Three freshwater resources were identified. A seasonal pan wetland is located within the central portion of the study area. Historically, the surrounding terrestrial area to this pan has been cultivated. More recently, these old abandoned fields and the pan are being grazed and trampled by livestock. An ephemeral drainage line with riparian vegetation was identified within the southern portion of the study area. Located within the western portion of the drainage line is a depression wetland. The depression wetland is fed by the drainage line and water leaves the depression via the drainage line, this system is thus exoreic and considered linked to the adjacent drainage of the area.

Hydrology of the pan

This pan is hydrologically driven by groundwater. Surface water is not always present within the pan, as the water table fluctuates. Lowering of the water table is potentially due to abstraction of water by local farmers from boreholes, and the rising thereof due to overland inflow (especially during rainfall events). Due to the high evaporation rate of this area, surface water is only present within the pan for short periods of time. Since trenches have also been historically created by farmers to drain water to



and from the pan, it is most likely that the pan would not exceed its banks during rainfall events as water would be conveyed to downgradient areas but would also receive water from the surrounding old agricultural fields.

Water quality of the pan

No obvious influencing factors, such as direct discharge of contaminated water related to the surrounding AfriSam mining and production plant, could be identified, which may impact on the water quality of this pan. Some enrichment of the water due to livestock grazing and trampling is possible. Drying out of the pan drives the precipitation of minerals, including calcium and phosphate minerals due to the concentrating effects of evaporation. Some of the accumulated salts and nutrients (such as organic nitrogen, and various phosphate and sulphate salts) can be transported out of the pan by the wind and be deposited on the surrounding area. Those remaining may dissolve again when the water table rises, and the pan fills up again.

Geomorphology of the pan

Few impacts to the geomorphology were noted and it is anticipated that under current conditions, natural deterioration of the geomorphology is considered unlikely. The most notable impact on the geomorphology is the trenches which have been created to drain water to and from the pan, which transport additional sediment into the pan. Also, due to the extent of the grazing activities of livestock within and surrounding the pan, some areas are left bare, from which sediment enters the pan.

Hydrology of the ephemeral drainage line

As this drainage line is ephemeral in nature, it only conveys water during times of rainfall, when water from the larger catchment drains into this resource. Some localised alterations to flow patterns within the drainage line have occurred as a result of some road and where trenches crosses through this drainage line. Small geomorphological modifications such as accumulation of sediment as a result of trampling have occurred, however, it is not deemed to have had significant detrimental impacts on the overall hydrological functionality of the drainage line.

Water quality of the ephemeral drainage line

The drainage line was largely dry at the time of the assessment. However, due to the relatively remote locality thereof, it can be concluded that the water quality is unlikely to be impacted by pollutants relating to the surrounding AfriSam mining and production plant but may be enriched with nutrients by the presence of livestock.

Geomorphology of the ephemeral drainage line

The geomorphology of this drainage line is largely intact. Erosion was apparent in some areas but was not considered severe at the time of the assessment, although losses of vegetation in the vicinity of the drainage line being crossed by trenches may exacerbate erosion leading to increased sedimentation. Trampling by livestock was observed in isolated areas, however, whilst this may contribute to increased



sediment loads, trampling by larger herbivores under natural conditions (i.e. in the absence of livestock) may have occurred, thus the potential alteration to the natural sediment balance is considered limited.

Hydrology of the depression wetland

As this depression wetland forms part of the drainage line, an inlet into the depression allows for water to drain into the depression during times of high rainfall and exit the depression to drain to the downstream section of the drainage line. Also, as per discussions with a local resident, if the water table rises, groundwater daylights within this depression. This usually only occurs during periods of high rainfall, when surface water in the catchment has infiltrated into the soil, feeding into the water table.

Water quality of the depression wetland

This depression was dry at the time of the assessment. However, due to the relatively remote locality thereof, it can be concluded that the water quality is unlikely to be impacted by pollutants relating to the surrounding AfriSam mining and production plant but may be potentially enriched with nutrients by the presence of livestock within the upstream drainage line portion.

Geomorphology of the depression wetland

The geomorphology of this depression is largely intact. Some sediment enters this depression via the drainage line, but no significant deposition thereof was evident. Also, due to the surface roughness of the wetland and the surrounding terrestrial habitat, limited excessive sediment is likely available to enter this wetland.



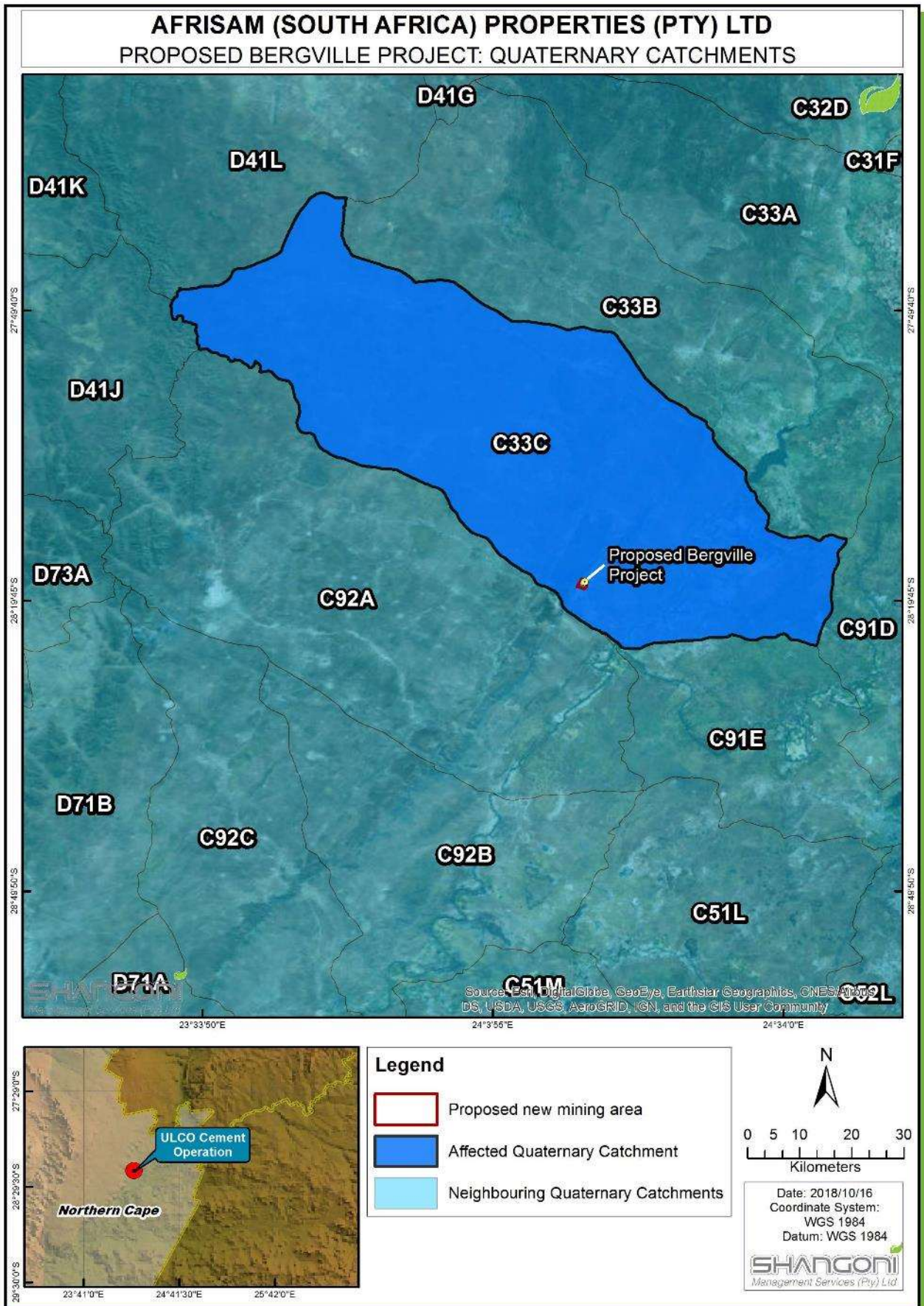


Figure 46: Quaternary catchments associated with the Bergville Project



Chapter H: Groundwater

Existing Mining operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

In 1997 a groundwater flow model was developed for Ulco by the Institute for Groundwater Studies at the University of the Free State in Bloemfontein. The report describes the ground water parameters in the vicinity of Ulco and is available at the mine. The purpose of the commissioned research was to:

- To determine the impact of abstraction of water from boreholes in the Bergville area.
- To determine the safe yield of the aquifer.
- To perform a risk analysis on the proposed extraction rates.

During this survey, 10 boreholes around the property were used to provide the necessary information. The mine only extracts water from the 3 boreholes on the Bergville farm.

Depth of Water Table

The average depth of the water table in the vicinity of Ulco is 23 m. The boreholes are labelled BG1 (East), BG2 (Central) and BG3 (West). In all three boreholes, the rest water level and the pump water level has decreased since January 1995 and hence the ground water study was commissioned (*Ground Water Flow Model for Ulco, 1997, Gerrit van Tonder & Riaan Grobbelaar*).

Figure 47 below indicates the location of both monitoring boreholes and the boreholes on the Farm Bergville used for groundwater extraction.

Proposed Borehole Yields and Ground Water Use

The predicted safe yield (extraction rate) from the Bergville boreholes is approximately 1 100 m³ / day. For a limited period of time (i.e. one year) water could be extracted at a rate of 3 000 m³ / day.

During 2003, the mine abstracted 417 495 m³ of ground water, which is an average abstraction of 1 144 m³ / day. This water is used for gardening and the wetting of the roads for dust suppression. In 2005 the mine has reduced its consumption of ground water to minimal and is mainly making use of the water obtained from the Vaal River.

Ground Water Quality

The quality of the water abstracted from the boreholes is not used for continuous human consumption as it is hard and has a high electro-conductivity. It is for this reason that borehole water is only used for gardening and dust suppression purposes. The quality of the water test is shown in Table 14.



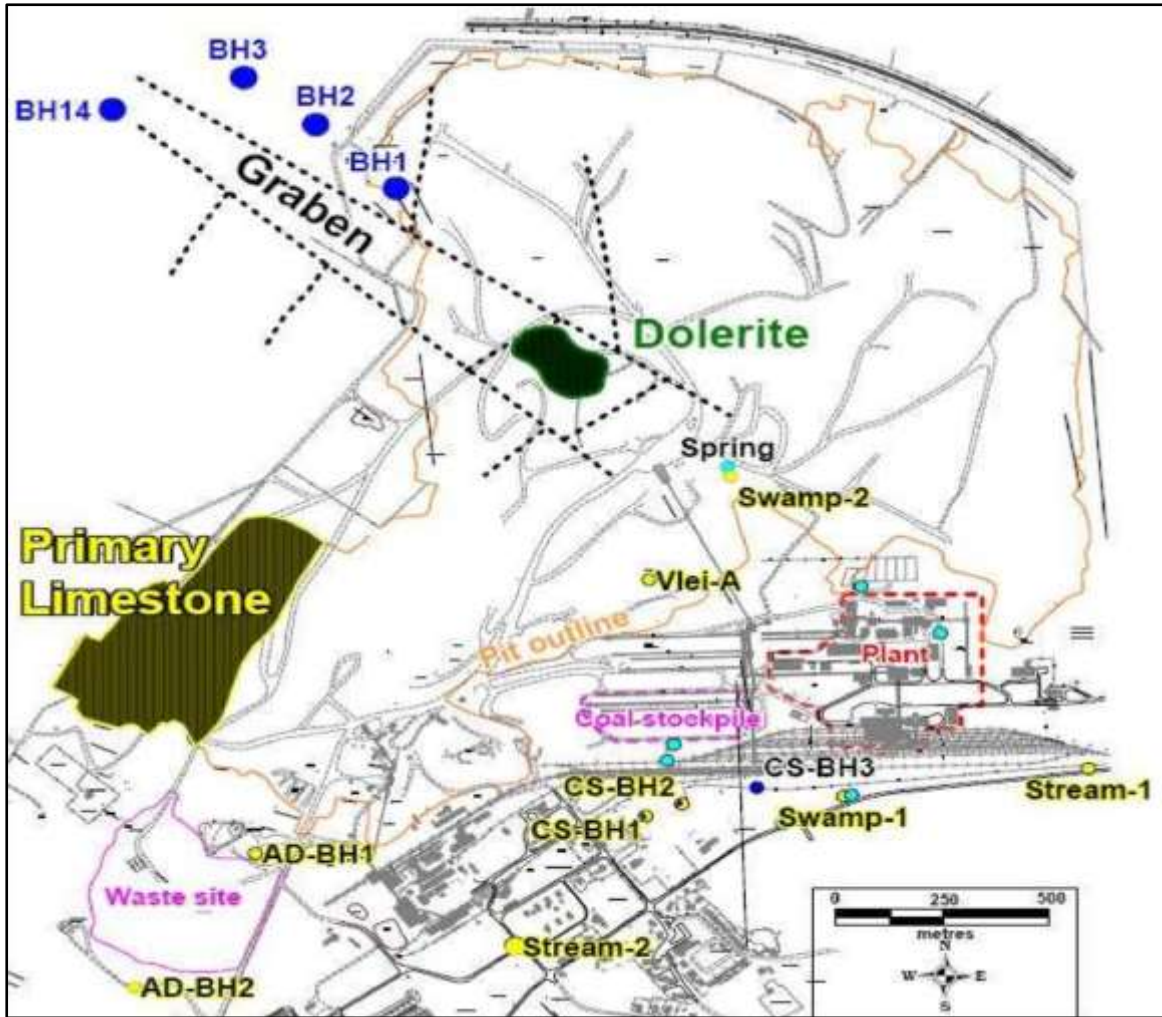


Figure 47: Location of both extraction boreholes and monitoring borehole

Table 14: Chemistry of the six boreholes tested for water quality (Feb 2008 – May 2010)

EC								
Date	Sample Location					Vlei (Qry Crusher Dam)	Drinking water standards:	
	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2		Class I (Recommended operational limit)	Class II (Max. allowable)
Feb-08	84.3	86.8	117	118	185		150.0	370.0
May-08	90	87	120	211	104	28	150.0	370.0
Feb-09	88.1	105	125	188	88.1	27	150.0	370.0
Aug-09	93.2	87.7	118	99.8	202	49.4	150.0	370.0
Feb-10	95.3	85.9	95	75.1	199	23	150.0	370.0



EC								
May-10	122	85.3	86.5	196	76.9		150.0	370.0
PH								
Sample Location						Drinking water standards:		
Date	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2	Vlei (Qry Crusher Dam)	Class I (Recommended operational limit)	Class II (Max. allowable)
Feb-08	7.25	7.47	7.34	7.05	6.91		5.5 tot 9.5	<4 en >10
May-08	7.10	7.34	7.13	6.77	7.00	9.20	5.5 tot 9.5	<4 en >10
Feb-09	7.22	6.84	7.19	6.78	7.33	8.63	5.5 tot 9.5	<4 en >10
Aug-09	7.26	7.58	7.3	7.34	7.1	9.21	5.5 tot 9.5	<4 en >10
Feb-10	6.95	7	7.19	6.95	6.78	8.45	5.5 tot 9.5	<4 en >10
May-10	7.11	7.1	6.92	6.79	6.87		5.5 tot 9.6	<4 en >11
Sulphate								
Sample Location						Drinking water standards:		
Date	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2	Vlei (Qry Crusher Dam)	Class I (Recommended operational limit)	Class II (Max. allowable)
Feb-08	54	57	155	143	283		400	600.0
May-08	51	56	193	399	132	23	400	600.0
Feb-09	145	401	211	388	73	33	400	600.0
Aug-09	65	75	224	134	328	66	400	600.0
Feb-10	182	62	70	94	289	19	400	600.0
May-10	204.7	67.3	61.9	274	69		400	600.0
Nitrate								
Sample Location						Drinking water standards:		
Date	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2	Vlei (Qry Crusher Dam)	Class I (Recommended operational limit)	Class II (Max. allowable)



Nitrate								
Feb-08	23.2	23.64	6.15	37.18	9.21		44.27	88.53
May-08	22.94	24.2	3.34	33.9	13.9	0.92	44.27	88.53
Feb-09	51	0.3	1.9	1.21	25.6	2.2	44.27	88.53
Aug-09	4.88	5.19	0.46	9.48	0.1	0.14	44.27	88.53
Feb-10	1.15	5.14	4.97	5.76	0.32	1.97	44.27	88.53
May-10	1.36	4.69	4.66	0.05	0.83		44.27	88.53

Iron								
Date	Sample Location					Vlei (Qry Crusher Dam)	Drinking water standards:	
	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2		Class I (Recommended operational limit)	Class II (Max. allowable)
Feb-08	0.007	0.025	0.012	0.018	0.009		0.2	2.0
May-08	0.017	0.018	0.013	0.010	0.016	0.055	0.2	2.0
Feb-09	0.016	0.009	0.017	0.017	0.018	0.119	0.2	2.0
Aug-09	0.022	0.019	0.015	0.014	0.027	0.039	0.2	2.0
Feb-10	0.02	0.018	0.026	0.082	0.019	0.024	0.2	2.0
May-10	0.016	0.014	0.017	0.022	0.023		0.2	2.0

Manganese								
Date	Sample Location					Vlei (Qry Crusher Dam)	Drinking water standards:	
	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2		Class I (Recommended operational limit)	Class II (Max. allowable)
Feb-08	0.018	0.036	0.359	0.046	0.303		0.1	1.0
May-08	0.016	0.020	0.388	0.053	0.015	0.030	0.1	1.0
Feb-09	0.024	0.319	1.044	0.29	0.014	0.023	0.1	1.0
Aug-09	0.007	0.007	0.114	0.038	0.37	0.018	0.1	1.0



Manganese								
Feb-10	0.388	0.037	0.04	0.028	0.388	0.005	0.1	1.0
May-10	0.176	0.02	0.026	0.025	0.299		0.1	1.0
Calcium								
Date	Sample Location						Drinking water standards:	
	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2	Vlei (Qry Crusher Dam)	Class I (Recommended operational limit)	Class II (Max. allowable)
Feb-08	185	188	233	335	460		150.0	300.0
May-08	80	75	112	205	108	9.0	150.0	300.0
Feb-09	113	218	115	215	78	16	150.0	300.0
Aug-09	86.3	74	98.4	105.8	193.4	14.7	150.0	300.0
Feb-10	95.3	67.7	83.4	93.1	172.9	17.7	150.0	300.0
May-10	99.7	69.1	71.1	173.7	107.3		150.0	300.0
Magnesium								
Date	Sample Location						Drinking water standards:	
	CS-BH-1	CS-BH-2	CS-BH-3	AD BH-1	AD BH-2	Vlei (Qry Crusher Dam)	Class I (Recommended operational limit)	Class II (Max. allowable)
Feb-08	271	262	283	233	529		70.0	100.0
May-08	68	63	76	152	66	11	70.0	100.0
Feb-09	71	148	89	147	69	13	70.0	100.0
Aug-09	69.6	67.3	73.2	67.9	138.9	27	70.0	100.0
Feb-10	63.4	58.8	55.7	24.8	112.5	10.8	70.0	100.0
May-10	70.5	56.8	61.6	119	27.7		70.0	100.0

Due to the quality of the water (hard with a high Electrical Conductivity) the ground water is not suitable for continuous human consumption.



Proposed Bergville Project

The information contained in the baseline environment for this section was informed by the *Geohydrological input as part of the environmental authorisation for the new mining area*, dated 2019 compiled by Shangoni AquiScience (Pty) Ltd.

The carbonate rocks of the Ghaap represents one of the most important aquifer systems in South Africa due to their potentially high yielding capabilities. The carbonate rocks of the Ghaap possess no primary porosity, but due to karstification they have a very high storage capacity and often highly permeable characteristics. Only the karstified superficial zone of these units acts as an aquifer, and therefore is classified as a karst aquifer system.

A ground-penetrating radar (“GPR”) survey conducted identified several possible karstic zones or solution cavities underlying the application area. These zones were identified to be relatively shallow, ranging between 2.5 and 17 mbs. Water table analysis could not be undertaken owing to the absence of a regular grid in places during the survey but the rest water levels of boreholes in the immediate vicinity of the application area were recorded to be between ~5 and ~12 meters below surface (mbs). Drilling records also confirm relatively shallow water with strikes of between 6 and 27 mbs. In contrast, the boreholes drilled on Klein Rietfontein encountered groundwater strikes at depths of between 80 and 120 mbs. These boreholes are associated with the regional dykes and dolomites of the Ulco Member. The aquifer in Rietfontein boreholes 1 and 2 contains stratigraphically bedded carbon shale bands in competent dolomite bedrock. The water levels measured in these boreholes are shallow, around 2.5 mbs. This indicates that the aquifers associated with the dykes are confined in nature and should be regarded as piezometric water levels rather than a true water table due to the confining shale beds.

The main aquifer expected within the study area is solution cavities that developed in micro-fissured, fractured and jointed dolomite. They may be located at relatively shallow depth ranging from 6 mbs (1150 mamsl) to 27 mbs (1181 mamsl), below or on the calcrete/dolomite contact, or within cavities formed within the limestone/dolomite. Yields could be substantial, especially if water is abstracted from these cavities. Aquifer characteristics that may be expected are summarised below:

- The Ulco Member is estimated to be about 220 m thick in the area and karstic aquifers are typically found. Enhanced aquifer conditions are associated with structures like dykes, faults, chert-buffers, joints and solution zones.
- The siting of successful boreholes is dependent on the occurrence of structures that will enhance the development of fracturing or cavity formation. These include:
 - Tectonic elements (faults, fractures, intrusions, dykes, contact zones);
 - Chemical dissolution (cavities); and
 - Weathering (mechanical, fractures).
- Depth to water strike: ≤11 - 14 m.
- Average borehole depth: 100 m.
- Average borehole yield: 470 m³/d (5 l/s).
- Yields as high as 3200 m³/d (37 l/s) is known in this aquifer.



- Storativity values range from as low as 0.00005 to 0.1 in accordance with the degree of karstification and the hydraulic conditions, which vary from unconfined to semi-confined.
- The dolomites can be nearly impervious to highly transmissive.
- Recharge vary between 2.5% and 8% of MAP.
- Groundwater quality is generally good.

Groundwater dewatering associated with mining will result in a cone of depression of which the extent will depend on aquifer characteristics such as abstraction rates, transmissivity and the effective porosity of the subsurface.

A baseline freshwater resource assessment (SAS, 2017) identified three (3) freshwater resources in the study area. A pan wetland is located within the central portion of the study area while an ephemeral drainage line with a depression wetland on its western portion, is located on the southern perimeter of the study area. The study area, and thus the surface water resources, are located within a semi-arid area and contain water only during certain periods of the year. Water is only present for a few months in the year during extreme rainfall events where after it evaporates and is dry for the remaining months. Due to the shallow groundwater table expected, the presence of water in the pan and depression wetland may be partly due to a fluctuating water table. Seasonally, these resources do provide habitat for a variety of species, which rely on the presence of surface water. The associated dewatering activities could therefore impact on their habitat, albeit only seasonally. According to WR90 data, no baseflow is expected within the catchment and it is also not expected that any run-off from AfriSam Ulco would reach the Steenbok and Vaal Rivers given the high evaporation rates and groundwater recharge rates.

Chapter I: Air Quality

Existing Mining Operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc

Ulco is located in the arid Kalahari / Karoo region and the base line air quality at Ulco (excluding impacts resulting from the operation) can be considered good, given that there are very few sources of pollution in the vicinity of Ulco. The primary source of atmospheric pollution is dust, particularly during the dry windy periods. The source of dust is both natural, due to the sparse natural vegetation covering, and as a result of human activities, such as diamond digging along the Vaal River and vehicle entrained dust from unpaved roads.

Ulco represents a source of atmospheric pollution, in the form of dust from both the mining operation and the cement plant. Other gaseous emissions from the stacks are also a source of atmospheric pollution. Coal is the primary fuel used to fire the rotary kiln, however Ulco is authorised to use the following alternative fuels and raw materials:

- Alternative Raw Materials;



- Hydrocarbon waste;
- Biomass/wood waste;
- Tyres and rubber waste;
- Waste plastic (excluding polyvinyl chloride);
- Coal contaminated waste;
- Refuse derived fuel;
- Waste Oils;
- Lime kiln dust; and
- Alumina based waste.

Alternative low grade fuels and coal is purchased from suitable suppliers and is transported by rail or road. The coal is stockpiled and then fed to the coal mill, which dries and grinds the coal to a fine powder, dried to below 2% moisture content and with a residue of 10% on a 90 µm screen. The coal is pneumatically fed into the kiln with air and combusts to form a high temperate flame (typically >2000 degrees C) at the main burner. The coal combustion contributes towards overall emissions. Pulverised coal is also fired into a pre-calciner located at the bottom of the pre-heating tower of Kiln 5.

Environmental dust monitoring campaign is guided by the requirements of SANS 1929 and the National Dust Control Regulations. According to this standard the dust fallout within the boundaries of Ulco should be within the “industrial band” and fallout off site should fall within the “residential band”. Below (see Table 15) shows an indication of the band levels.

Table 15: Four band scale and evaluation criteria for dust deposition by SANS

CLASSIFICATION	DUSTFALL RATE (30 DAY AVERAGE)	COMMENT
“Residential”	Less than 600 µg/m ² /day	Permissible for residential and light commercial.
“Industrial”	600 – 1 200 µg/m ² /day	Permissible for heavy commercial and industrial.
“Action”	1 200 – 2 400 µg/m ² /day	Requires investigation and remediation if two sequential months lie in this band, or more than three occur in a year.
“Alert”	More than 2 400 µg/m ² /day	Immediate action and remediation required following the first incidence of this dust fall rate being exceeded. Incident report to be submitted to the relevant authority.

Ulco has for a number of years implemented a dust monitoring campaign through the recording of dust fallout levels making use of dust buckets. Historically 8 locations were used however since the fallout levels have consistently been below “residential” levels, the number of dust buckets has recently been reduced to 5. Refer below (See Figure 48) for an indication of the location of the dust buckets.





Figure 48: Location of Dust buckets at Ulco

Proposed Bergville Project

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) Properties (Pty) Ltd: Ulco Cement Operation - Proposed Bergville Project Air Quality Impact Assessment*, dated 2019 and compiled by Shangoni Management Services (Pty) Ltd.

The Ulco operation site falls outside South Africa's three declared airshed priority areas, the Vaal Triangle Air-shed Priority Area, the Highveld Priority Area and the Waterberg Bojanala Priority Area.

The Northern Cape province, with the assistance of uMoya-NILU Consulting (Pty) Ltd, are in the process of developing an Air Quality Management Plan ("AQMP"). A review of the AQMP's model plan of study found that, due to mining and the arid nature of the environment, the province considers particulates (e.g. dust, PM10 and PM2.5), as air pollutants of concern.

The Frances Baard District Municipality's ("FBDM's) 2010 Environmental Management Framework identified the following developments as having the potential to impact on the ambient air quality in the Dikgatlong Local Municipality:

- Commercial:
 - National road through town (high volumes of traffic producing vehicle emissions); and
 - Lack of public toilets in the CBD (odours and wind-blown refuse).
- Industrial:



- Light industry;
- Industrial waste;
- Afrisam Ulco operation (alternative fuel-use project); and
- Garage and biltong factory in Delportshoop.
- Mining:
 - Numerous and wide spread open cast diamond diggings, as well as unrehabilitated old diggings; and
 - More mining activities than on DME records.
- Power stations / alternative energy sources:
 - The lack of energy generation capacity in this municipality results in reliance on burning fossil fuels.
- Roads:
 - The main roads experience heavy traffic, including mine heavy duty vehicles on roads not designed to accommodate such big trucks.
- Railways, Related Structures & Facilities:
 - There is a main railway line through this municipal area, with high levels of diesel fume emissions from trains.
- Settlements:
 - Several levels of magnitude below Kimberley, the next largest town is situated in Dikgatlong Local Municipality, namely Barkly West ($\pm 7\ 000$);
 - Towns include Delportshoop en Windsorton; and
 - There are several smaller villages, including the largest of which are Ulco.
- Agriculture (crop farming):
 - Stilwater Farm, which is one of the largest farms in the area.

The FBDM's Environmental Management Framework confirms that there is a lack of ambient air quality monitoring within the district and argues that in absence of this data and given the large number of polluting activities, it can only be envisaged that air quality in the Dikgatlong Local Municipality is poor.

Ulco operation's existing mining and processing operation, south of the proposed Bergville Project, was identified as the primary source of air pollution in the area. This operation undertakes the following activities:

- Mining;
- Crushing;
- Raw material milling;
- Clinker production, using a coal-fired kiln;
- Cement milling;



- Packaging and dispatch.

The mining, crushing and milling activities are major sources of dust and fine particulates (PM10 and PM2.5). Ulco operation fugitive dust management plan specifies dust suppression using water for the emissions from its unpaved roads and its crushing and milling operations are fitted with bag filters. Ulco operation's kiln is a major source of combustion emissions and is fitted with an electrostatic precipitator and a bag filter, in order to mitigate this problem.

Health & Occupational Hygiene Laboratory CC, conducted an Environmental Noise and Particulate Matter (PM10 & PM2.5) survey around the existing Ulco cement operation in July 2017. The survey measured PM10 and PM2.5 using a TSI Dust Tract real-time monitor and found PM10 and PM2.5 to fall below their respective National Ambient Air Quality Standards ("NAAQS").

Chapter J: Noise, blasting and vibration

Existing Mining Operations and Proposed Bergville Project

The following information was obtained from the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Noise and PM10/PM2.5 Survey Report* dated 2018 and compiled by Health and Occupational Hygiene Laboratory CC.

An environmental "Perimeter Noise Survey" has been completed for the Ulco in 2018. Figure 49 provides an indication on where the noise measurements were taken from. Table 16 provides an indication of the acceptable levels of noise for the various categories of areas.



Figure 49: Location for Ulco noise monitoring points

Table 16: Rating Noise levels of Ambient Noise levels for various areas.

Type of district	Outdoors			In-doors, with open windows.		
	Day	Evenings /weekends	Night	Day	Evenings /weekend s	Night
Rural	45	40	35	35	30	25
Suburban with little road traffic	50	45	40	40	35	30
Urban	55	50	45	45	40	35
Urban with some workshops, business premises and main roads	60	55	50	50	45	40
Central business	65	60	55	55	50	45
Industrial	70	65	60	60	55	50

Table 17: Feedback of noise levels from the environmental noise survey

TEST STATION	DAY TIME NOISE LEVEL					EVINING NOISE LEVELS				
	Peak dB (A)	Max dB (A)	Min dB (A)	Laeq dB (A)	Rural Limit	Peak dB (A)	Max dB (A)	Min dB (A)	Laeq dB (A)	Rural Limit
Test Station 1	91.7	81.4	33.6	38.7	60	90.6	62.9	26.7	34.3	55
Test Station 2	93.3	84.2	34.1	39.9	60	91.1	64.8	25.2	33.7	55
Test Station 3	92.9	85.1	34.6	40.1	60	91.4	65.1	26.3	34.0	55
Test Station 4	97.3	86.8	35.2	42.6	60	90.8	64.9	27.2	34.8	55
Test Station 5	94.6	85.1	33.9	38.7	60	88.6	52.2	26.1	33.3	55
Test Station 6	93.9	83.6	34.2	39.3	60	89.3	59.9	27.2	35.4	55

Typical rating levels for ambient noise in the different districts are set out in Table 2 of the South African Bureau of Standards (SABS) Code of Practice 0103 for “The measurement and rating of environmental noise with respect to annoyance and to speech communication”. This code covers a method of measurement and assessment of noise to determine the suitability of an environment with respect to possible annoyance (i.e. whether complaints could be expected). Typical outdoor rating levels, Lr, in dBA are provided in Table 18.

Table 18: Typical outdoor rating levels (dBA) for ambient noise in different districts (refer SABS Code 0103)

Type of District	Daytime	Evening	Night-time
Rural	45	40	35



Type of District	Daytime	Evening	Night-time
Suburban with little road traffic	50	45	40
Urban	55	50	45
Urban with some workshops, with business premises & main roads	60	55	50
Central business	65	60	55
Industrial	70	65	60

Noise generated by the Ulco operation emanates primarily from the fans, with intermittent noise as a result of blasting activities at the adjacent limestone quarry. Noise levels at the plant are within the limits, as specified in the SABS code, at the boundary of the plant. The Ulco Village is the closest residential area to the plant. Noise from the plant and mine is audible at night, and can be considered to be a disturbance at times, mainly as a result of the mine and train shunting. Ambient noise levels in the area surrounding the Ulco operation are generally typical of those associated with rural agricultural activities.

Blasting and Vibration

The following information was obtained from the report titled *Blast Impact Assessment Proposed Bergville Mine Project*, dated June 2019 compiled by Blast Management & Consulting.

Blasting conducted at AfriSam Ulco operations was monitored for ground vibration, air blast and videoed to observe, measure and be able to determine typical attenuation factors for the mine. These factors are applicable in evaluating the expected ground vibration and air blast outcomes for the Bergville project.

The following process was followed to determine baseline.

- A blast was monitored with multiple seismographs for ground vibration and air blast
- The blast was videoed to observe extent of fly rock
- The blast data then applied to JKSimblast blast design software to define firing sequences and detonation of the blast. Information from the simulation provides the charge mass per delay required for attenuation calculations.
- Attenuation calculations then done for use in prediction equations.

The following section presents various figures and tables of information applied and obtained in this process. The following figure shows layout of monitoring points in relation to the blast done. Table below (Table 19) shows the averages values for the blast done.



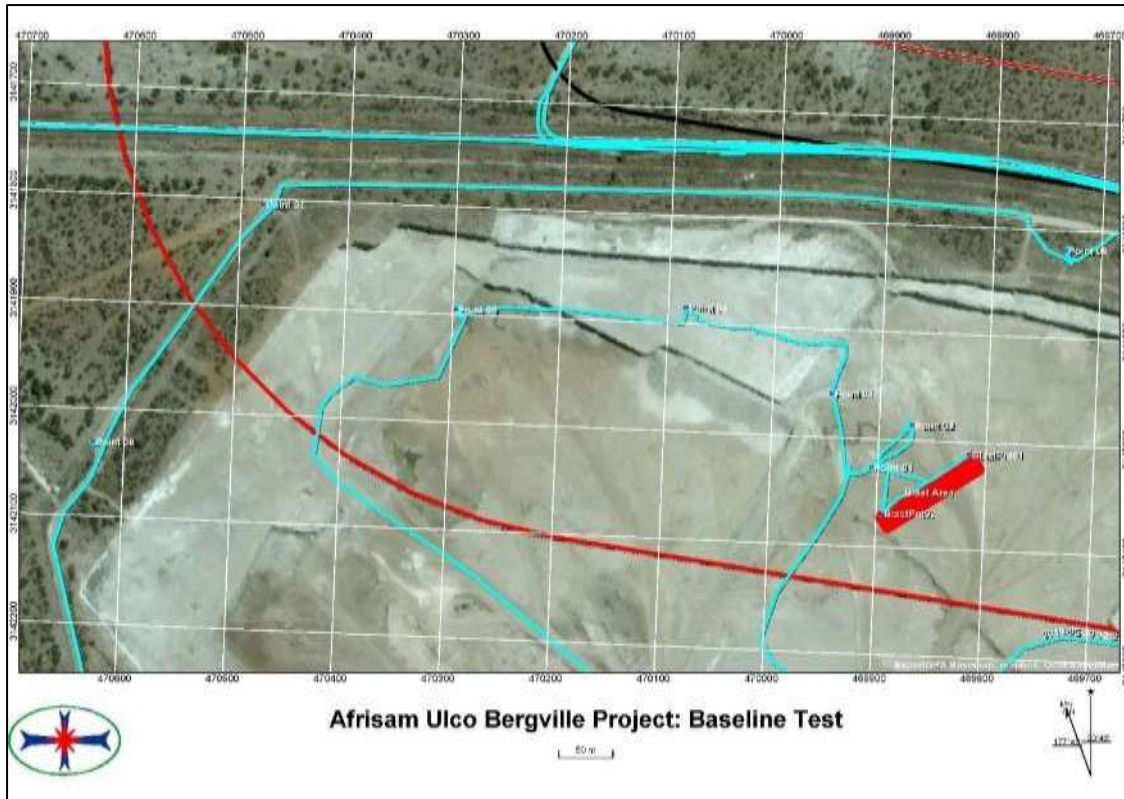


Figure 50: Test layout in relation to blasting done

Table 19: Blast parameters

B/H Diameter (mm)	115
Explosive Density (1.0 - 1.25 g/cm ³)	1.15
Explosive Type	Emulsion
Explosive Description	Hef100
Cartridge Quantity	7.0
Cartridge Length (m)	0.560
Cartridge Diameter (mm)	50
Cartridge Mass (kg)	1.338
Burden (m)	4
Spacing (m)	5
Pattern	Staggered
Average Depth (m)	9.24
Linear Charge Mass (kg)	11.94
P/F Blasthole (kg/m ³)	0.44
Stemming Length (m)	2.50



B/H Diameter (mm)	115
Column Length (incl. Sub drill.)	6.7
Explosives Per B/H (incl. Sub drill) (kg)	80.5

The results recorded from monitoring of the blast is presented below (See Table 20).

Table 20: Recorded data for ground vibration and Air blast

Date	Time	Seis. Location	L-PPV	T-PPV	V-PPV	L-Freq	T-Freq	V-Freq	Resultant PPV (mm/s)	Air Blast (dB)
2019/05/30	15:14:40	Point 01	100.10	84.71	113.80	43.57	60.24	33.57	138.90	147.2
2019/05/30	15:14:39	Point 02	64.64	96.90	83.95	55.35	58.51	20.48	102.40	146.4
2019/05/30	15:14:40	Point 03	17.65	10.54	19.68	29.26	128.00	36.57	22.54	139.9
2019/05/30	15:14:46	Point 04	9.15	7.05	9.07	11.38	52.51	11.84	10.80	129.3
2019/05/30	15:14:46	Point 05	1.45	1.81	2.81	12.34	17.81	11.77	2.83	127.6
2019/05/30	15:14:46	Point 06	11.04	15.53	11.81	35.31	44.52	25.60	17.03	133.6
2019/05/30	15:14:46	Point 07	1.93	1.73	1.20	89.04	13.56	18.12	2.14	118.6
2019/05/30	15:14:47	Point 08	1.35	1.72	1.14	8.53	15.06	12.96	1.74	122.0

Figure 51 below shows graphical display of the results recorded for the different monitoring points.

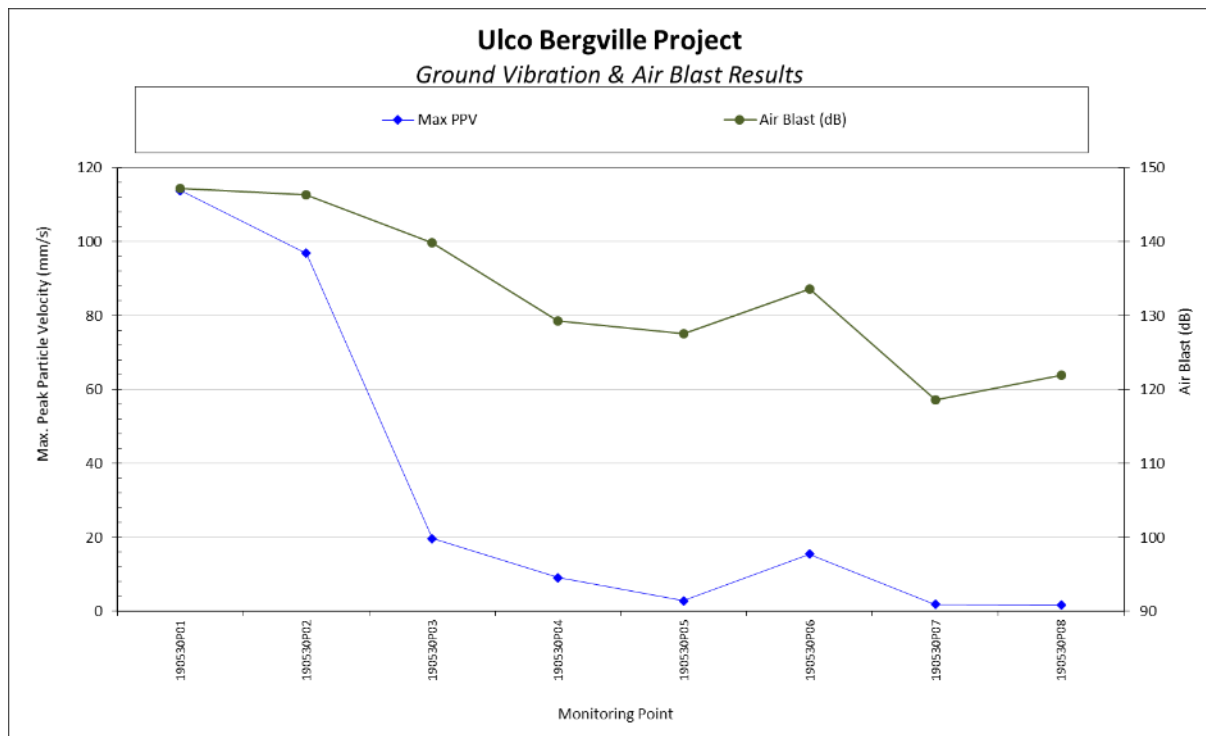


Figure 51: Ground vibration and air blast results



The table below show the calculations done to obtain attenuation constants to be used for prediction. These graphs are the result from monitoring and calculating the decay of the ground vibration and air blast.

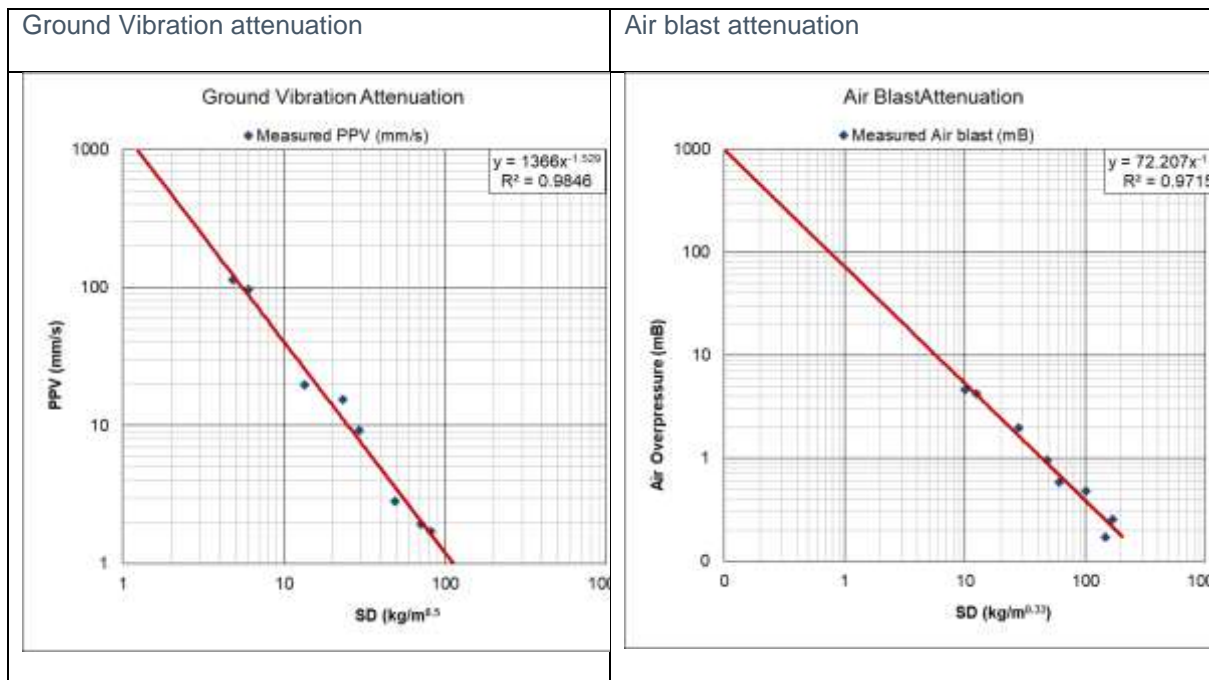


Figure 52: The attenuation for ground vibration and air blast

The tests conducted showed data to comply with expected outcomes very good correlation coefficients. There is no reason to believe that this data cannot be applied for prediction of ground vibration and air blast for the project. It should however be mentioned that air blast is dependent on external factors such as meteorological conditions. The data presented is a good baseline but may differ with changes in temperature, wind strength and directions for instance.

Chapter K: Archaeology and Cultural History

Existing Mining Operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

An archaeological and cultural survey was carried out by the McGregor Museum in August 1999.

Three separate areas were assessed for archaeological importance, namely:

- Gorrokop:
 - Later Stone Age and Middle Stone Age material was found on the surface in the general vicinity of two springs at the crest of the escarpment. This spring is located 3 km from the current active mining operation. The grave of Adam Jonkers, dated 1894 is also close to the springs in question.
- Grootkloof:



Stone artefacts were found in fair profusion on the slopes of the escarpment in the vicinity of the hut built by the mine manager in 1963. On the southern side of the kloof, which is conserved by the mine as a nature reserve, three localities containing finger paintings of exceptional quality have been identified. These painting have been described as “the best preserved in the area” and are amongst the most elaborate of their kind along the Ghaap escarpment (Morris, 1999).

- Present Mining Operation:

Surface areas adjacent to and up-slope from the existing quarries were inspected for traces of archaeological material and no significant findings were identified.

Proposed Bergville Project

A brief overview of pre-historical and historical information can be obtained from the document *titled 1st phase H.I.A. of a study area that includes portion 3 (Bergville) of the farm Hondefontein 216, portion 2 of the farm Vogelfontein 176 and a portion of Erven 4 Delportshoop, Kimberley district Northern Cape for: AfriSam – Ulco. Northern Cape*, dated 2018 and compiled by S. Miller.

The general area is known to contain both Early as well as Later Stone Age sites as well as engraving sites. On the study area, no Stone Age (either Early, Middle or Later) artefacts were observed. Neither were there any engravings or other rock art observed. Furthermore, the area investigated revealed no indication of Iron Age settlement. On and around the farmyard of the property under investigation there remain some buildings and structures related to farming activities that fall under the protection of the heritage law under the 60 year rule. These include a reservoir, a well, a milking shed and several canals related to flood irrigation. The graves observed are those of two white pioneer farmers, as well as approximately 20 other graves that could not be linked to any family as they bear no engraved head stones. These are most probably the graves of labourers on the farm as well as their families. In 10 years' time as the mining progresses, these heritage remains will become an impediment and second phase studies may be undertaken and demolition applications could be made at the provincial Heritage Authorities in Kimberley. In the same way, the white pioneer graves and the other 20 labourers' graves may be treated similarly. If they do not impede the mining process they may be left in place. On the other hand, depending on the proposed mining plans, these graves may be relocated to the most suitable position.

In addition to the Heritage Impact Assessment a desktop palaeontological study was conducted in December 2019 by Dr. Heidi Fourie entitled: *Palaeontological Impact Assessment: Desktop Study AfriSam (South Africa) Properties (Pty) Ltd: Ulco Cement Plant and Mining Operation: Proposed Bergville Project Dikgatlong Local Municipality, Frances Baard District Municipality, Northern Cape Province. Farm: Portion 3 (Bergville) of Hondefontein 216, Portion 2 of Vogelfontein 176, Portion of Erven 4 Delportshoop*. A brief overview of the information contained in the above mentioned report is provided below.

When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desk top and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas



within the development footprint where specialist palaeontological mitigation during the construction phase may be required (SG 2.2 SAHRA AMPHOB, 2012). The Cenozoic Era, in which we are presently living, is popularly known as the 'Age of the Mammals'. Its fossils are preserved on the river gravel terraces (Cornelia), cave systems (Makapan), coastal plains (Langebaanweg), and basins. The Cenozoic Era of South Africa has been subdivided into six African Land Mammal Ages, namely, Recent, Florisian, Cornelian, Makapanian, Langebaanian, and Namibian (MacRae 1999). Significant fossil finds in the Free State are recorded from Cenozoic aged superficial deposits at specific localities such as Florisbad, Cornelia and others. The fossils recorded include bones and teeth of mammals, reptiles, fish, freshwater molluscs, petrified wood, trace fossils, rhizoliths and diatom floras (Groenewald and Groenewald 2014). A very wide range of possible fossil remains occur in the Cenozoic, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size. They are the result of algal growth in shallow water, indicating a very rich growth that would have caused an enrichment in the amount of oxygen in the atmosphere (Groenewald and Groenewald 2014). The Quaternary deposits are covered by the Heritage Impact Assessment and if fossils are present these should be studied by an archaeozoologist as they do faunal lists through identification of individual skeletal elements. Groenewald and Groenewald 2014 described these as alluvial deposits associated with recent water courses of main rivers and streams. These sediments are presently not well studied and records of fossil occurrences are mainly associated with archaeological reports. The floodplains are protected by the 1:100 and 1:50 year flood lines that cannot be intruded during construction, except for roads, services and parking areas. Fossils have not been found during mining of the present Ulco mine. Taung is north of Kimberley closer to Vryburg and is known for the Taung child or Australopithecus africanus. Another well-known site is that of Florisbad near Bloemfontein which yielded archaic Homo sapiens. Early in the Palaeocene, mammals of all types became abundant and at the beginning of the Miocene the primates became abundant and approximately eight million years ago the first hominin lineage is seen (McCarthy and Rubidge 2005). Shallow marine and lacustrine stromatolites in carbonites, organic-walled microfossils in siliciclastics/cherts/carbonates may be present in the Ghaap Group (Almond and Pether 2009) Summary below.

<p>Transvaal Supergroup shallow marine and lacustrine stromatolites, organic-walled microfossils c. 2.7-2.5 Ga</p>	<p>Ghaap Plateau <i>etc</i></p>	<p>Record of early microbial-dominated life in shallow seas and lakes of Early / Mid Precambrian</p>
---	---------------------------------	--





Figure 53: Photograph of a stromatolite (Elize Butler).

Marine invertebrates, including cephalopods, bivalves and brachiopods, have been found near the base of the Prince Albert Formation at Douglas (WSW of Kimberley) (Johnson 2009). Cephalopods, brachiopods (*Attenuatella*) and lamellibranchs (*Phestia*, *Nuculopsis*) are found in calcareous concretions, which also contain palaeoniscoid fish (*Namaichthys*), coprolites, fossil wood (*Glossopteris*), and the mineral glauberite. Localities are on Blaauw Krantz and Zand Bult (McLachlan and Anderson 1973). Fossil shark (*Neurocranium*) also occurs near Klaarstroom and ichnofossils near Kimberley (Cole 2005).

Table 21: Taken from *The Palaeotechnical Report* (Almond and Pether 2009).

<p>19. OTHER CAENOZOIC FLUVIAL, LACUSTRINE & TERRESTRIAL DEPOSITS OF INTERIOR</p> <p>(Most too small to be indicated on 1:250 000 geological maps)</p> <p>eg Kwaggaskop, Dasdap, Vaalputs, Arries Drift, Windsorton, Rietputs, Riverton Fms</p>	<p>Fluvial, pan, lake and terrestrial sediments, including diatomite (diatom deposits), pedocretes, spring tufa / travertine, cave deposits, peats, colluvium</p> <p>Late Cretaceous /Palaeocene to Holocene</p>	<p>Bones and teeth of wide range of mammals, including mammals (eg teeth & bones of mastodont proboscideans, rhinos, bovids, horses, micromammals), reptiles (crocodiles, tortoises), ostrich egg shells, fish, freshwater and terrestrial molluscs (unionid bivalves, gastropods), crabs, trace fossils (eg termitaria, horizontal invertebrate burrows, stone artefacts), petrified wood, leaves, rhizoliths, diatom floras, peats and palynomorphs.</p> <p>Calcareous tufas at edge of Ghaap Escarpment might be highly fossiliferous (cf Taung in NW Province – abundant Makapanian Mammal Age vertebrate remains, including australopithecines)</p>	<p>Scattered records, many poorly studied and of uncertain age</p> <p>Reflect ancient drainage systems of subcontinental interior (eg Geelvloer – Koa River Valley system, Palaeo-Orange and Vaal systems)</p> <p>Include fossil equivalents of famous Arriesdrift Mid Miocene fauna from S. Namibia (eg at Boskuispan, Proto-Orange Terrace Gravels of lower Orange River)</p> <p>Fossils threatened by alluvial diamond mining (Vaal & Mid to Lower Orange River gravels)</p> <p>Orange River Man (100-50 Ka, <i>H. heidelbergensis</i>)</p> <p>See archaeological literature for fossil & subfossil remains from archaeological sites (eg Wonderwerk Cave nr Kuruman, Kathu Pan near Sishen)</p>
--	--	--	---



<p>2. TRANSVAAL SUPERGROUP</p> <p>2c. Postmasburg Group (Vmk, Vo) 2b. Ghaap Group (Vsc, Vvs, Vca, Va, Vk) 2a. Vryburg Fm (Vv)</p>	<p>Dominantly shallow marine carbonate metasediments (low grade), deeper water BIF (ironstones, chert), subordinate siliclastic sediments, volcanics, tilitites</p> <p>L. Archaean / E. Proterozoic (Vaalken) c. 2.6-2.2 Ga</p>	<p>Shallow marine and lacustrine stromatolites in carbonates organic-walled microfossils (eg cyanobacteria) in siliciclastics / cherts / carbonates</p> <p>Controversial records of 2.2 Ga "trace fossils"</p>	<ul style="list-style-type: none"> • Classic Early Proterozoic stromatolitic successions (Ghaap & Postmasburg Groups of Griqualand West Basin) • Early continental shelf environments (margins of Kaapvaal Craton)
--	---	--	--

A very wide range of possible Quaternary fossil remains may occur, though these are often sparse, such as: mammalian bones and teeth, tortoise remains, ostrich eggshells, non-marine mollusc shells, ostracods, diatoms, and other micro fossil groups, trace fossils (e.g. calcretised termitaria, rhizoliths, burrows, vertebrate tracks), freshwater stromatolites, plant material such as peats, foliage, wood, pollens, within calc tufa. Stromatolite structures range from a centimetre to several tens of metres in size. They are the result of algal growth in shallow water, indicating a very rich growth that would have caused an enrichment in the amount of oxygen in the atmosphere (Groenewald and Groenewald 2014). Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to be determined due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot.

Chapter L: Sensitive Landscapes

Existing Mining Operations

The information contained in the baseline environment for this section was informed by the *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Impact Assessment & Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

Originally, the only wetland identified within Ulco's mining right area was an endoreic pan located approximately 1 km north of the current primary limestone quarry. The pan in the Ulco mining right area can be described as a terminal water body of an endoreic or inwardly draining drainage systems (also known as playas in arid areas). Pans of this nature accumulate salts, and in the case at Ulco, form calcareous pans which support plant species (often range restricted endemics) especially adapted to survive in pan habitats, such as *Ruschia lawsonii*.

In addition, there were no natural wetlands occurring in the area demarcated for mining between 2011-2013. However, as a result of the mine channelling surface water from the secondary limestone quarry into the lowest point within the Harrison area, two man-made wetlands have been established. The wetlands support a reed-bed, which acts as a natural filter, trapping sediments within the surface runoff generated in the mining area, before the water either seeps out of the mining area or infiltrates.

As Ulco is currently considering extending their operations to the north of the secondary quarry, AfriSam (South Africa) (Pty) Ltd appointed MojaTerre (Pty) Ltd, in June 2016, to assess two existing water features within the vicinity to determine their wetland status.

The report confirmed the presence of wetland conditions at the sites, though partly artificial as originally anticipated

■ Hydrophilic Vegetation



At both Wetland 1 and 2 hydrophilic vegetation, including: *Phragmites australis*, *Andropogon eucomus*, *Juncus rigidus* and *Juncus c.f. dregeanus* was identified.

- **Soil Form and Wetness**

At Wetland 1 very little soil is present due to the mining activities that have taken place. Rock was encountered within 30cm and there is a thin layer of silt and gravel. At Wetland 2 the soil morphology is more advanced with distinct iron-oxide mottles and gleying, indicative of a fluctuating water table. The soil is also slightly deeper suggesting that Wetland 2 may be older and more natural than Wetland 1.

The soil wetness indicator was met for both wetlands and the soil form indicator was met at Wetland 2 due to the presence of a Katspuit soil form but not at Wetland 1 as there has been insufficient pedogenesis since the mining operations.

- **Terrain**

Both Wetland 1 and 2 occupy foot slope positions in the mined landscape albeit by artificial means. The mined topography enables water to accumulate, while the old mining face acts as a berm.

- **Hydrology**

While a hydrological study would be required to accurately verify the source of water for both Wetland 1 and 2, it appears that the source of water flowing into Wetland 1 is artificial; from an aquifer that was intercepted during mining, whereas Wetland 2 is much drier and therefore most likely influenced by rainfall runoff rather than groundwater.

In 2017 an additional wetland study was conducted by Scientific Aquatic Services Cc. During the site assessment several watercourses were identified within the Mining Right area. The delineation of these watercourses in relation to the study area is presented in Figure 55 and Figure 56



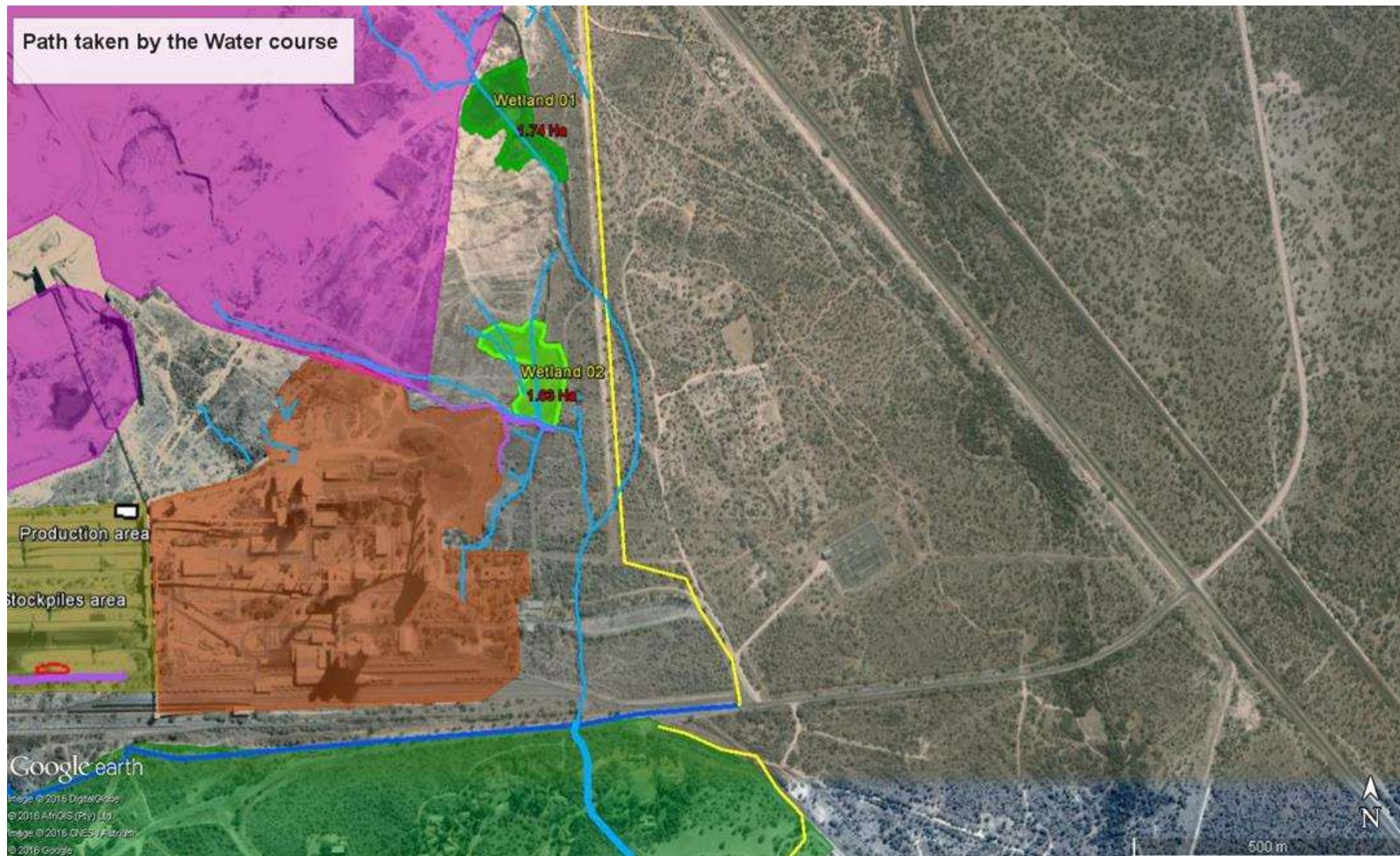


Figure 54: Ulco mine wetland 1 and wetland 2



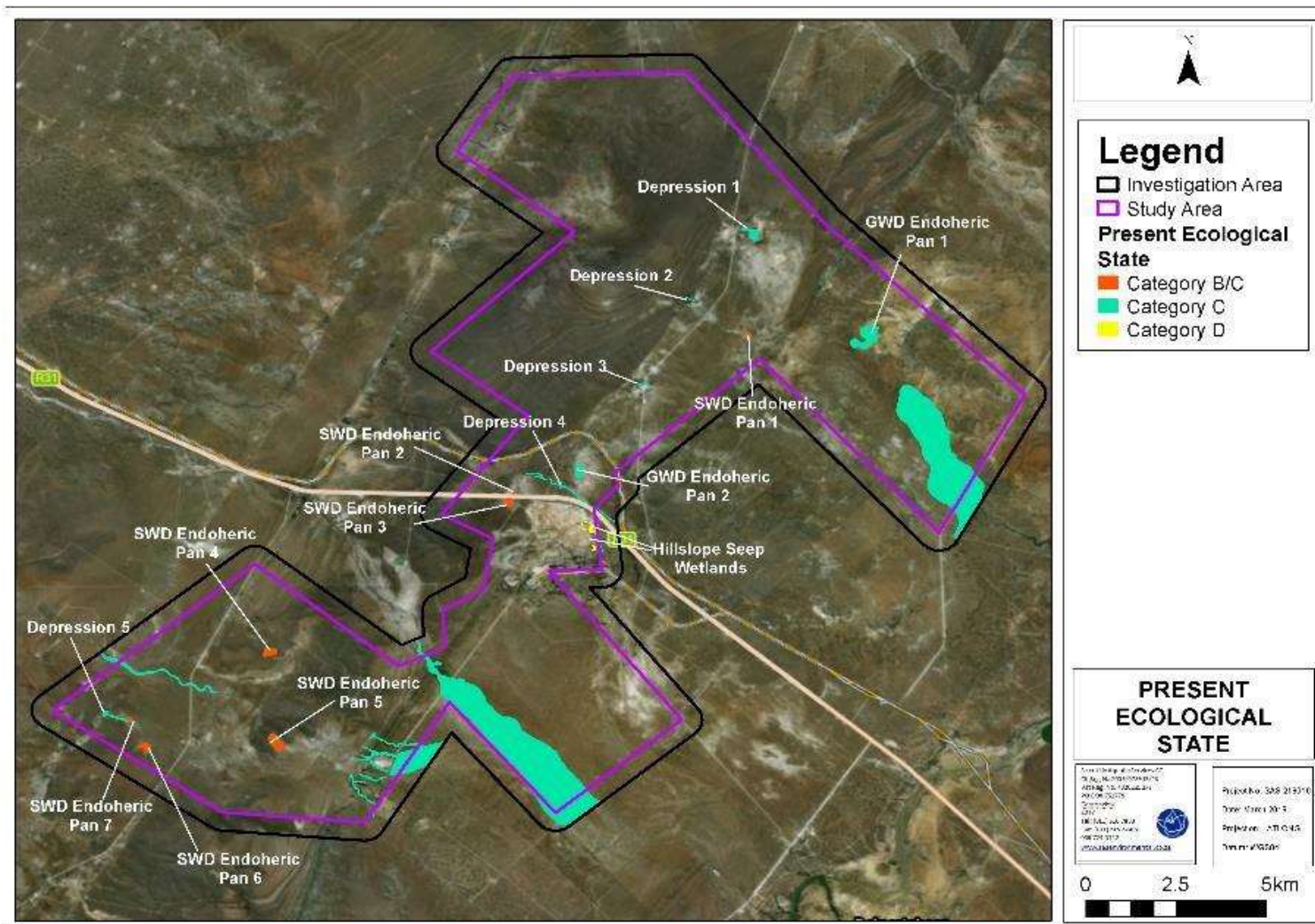


Figure 55: Present Ecological state of the wetlands within the Mining Right area



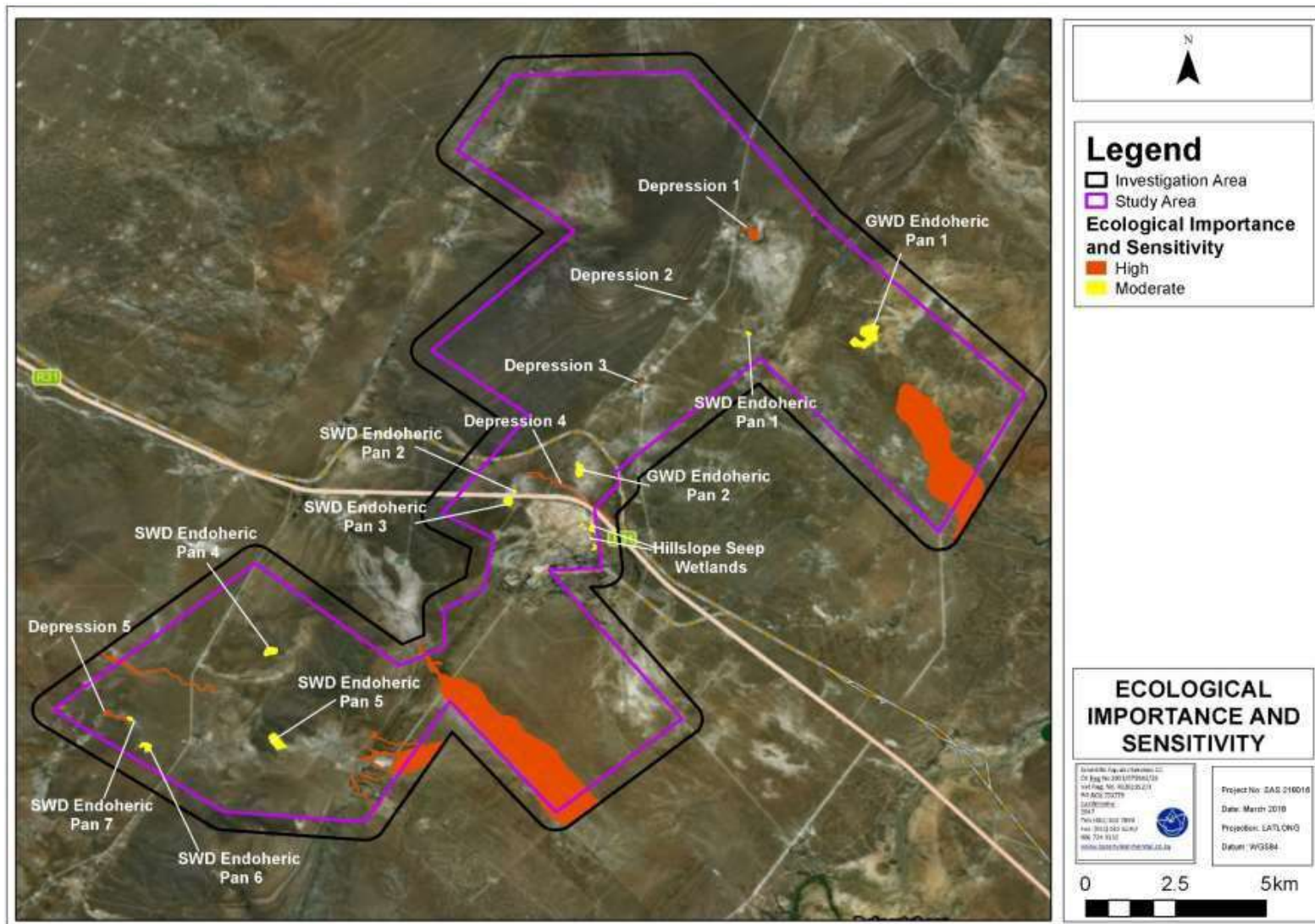


Figure 56: Ecological Sensitivity of the wetlands within the Mining Right area



Proposed Bergville Project

The information contained in the baseline environment for this section was informed by the *Freshwater ecological assessment as part of the environmental authorisation process for the Ulco AfriSam Mining operation, near Kimberley, Northern Cape province*, dated April 2019 compiled by Scientific Aquatic Services Cc.

Three freshwater resources were identified in the study area. A pan wetland is located within the central portion of the study area. Historically, the surrounding terrestrial area to this pan has been cultivated. More recently, these old abandoned fields and the pan are being grazed and trampled by livestock. An ephemeral³⁸ drainage line with riparian vegetation was identified within the southern portion of the study area. Located within the western portion of the drainage line is a depression wetland. The depression wetland is fed by the drainage line and water leaves the depression via the drainage line, this system is thus exoreic and considered linked to the adjacent drainage of the area.

Also, several areas of depression were identified within the study area, within the temporary zone of the pan and within the terrestrial areas. It is assumed that these areas have been created due to subsidence from the underlying limestone being dissolved by the shallow water table of this area, corresponding with the cavity clusters identified within the GPR survey.

Groundwater is deemed the main hydrological driver of the pan and depression wetlands, whilst surface water is present within the drainage line only during periods of rainfall. These freshwater resources could be dry for relatively long periods of time between temporary flooding. This is mainly due to a high evaporation rate and low precipitation received in this part of the country.

The results of the watercourse characterisation are summarised in the table below.

Table 22: Characterisation of the watercourses identified within the study area.

Watercourse	Level 3: Landscape Unit	Level 4: HGM Type
Pan and Depression	Valley floor: the base of a valley, situated between two distinct valley side-slopes, where alluvial or fluvial processes typically dominate	Depression: a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates
Ephemeral drainage line	Plain: an extensive area of low relief. These areas are generally characterised by relatively level, gently undulating or uniformly sloping land with a very gentle gradient that is not located within a valley. Gradient is typically less than 0.01 or 1:100.	River: a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water (It should be noted that the above-mentioned description applies only to true riparian systems/true watercourses. Since the episodic preferential flow paths identified within the study area are not true watercourses, this description does not strictly apply.)

³⁸ Ephemeral rivers flow for less time than they are dry. Flow or flood for short periods of most years in a five-year period, in response to unpredictable high rainfall events." (Rossouw et. al, 2006)



PES and EIS of the watercourses

Pan wetland located within the central portion of the study area

PES Category: C (Moderate). Impacts on this pan are mainly due to the transformation of the surrounding area of the pan, particularly due to historical agricultural activities within the buffer zone of the pan, and recently, from the trampling and grazing of livestock within the pan. Various trenches draining water into and from the pan has been created. Several areas of depression, assumed to be from subsidence of the underlying limestone dissolving in the shallow water table (thus forming underground cavities), is also present within the eastern temporary zone of the wetland.

EIS Category C (Moderate). Although the ecological integrity of the pan has been compromised to a certain degree, especially as a result of the extensive livestock grazing and historical agricultural activities, the pan is still considered to provide habitat for a variety of species, and is important on a landscape scale. A portion of the pan is also classified as an ESA by the Northern Cape Critical Biodiversity Database (2016).

Ephemeral drainage line with riparian vegetation, located within the southern portion of the study area

PES Category: C (Moderate). VEGRAI Category: C. This drainage line occurs at a position in the landscape where runoff flows as surface water over the impermeable bedrock at the point of outcropping. The riparian vegetation cover within the marginal zone remains fairly intact and indicative of the natural species composition expected in the vegetation type, however, some invasive species were present in areas which are extensively trampled. Farm roads, trenches, fences and powerlines which traverse some portions of this drainage line, have resulted in localised incidences of increased sediment inputs and altered flow patterns during rainfall events, which has altered the overall ecological integrity of this feature.

EIS Category B (High): This drainage line is considered of high ecological importance due to its hydro-functional importance (with specific mention of the streamflow and flood attenuation it provides), and because it forms part of an ESA (Northern Cape Critical Biodiversity Database, 2016). This drainage line also has a diversity of habitat types to host a variety of species.

Depression wetland located within the southern portion of the study area

PES Category: B (Largely natural with few modifications). This depression wetland is considered to be largely natural, mainly because it is partially secluded by the surrounding tree species from any livestock to enter this wetland. The vegetation component of this wetland is considered largely intact. The hydrology of this wetland has been impacted on to some degree, mainly by an informal road located within the northern portion of the wetland and the construction of a powerline within close proximity of the wetland.

EIS Category B (High) As with the drainage line this depression is connected to, this wetland is also considered of high ecological importance due to its hydro-functional importance (with specific mention of its nutrient assembly), and because it forms part of an ESA (Northern Cape Critical Biodiversity Database, 2016).



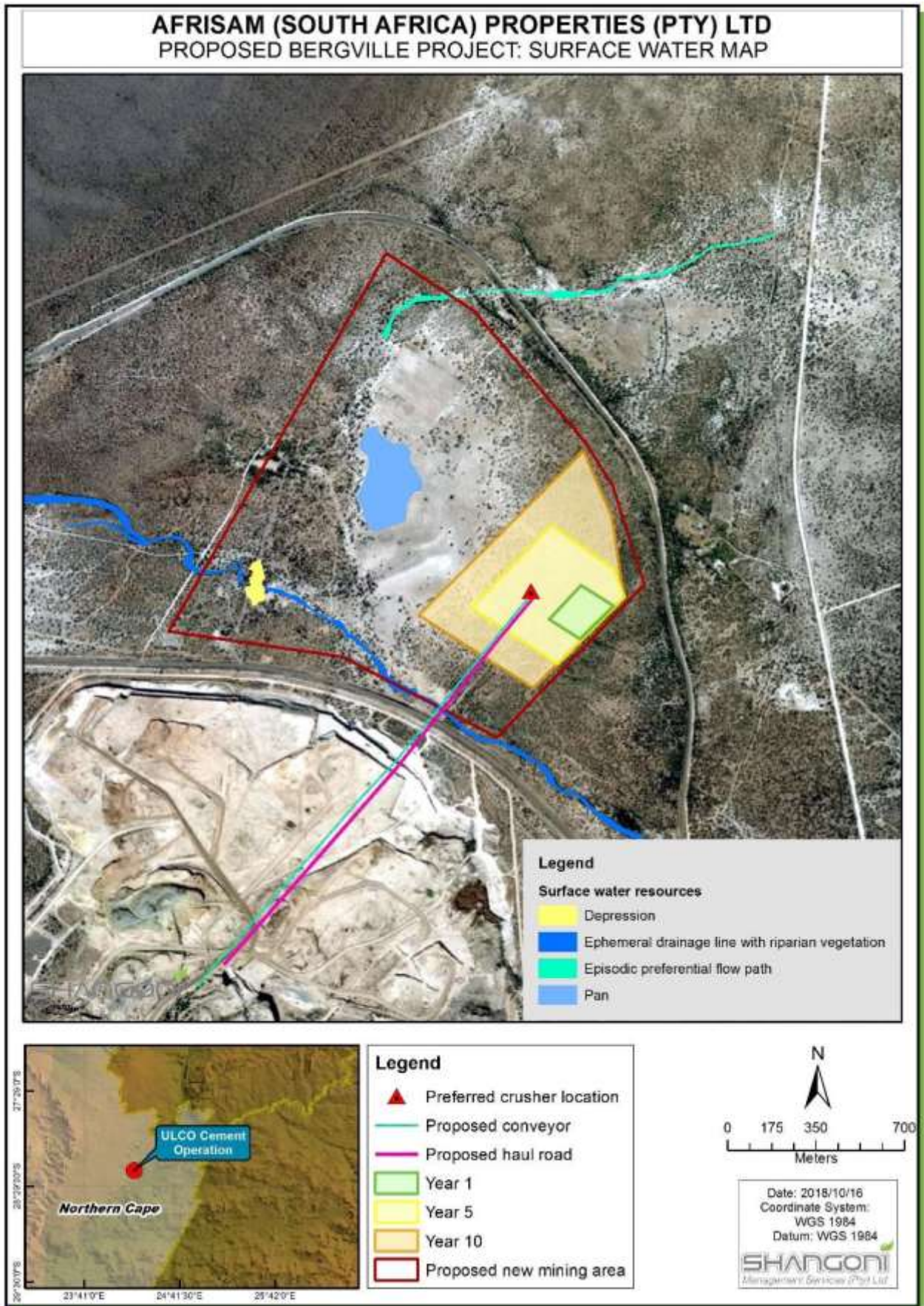


Figure 57: Freshwater resources associated with the Bergville Project



Chapter M: Visual Aspects

The area can be described as being essentially flat with two prominent base levels, one below the escarpment, which lies west of the existing Ulco operation, and the Ghaap Plateau above. The edge of the scarp trends in a north-east south-westerly direction and reaches a maximum exposed height of 100 m some distance south of the existing Ulco operation. At Ulco and its surroundings, the height of the scarp averages 75 to 80 m, being near vertical except where secondary limestone deposits drape over it such as the Bergville-Harrison quarry area and Gorrokop as well as north of the main tarred road traversing the area. Beneath the escarpment, the land drops gently away from the Ulco township / factory area at a gradient of $\pm 1:110$ (i.e. 90 m over 10 km) eastwards down to the confluence of the Harts and Vaal Rivers. West of the Ghaap Plateau the land rises at an average gradient of 1:60 (122 m in 7 km) in a westerly direction. Small gently rounded hillocks of up to 15 m in height do occur on the escarpment which is incised by many intermittent streams, especially at the escarpment edge. Figure 58 below provides a visual indication of the natural topography of the area. Due to the nature of the topography and the distance from the existing provincial road, the proposed crusher and mining activities will be visible from the provincial road.

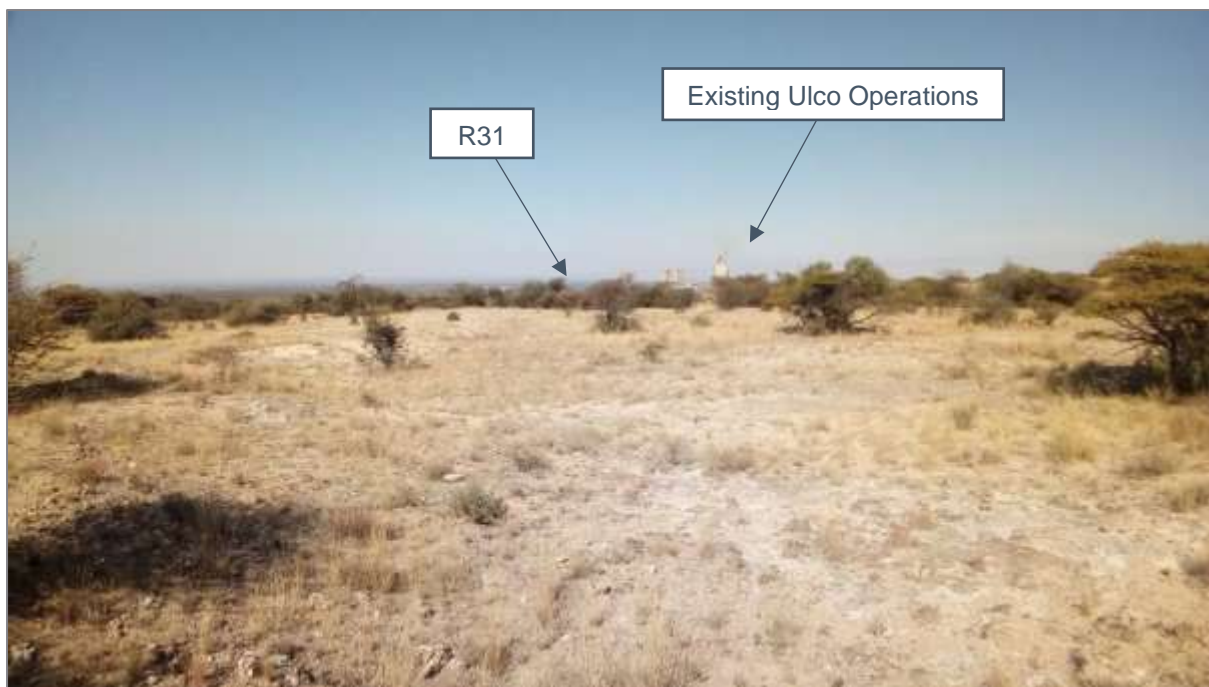


Figure 58: View of Ulco operation from the study area with the R31 traversing

Chapter N: Regional Socio-Economic Structure

The information concerning the socio-economic information has been extrapolated from the *Ulco Cement Plant and Mining Operation: Social and Labour plan* dated December 2017.

Ulco operation is located within the Northern Cape Province, the Frances Baard District Municipality and Ward 6 of Dikgatlong Local Municipality. The majority of the labour used by Ulco operation is sourced from Dikgatlong Municipality (79%) and more specifically the towns of both Ulco and



Delportshoop. Due to the rural location of Ulco and the fact that the majority of labour is sourced locally, all the focus of this socio-economic information is focused in the Dikgatlong Local Municipality. There are 7 different wards in Dikgatlong of which Ulco falls within Ward 6. The background information provided below concentrated on providing an indication of the socio-economic status of both Dikgatlong Municipality and Ward 6 of Dikgatlong. Dikgatlong Municipal building is situated in Barkley West.

Population

The Dikgatlong Local Municipality covers an area of 7 315 km² and according to the 2011 census has a population of 46,841 which equates to a population density of approximately 6 persons per km². The economically active population accounts for 63.1% of the population while 39.7% are unemployed. The municipality's main economic activities are mining and agriculture. Over 15% of the households in the municipality receive no income. Ulco village has a population of approximately 1 500.

Of the population in Dikgatlong Local Municipality, 58.5% are black African, 28.5% are Coloured, 3.6% are White, and 0.6% are Indian. Setswana (52%) and Afrikaans (39%) are the most prominent spoken languages in the area.

Unofficial feedback from the LED Manager for Dikgatlong Local Municipality (Mr George Damoense) indicated that the population has increased over the last few years and may be as high as 60 000.

The main communities which fall into the Ulco area of influence include:

- Delportshoop;
- Tidimalo;
- Proteahof;
- Rooikoppies;
- Sydney-on-Vaal;
- Longlands; and
- Vaal Gamagarra.

Employment

The survey commissioned by the Company in 2003 and conducted by Ayanka Development Agency presents a far worse picture regarding employment in the Delportshoop area – unemployment in the area is estimated in this survey to be between 94% and 98%. The reasons behind the high unemployment rates have been documented as follows:

- Illiteracy - most people cannot be hired due to the standards set by the employers;
- Lack of training;
- Retrenchment from the diamond mining industry;
- Lack of transport denies people the opportunity to seek employment; and
- Lack of job opportunities.

The higher unemployment figures in the survey compared to those provided by the census figures have been verbally confirmed by a number of community representatives in the area.



Housing

The IDP indicates that each household has on average 3.7 people. A site visit to the area revealed that housing standards vary. There is a high concentration of formal houses in Delportshoop; RDP housing is prevalent in Protehof, Timimalo, Rooikoppies; and there is informal housing in Longlands. The IDP Review for 2015/2016 identifies housing and land as the number 1 priority issue.

All Ulco employees and contractors, who are based at Ulco, are provided with housing at Ulco. It should be noted that in 2005, Ulco won the Cleanest Mining Town Award for the Northern Cape.

Education

Various site visits to the communities revealed a high number of school-going children within the local area. The IDP states that there are 27 schools in the municipal area, of which 14 are farm schools. The following schools operate within the area of influence of Ulco:

- Delportshoop Primary School – currently 861 learners up to Grade 7;
- Dikgatlong Secondary School – currently 982 learners in Grade 8 – 12;
- Francis Mohapanele Primary School – currently 549 learners up to Grade 7;
- G.N. Pressly Primary School in Longlands – currently 562 learners up to Grade 7;
- Hoërskool Delportshoop – currently 443 learners in Grade 1 – 12; and
- Primary School – currently 73 learners up to Grade 7.

In addition, Ulco has three pre-primary schools and there are a further three pre-primary schools in the communities.

Water Supply

The Ulco village receives the majority of its water from the Vaal River, via purification works, which is owned and maintained by the Company.

Power supply

More than half (75.9%) of the total number of households in Dikgatlong Local Municipality use electricity as a source of lighting. Of the remainder, 18.7% use candles and 5.2% use either solar power, gas or paraffin.

Sanitation

In the Dikgatlong Local Municipality as a whole, flush toilet sanitation systems have increased dramatically since 1996. At the same time, there has been a decrease in households using bucket latrines. There has been a strong drive by the Local Municipality to eradicate the bucket latrine toilet system in the past few years and since 2001 a total of 3 816 flush toilets have been constructed in Dikgatlong Local Municipality.

Waste

The landfill site in Delportshoop is in a poor condition. There is no proper security at the site, settling ponds for sewage are easily accessed and the waste is not dealt with in an acceptable manner.



7.4.2 Description of the current land uses

Ulco is located within a rural area of which the surrounding land is predominantly used for grazing purposes. Approximately 15% of the surrounding land use can be classified as wilderness. The closest built up area that is not associated with the mine is Delpportshoop, which lies approximately 17 km south east of Ulco. There is a village adjacent to the cement plant that is used to house the employees of Ulco.. The closest built up area (to the Bergville project) is the existing Ulco operation that is 200 m to the south. Refer to Figure 59 for a visual indication of the surrounding land use.





Figure 59: Plan showing the mining right area and surrounding land use



7.4.3 Description of specific environmental features and infrastructure on the site

Various drainage lines as well as a pan are specific environmental features identified on site. The drainage lines are considered to be of moderately-high sensitivity. The pan is considered to be of high sensitivity. Specific infrastructures on site include a farmyard with a well, a reservoir, a milking shed, sheep dip and various forms of flood irrigation canals. Various graves are also present on the site. A building (Ghaap station) containing the signal control system for a section of the railway line running from the north east to southeast adjacent to the site. On the western side of the site a farm dumping site is present as well as a station and cattle loading platform.

7.4.4 Environmental and current land use map

Refer to the figure below for an indication of the current land use and environmental features present.



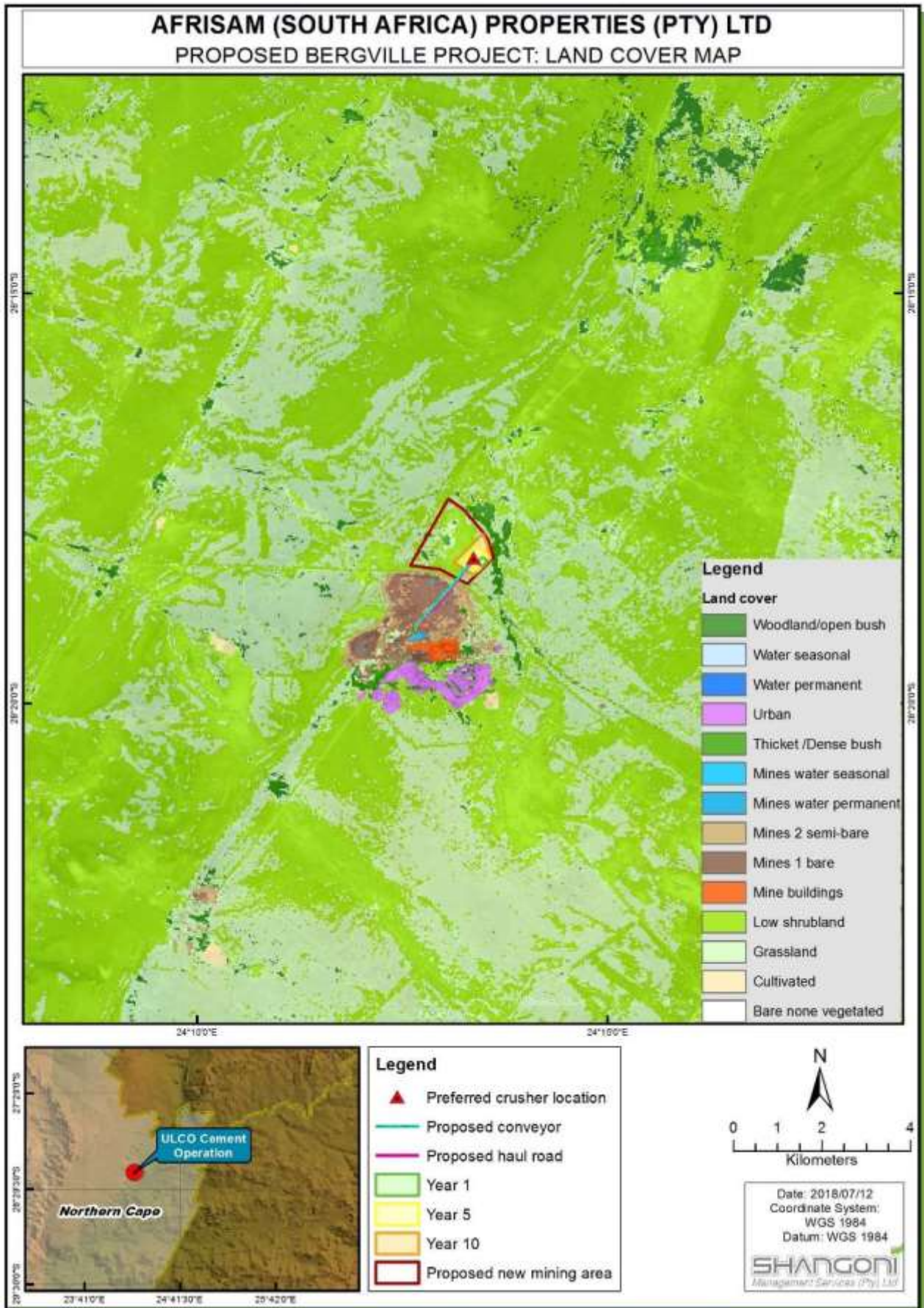


Figure 60: Land Use Map associated with the Bergville Project.

7.5. Impacts and Risks Identified

7.5.1 Existing Ulco operations

The following information was obtained from the approved *AfriSam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Management Programme* compiled by Umhlaba Environmental Consulting Cc dated 2005.

Table 23: Impacts and Risks identified including mitigation/management measures included in the EMP³⁹

No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
Mining Department: Mine and resource planning												
1.1	Geology	Mining Department: Mine and resource planning	Effective mine planning results in optimal utilisation of mineral resources. Clinker manufacturing is reliant on a specific grade of limestone to be processed. Through mine planning, low and high grade limestone reserves can be blended to generate the ideal grade for Clinker production. Through blending of reserves, there is less geological waste and therefore less impact on the land per ton of clinker generated. The positive impact of mine planning can be summarized as;	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	H +		Control	On-going prospecting: <ul style="list-style-type: none"> Ulco will continue with prospecting activities (drilling) of all future mining areas to determine the quality of the mineral deposits within the mining right area. The results from the prospecting will be used in generating the long term mine plans, which will include; <ul style="list-style-type: none"> The future mining of the existing quarries The development of the new quarries The positioning of haul roads. All prospecting sites will be concurrently rehabilitated after drilling activities at the site is completed. 	To optimise utilisation of mineral resources within the mining right area and to mitigate the generation of mining waste.	LOM	
									Day to day mining requirements: <ul style="list-style-type: none"> Variable qualities of limestone, dolerite and shale will be mined, blended and stockpiled homogeneously to ensure that the limestone stockpiles are suitable for clinker production and to minimise geological waste. The mine will use feedback from laboratory analysis on the quality of the limestone and shale to ensure that the correct quality of material is being fed to the stockpiles for clinker production. 		LOM	
									Drill hole sampling: <ul style="list-style-type: none"> If necessary, as determined by the Quarry manager, drill hole sampling is to be implemented which will include: <ul style="list-style-type: none"> In the areas prepared for mining, a composite sample of the limestone fines from drill holes will be taken and analysed for chemical composition. The results of the samples will be used to plan where mining should take place within the quarry to ensure the correct quality of limestone blend for clinker production. 		As and when required	

³⁹ The risk assessment was obtained from the approved *Afrisam (South Africa) (Pty) Ltd - Ulco Cement Operation Environmental Management Programme* dated 2005 and compiled by Umhlaba Environmental Consulting CC.. Note that no significance rating after mitigation and compliance with standards was provided for in the approved EMP.



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<p>Surveyor requirements:</p> <ul style="list-style-type: none"> Face advances will be surveyed regularly by the mine surveyor and the working plan updated by the mine planner. <p>Quarry planning meeting:</p> <ul style="list-style-type: none"> The mine will implement quarry planning meetings where the following will be discussed: <ul style="list-style-type: none"> Planning for the next year's mining requirements based on the requirements for the kiln production through the creation of a short term mine plan. Environmental issues to be discussed and address in the short term mine plans will include (but not limited to); Storm water control. Rehabilitation Heritage findings Topsoil removal and use in concurrent rehabilitation. Final side wall design at the end of each mining phase. Historic /concurrent rehabilitation requirements (if any). Fire break requirements. Short term mine plans will be implemented by the Quarry Manager. <p>Mine plans / Aerial photographs:</p> <ul style="list-style-type: none"> The mine will update and submit to the DMR the statutory mine plans using a surveyor. Future mine plans will (at least) show; <ul style="list-style-type: none"> The amount of mining undertaken during the year. The location of rehabilitated areas. A 9m buffer zone along the boundary of the mining right area – no mining will be allowed within 9m of the boundary of the mining right area. The 100m buffer zone around the endoreic pan Aerial photographs will be taken to provide proof of the concurrent rehabilitation 		<p>On average Bi-annually</p> <p>Bi-annually</p> <p>Annually</p>
Mining Department: Haul road construction												
2.1	Topography, Soils Land use and land capability	Mining Department: Haul road construction	Loss of topsoil During the clearing of the area to create the haul road topsoil may be lost. It is vital to keep topsoil for future rehabilitation. The amount of topsoil associated with haul roads is minimal.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance			Control	<p>Haul road construction:</p> <ul style="list-style-type: none"> All haul roads will be planned so as to take the shortest possible distance to access the required reserves, as determined by the mine plans, while avoiding sensitive environmental features such as: <ul style="list-style-type: none"> Endoreic pans. Areas that fall outside future mining areas. 	To position the route of haul roads to ensure that the limestone reserves are accessed in the shortest possible route (to save fuel) and not to go through sensitive environmental features.	During haul road construction



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> See generic management measures for management of both heritage resources and red data plants Topsoil will be removed ahead of the haul road development and either stockpiled or used in concurrent rehabilitation. During haul road construction (as per appropriate work instruction) the following environmental parameters will be considered: <ul style="list-style-type: none"> Free draining of rain water falling on the haul roads. Allow natural drainage of surface water underneath the haul road, using culverts if necessary, to cater for a 1:5 year storm event. Appropriate compaction to reduce the future generation of dust as and when in use by haulage trucks. Raising of the haul road above the natural topography to ensure runoff does not flow over the haul road. 	Upon completion of haul roads they will be maintained in an acceptable standard.	
									<p>Haul road maintenance:</p> <ul style="list-style-type: none"> All haul roads in use by the mine will be monitored for; <ul style="list-style-type: none"> Free draining of rain water falling on the haul roads. Surface ponding adjacent to the haul road. Potholes and corrugation on the surface of the haul road. As and when any of the above are identified, maintenance of the haul road will be implemented, which could include: <ul style="list-style-type: none"> Should ponding be discovered either on the road or adjacent to the road, the mine will create the appropriate diversion / culvert channel to stop future ponding. All potholes will be fixed as and when identified. As and when surfaces become uneven from use (as determined by the haulage drivers) they will be re-graded. Culverts under haul roads will be inspected and if necessary cleared to ensure free flow of water. 		LOM	
2.2	Fauna and Flora	Mining Department: Haul road construction	Destruction of vegetation and habitats for faunal species. The small area affected by development of haul roads will have a minimal impact on flora and fauna.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance		Control	<p>Haul road construction:</p> <ul style="list-style-type: none"> All haul roads will be planned so as to take the shortest possible distance to access the required reserves, as determined by the mine plans, while avoiding sensitive environmental features such as: <ul style="list-style-type: none"> Endoreic pans. Areas that fall outside future mining areas. See generic management measures for management of both heritage resources and red data plants. 	To position the route of haul roads to ensure that the limestone reserves are accessed in the shortest possible route (to save fuel) and not to go through sensitive environmental features. Upon completion of haul roads they will be	During haul road construction	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> ▪ Topsoil will be removed ahead of the haul road development and either stockpiled or used in concurrent rehabilitation. ○ During haul road construction (as per appropriate work instruction) the following environmental parameters will be considered: ○ Free draining of rain water falling on the haul roads. ○ Allow natural drainage of surface water underneath the haul road, using culverts if necessary, to cater for a 1:5 year storm event. ○ Appropriate compaction to reduce the future generation of dust as and when in use by haulage trucks. ○ Raising of the haul road above the natural topography to ensure runoff does not flow over the haul road. 	maintained in an acceptable standard.	
									<p>Haul road maintenance:</p> <ul style="list-style-type: none"> ▪ All haul roads in use by the mine will be monitored for; <ul style="list-style-type: none"> – Free draining of rain water falling on the haul roads. ○ Surface ponding adjacent to the haul road. ○ Potholes and corrugation on the surface of the haul road. ▪ As and when any of the above are identified, maintenance of the haul road will be implemented, which could include: <ul style="list-style-type: none"> ○ Should ponding be discovered either on the road or adjacent to the road, the mine will create the appropriate diversion / culvert channel to stop future ponding. ○ All potholes will be fixed as and when identified. ○ As and when surfaces become uneven from use (as determined by the haulage drivers) they will be re-graded. ▪ Culverts under haul roads will be inspected and if necessary cleared to ensure free flow of water. 		LOM	
2.3	Fauna and Flora	Mining Department: Haul road construction	<p>Destruction of red data plant species.</p> <p>A limited number of red data species have been identified in the area of Ulco. Should the haul road be positioned in a manner that has a red data plant, it could be destroyed.</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance		Control	<p>Haul road construction:</p> <ul style="list-style-type: none"> ▪ All haul roads will be planned so as to take the shortest possible distance to access the required reserves, as determined by the mine plans, while avoiding sensitive environmental features such as: <ul style="list-style-type: none"> ○ Endoreic pans. ○ Areas that fall outside future mining areas. ▪ See generic management measures for management of both heritage resources and red data plant. ▪ Topsoil will be removed ahead of the haul road development and either stockpiled or used in concurrent rehabilitation. 	To position the route of haul roads to ensure that the limestone reserves are accessed in the shortest possible route (to save fuel) and not to go through sensitive environmental features. Upon completion of haul roads they will be maintained in an acceptable standard.	During haul road construction	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> ▪ During haul road construction (as per appropriate work instruction) the following environmental parameters will be considered: <ul style="list-style-type: none"> ○ Free draining of rain water falling on the haul roads. ○ Allow natural drainage of surface water underneath the haul road, using culverts if necessary, to cater for a 1:5 year storm event. ○ Appropriate compaction to reduce the future generation of dust as and when in use by haulage trucks. ○ Raising of the haul road above the natural topography to ensure runoff does not flow over the haul road. <p>Haul road maintenance:</p> <ul style="list-style-type: none"> ▪ All haul roads in use by the mine will be monitored for; <ul style="list-style-type: none"> – Free draining of rain water falling on the haul roads. ○ Surface ponding adjacent to the haul road. ○ Potholes and corrugation on the surface of the haul road. ▪ As and when any of the above are identified, maintenance of the haul road will be implemented, which could include: <ul style="list-style-type: none"> ○ Should ponding be discovered either on the road or adjacent to the road, the mine will create the appropriate diversion / culvert channel to stop future ponding. ○ All potholes will be fixed as and when identified. ○ As and when surfaces become uneven from use (as determined by the haulage drivers) they will be re-graded. ▪ Culverts under haul roads will be inspected and if necessary cleared to ensure free flow of water. 		LOM
2.4	Sites of Archaeological and Cultural Importance	Mining Department: Haul road construction	Potential destruction of heritage resources Should the haul road progress through an identified heritage resource then it could be destroyed resulting in a significant impact.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium Significance			Control and stop	<p>Haul road construction:</p> <ul style="list-style-type: none"> ▪ All haul roads will be planned so as to take the shortest possible distance to access the required reserves, as determined by the mine plans, while avoiding sensitive environmental features such as: <ul style="list-style-type: none"> ○ Endoreic pans. ○ Areas that fall outside future mining areas. ▪ See generic management measures for management of both heritage resources and red data plants. ▪ Topsoil will be removed ahead of the haul road development and either stockpiled or used in concurrent rehabilitation. ▪ During haul road construction (as per appropriate work instruction) the following environmental parameters will be considered: <ul style="list-style-type: none"> ○ Free draining of rain water falling on the haul roads. 	To position the route of haul roads to ensure that the limestone reserves are accessed in the shortest possible route (to save fuel) and not to go through sensitive environmental features. Upon completion of haul roads they will be maintained in an acceptable standard.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> o Allow natural drainage of surface water underneath the haul road, using culverts if necessary, to cater for a 1:5 year storm event. o Appropriate compaction to reduce the future generation of dust as and when in use by haulage trucks. o Raising of the haul road above the natural topography to ensure runoff does not flow over the haul road. <p>Haul road maintenance:</p> <ul style="list-style-type: none"> ▪ All haul roads in use by the mine will be monitored for; <ul style="list-style-type: none"> – Free draining of rain water falling on the haul roads. o Surface ponding adjacent to the haul road. o Potholes and corrugation on the surface of the haul road. ▪ As and when any of the above are identified, maintenance of the haul road will be implemented, which could include: <ul style="list-style-type: none"> o Should ponding be discovered either on the road or adjacent to the road, the mine will create the appropriate diversion / culvert channel to stop future ponding. o All potholes will be fixed as and when identified. o As and when surfaces become uneven from use (as determined by the haulage drivers) they will be re-graded. ▪ Culverts under haul roads will be inspected and if necessary cleared to ensure free flow of water 		
2.5	Surface water	Mining Department: Haul road construction	<p>Altered surface water run-off patterns.</p> <p>A haul road running through a surface water runoff channel could result in potential flooding or ponding. Storm water runoff requires consideration during the development of haul roads.</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	Significance	Control	<p>Haul road construction:</p> <ul style="list-style-type: none"> ▪ All haul roads will be planned so as to take the shortest possible distance to access the required reserves, as determined by the mine plans, while avoiding sensitive environmental features such as: <ul style="list-style-type: none"> o Endoreic pans. o Areas that fall outside future mining areas. ▪ See generic management measures for management of both heritage resources and red data plants. ▪ Topsoil will be removed ahead of the haul road development and either stockpiled or used in concurrent rehabilitation. ▪ During haul road construction (as per appropriate work instruction) the following environmental parameters will be considered: <ul style="list-style-type: none"> o Free draining of rain water falling on the haul roads. o Allow natural drainage of surface water underneath the haul road, using culverts if necessary, to cater for a 1:5 year storm event. 	To position the route of haul roads to ensure that the limestone reserves are accessed in the shortest possible route (to save fuel) and not to go through sensitive environmental features. Upon completion of haul roads they will be maintained in an acceptable standard.	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> o Appropriate compaction to reduce the future generation of dust as and when in use by haulage trucks. o Raising of the haul road above the natural topography to ensure runoff does not flow over the haul road. <p>Haul road maintenance:</p> <ul style="list-style-type: none"> ▪ All haul roads in use by the mine will be monitored for; <ul style="list-style-type: none"> – Free draining of rain water falling on the haul roads. o Surface ponding adjacent to the haul road. o Potholes and corrugation on the surface of the haul road. ▪ As and when any of the above are identified, maintenance of the haul road will be implemented, which could include: <ul style="list-style-type: none"> o Should ponding be discovered either on the road or adjacent to the road, the mine will create the appropriate diversion / culvert channel to stop future ponding. o All potholes will be fixed as and when identified. o As and when surfaces become uneven from use (as determined by the haulage drivers) they will be re-graded. ▪ Culverts under haul roads will be inspected and if necessary cleared to ensure free flow of water. 		
Mining Department: Stripping of Vegetation / Topsoil / Overburden												
3.1	Topography, soils Land use and land capability	Mining Department: Stripping of Vegetation / Topsoil / Overburden	<p>Sterilisation / Loss of topsoil.</p> <p>During the clearing of the area to expose the limestone, topsoil may be lost. It is vital to keep topsoil for future rehabilitation</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> ▪ To prevent pollution of soil through oil spillages from vehicles: <ul style="list-style-type: none"> o All vehicles used for stripping topsoil will be maintained as per the maintenance schedule (on average every 250 hours). o Vehicles will be inspected daily for signs of oil leaks prior to commencement of a shift. If leaks are discovered, they will be fixed prior to using the vehicle. <p>Generic topsoil management requirements:</p> <ul style="list-style-type: none"> ▪ No topsoil will be removed from areas demarcated as a sensitive feature (unless appropriate authorisation has been obtained); – Endoreic pans (100m). ▪ Topsoil will only be stripped a maximum of 6 months prior to an area being mined. ▪ Topsoil will be stripped a maximum of 200m ahead of the working face. When stripped the topsoil will be; <ul style="list-style-type: none"> o immediately transported to areas undergoing concurrent or historic rehabilitation. Or o transported to a topsoil stockpile. 	The goal is to only strip vegetation and topsoil as and when required (no more than 6 months prior to anticipated mining). Topsoil stripped ahead of the mining face should either be stockpiled or used for concurrent rehabilitation.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> After an area has been stripped of topsoil, it will be checked by a supervisor to ensure that all topsoil is removed. No topsoil will be stripped during periods of heavy rain. In the event that topsoil is required to be stockpiled, the following will be applicable: <ul style="list-style-type: none"> Stockpiles will be restricted to a height of 5m. Stockpiles will be protected from storm water runoff by appropriate profiling and placement of stockpiles. Stockpiles will be monitored for erosion and if discovered, the erosion will be fixed. Stockpiles will be monitored for establishment of alien vegetation, if discovered the vegetation will be removed. At no time is topsoil to be contaminated with rubble or rubbish (any foreign material such as waste drums or blasting waste etc.). This is applicable for both topsoil which has yet to be stripped, topsoil stockpiles and topsoil used in concurrent rehabilitation. 		
3.2	Fauna and Flora	Mining Department: Stripping of Vegetation / Topsoil / Overburden	<p>Destruction of vegetation and habitats for faunal species</p> <p>There are no ecologically unique ecosystems ahead of the mining face however due to the size of the potential area that will be affected by stripping of topsoil and vegetation, the impact is ranked as medium</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance		Control	<p>Removal of vegetation:</p> <ul style="list-style-type: none"> Vegetation will be bulldozed into piles ahead (up to 200m) of the mine face prior to stripping of topsoil. No other vegetation other than that required to be moved to facilitate mining will be destroyed. Vehicle movement will be restricted to the areas demarcated for mining and along demarcated haul roads. Before clearing for the next section of mining face, the piles of vegetation will be moved into the concurrently rehabilitated areas to act as a seed bank and organic matter in concurrent rehabilitation. 	The goal is to only strip vegetation and topsoil as and when required (no more than 6 months prior to anticipated mining). Topsoil stripped ahead of the mining face should either be stockpiled or used for concurrent rehabilitation	LOM	
3.3	Fauna and Flora	Mining Department: Stripping of Vegetation / Topsoil / Overburden	<p>Destruction of red data plant species</p> <p>A limited number of red data plants have been identified. Should stripping occur in an area which has a red data plant, it could be destroyed.</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance		Control	<p>Red data species / Heritage resources:</p> <ul style="list-style-type: none"> See generic management measures for both heritage and red data flora species requirements. 	The goal is to only strip vegetation and topsoil as and when required (no more than 6 months prior to anticipated mining). Topsoil stripped ahead of the mining face should either be stockpiled or used for concurrent rehabilitation.	None identified	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
3.4	Surface water	Mining Department: Stripping of Vegetation / Topsoil / Overburden	Altered surface water run-off patterns. Clearing of an area which acts as a natural surface run off channel could result in potential flooding or ponding.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	Storm water management: <ul style="list-style-type: none"> See generic management measures for storm water control requirements in the mining area. 	The goal is to only strip vegetation and topsoil as and when required (no more than 6 months prior to anticipated mining). Topsoil stripped ahead of the mining face should either be stockpiled or used for concurrent rehabilitation.	None identified
3.5	Surface water	Mining Department: Stripping of Vegetation / Topsoil / Overburden	Impact on water quality, By disturbing the surface vegetation, runoff will be subjected to increased sediment load which could impact on natural surface water quality.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	Generic topsoil management requirements: <ul style="list-style-type: none"> No topsoil will be removed from areas demarcated as a sensitive feature (unless appropriate authorisation has been obtained); – Endoreic pans (100m). Topsoil will only be stripped a maximum of 6 months prior to an area being mined. Topsoil will be stripped a maximum of 200m ahead of the working face. When stripped the topsoil will be; <ul style="list-style-type: none"> immediately be transported to areas undergoing concurrent or historic rehabilitation. Or transported to a topsoil stockpile. After an area has been stripped of topsoil, it will be checked by a supervisor to ensure that all topsoil is removed. No topsoil will be stripped during periods of heavy rain. In the event that topsoil is the following will be applicable: <ul style="list-style-type: none"> Stockpiles will be restricted to a height of 5m. Stockpiles will be protected from storm water runoff by appropriate profiling and placement of stockpiles. Stockpiles will be monitored for erosion and if discovered, the erosion will be fixed. Stockpiles will be monitored for establishment of alien vegetation, if discovered the vegetation will be removed. At no time is topsoil to be contaminated with rubble or rubbish (any foreign material such as waste drums or blasting waste etc.). This is applicable for both topsoil which has yet to be stripped, topsoil stockpiles and topsoil used in concurrent rehabilitation required to be stockpiled. 	The goal is to only strip vegetation and topsoil as and when required (no more than 6 months prior to anticipated mining). Topsoil stripped ahead of the mining face should either be stockpiled or used for concurrent rehabilitation.	LOM
3.6	Air quality	Mining Department: Stripping of Vegetation / Topsoil / Overburden	Generation of dust. Earth moving activities required for the stripping of the area will result in dust. The exposed surface left after the area has been stripped of vegetation will act as a potential source for wind-blown dust.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low	significance		Control	Generic topsoil management requirements: <ul style="list-style-type: none"> No topsoil will be removed from areas demarcated as a sensitive feature (unless appropriate authorisation has been obtained); – Endoreic pans (100m). Topsoil will only be stripped a maximum of 6 months prior to an area being mined. 	The goal is to only strip vegetation and topsoil as and when required (no more than 6 months prior to anticipated mining). Topsoil stripped ahead of the mining face should	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> Topsoil will be stripped a maximum of 200m ahead of the working face. When stripped the topsoil will be; <ul style="list-style-type: none"> immediately transported to areas undergoing concurrent or historic rehabilitation. Or transported to a topsoil stockpile. After an area has been stripped of topsoil, it will be checked by a supervisor to ensure that all topsoil is removed. No topsoil will be stripped during periods of heavy rain. In the event that topsoil is the following will be applicable: <ul style="list-style-type: none"> Stockpiles will be restricted to a height of 5m. Stockpiles will be protected from storm water runoff by appropriate profiling and placement of stockpiles. Stockpiles will be monitored for erosion and if discovered, the erosion will be fixed. Stockpiles will be monitored for establishment of alien vegetation, if discovered the vegetation will be removed. At no time is topsoil to be contaminated with rubble or rubbish (any foreign material such as waste drums or blasting waste etc.). This is applicable for both topsoil which has yet to be stripped, topsoil stockpiles and topsoil used in concurrent rehabilitation required to be stockpiled. 	either be stockpiled or used for concurrent rehabilitation.	
3.7	Sites of Archaeological and Cultural Importance	Mining Department: Stripping of Vegetation / Topsoil / Overburden	Destruction of heritage resources. If the stripping of vegetation goes through an identified heritage resource then it could be destroyed.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance		Control and stop	<p>Red data species / Heritage resources:</p> <ul style="list-style-type: none"> See generic management measures for both heritage and red data flora species requirements. 	The goal is to only strip vegetation and topsoil as and when required (no more than 6 months prior to anticipated mining). Topsoil stripped ahead of the mining face should either be stockpiled or used for concurrent rehabilitation.	None identified	

Mining Department: Drilling and blasting and secondary breaking.



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
4.1	Topography, Soils Land use and land capability	Mining Department: Drilling and blasting and secondary breaking.	Visual impact from the altering of the topography. The purpose of mining activities is to extract the mineral reserves which will have the inevitable effect of altering the topography of the land.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> ▪ Blasting activities will loosen mineral resources to align to the requirements of the short term mine plan. ▪ Concurrent rehabilitation will be implemented 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the desired fragmentation of the rock	LOM
4.2	Groundwater	Mining Department: Drilling and blasting and secondary breaking.	Water availability resulting from groundwater draw down. The lowering of the topography will have an effect of creating a localised geohydrological drawn down which will reduce the availability of water in boreholes in close proximity to the mine.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> ▪ The impacts of lowering the topography on ground water will be monitored via recording the depth of the ground water in the mining area from existing boreholes. <ul style="list-style-type: none"> ○ Over time the seasonal variation in groundwater levels will be determined. 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the desired fragmentation of the rock.	LOM
4.3	Groundwater	Mining Department: Drilling and blasting and secondary breaking.	Water pollution. Explosives are high in nitrates. Potentially the nitrates from the explosive could impact on the quality of the water in boreholes in close proximity to the mine.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> ▪ The impacts of mining on the quality of the water will be monitoring via water samples being taken from existing boreholes / sumps. <ul style="list-style-type: none"> ○ Over time the quality of the groundwater will be determined. ○ Future fluctuations in groundwater quality that could be linked to the mining activities will be investigated. ○ Feedback from the investigation will guide future management measures. 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the desired fragmentation of the rock.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
4.4	Air quality	Mining Department: Drilling and blasting and secondary breaking.	Dust generated during drilling and blasting. Dust is generated from the drilling operations. The dust is limited. A cloud of dust will be generated during blasting activities. This cloud of dust could affect the adjacent road.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<p>Drilling:</p> <ul style="list-style-type: none"> All drilling to be conducted in accordance to a drill plan as approved by the Quarry manager (which complements the short term mine plans). All drill rigs used on the mine will be fitted with the appropriate dust suppression equipment. Drill rigs will be maintained as per a preventative maintenance schedule. Large Oil spills (greater than 2m in diameter) created during drilling operations will be cleaned up as per the generic oil spill management measures. <p>Blasting:</p> <ul style="list-style-type: none"> All blasting activities must take place in accordance with a detailed blasting procedure and be conducted by a person who holds a blasting certificate. <ul style="list-style-type: none"> Blasts will only be performed under suitable climatic conditions as determined by the certified blaster. Blasting activities will take place during the daylight. The size / intensity of the blast will be suitably scaled to ensure that the blast will create the desired fragmentation while having an insignificant impact on surrounding structures. 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the desired fragmentation of the rock.	LOM
4.5	Air quality	Mining Department: Drilling and blasting and secondary breaking	Dust and Noise generated during secondary breaking. All secondary breaking takes place within the quarries. The small amount of noise and dust will be confined to the mining area.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low	significance		Control	<p>Oversize material (secondary breaking):</p> <ul style="list-style-type: none"> All fragmented material too big to process through the crusher will be stacked in a designated area for reduction by impact hammer or secondary blasting. Once reduced in size the material will be processed through the crusher. 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the desired fragmentation of the rock.	As and when required.
4.6	Noise, Blasting and Vibration	Mining Department: Drilling and blasting and secondary breaking	Noise generated during drilling and blasting. All drilling takes place within the quarries. All noise will be contained to within the quarries. The noise of the blast is restricted due to the blasts taking place within the quarries. There are no affected parties in close proximity to the mine who may be affected.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low	significance		Control	<p>Drilling:</p> <ul style="list-style-type: none"> All drilling to be conducted in accordance to a drill plan as approved by the Quarry manager (which complements the short term mine plans). All drill rigs used on the mine will be fitted with the appropriate dust suppression equipment. Drill rigs will be maintained as per a preventative maintenance schedule. Large Oil spills (greater than 2m in diameter) created during drilling operations will be cleaned up as per the generic oil spill management measures. 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
											desired fragmentation of the rock.	
4.7	Noise, Blasting and Vibration	Mining Department: Drilling and blasting and secondary breaking	Dust and Noise generated during secondary breaking. All secondary breaking takes place within the quarries. The small amount of noise and dust will be confined to the mining area.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance			Control	<p>Oversize material (secondary breaking):</p> <ul style="list-style-type: none"> All fragmented material too big to process through the crusher will be stacked in a designated area for reduction by impact hammer or secondary blasting. Once reduced in size the material will be processed through the crusher. <p>Blasting:</p> <ul style="list-style-type: none"> All blasting activities must take place in accordance with a detailed blasting procedure and be conducted by a person who holds a blasting certificate. <ul style="list-style-type: none"> Blasts will only be performed under suitable climatic conditions as determined by the certified blaster. Blasting activities will take place during the daylight. The size / intensity of the blast will be suitably scaled to ensure that the blast will create the desired fragmentation while having an insignificant impact on surrounding structures. 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the desired fragmentation of the rock.	As and when required.
4.8	Noise, Blasting and Vibration	Mining Department: Drilling and blasting and secondary breaking	Fly rock / vibrations. Fly rock may land on the adjacent road. Vibrations. Due to the distance between the blasting activities and the closest neighbours the potential for an impact from blasting vibrations and fly rock is low.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> The mine must maintain the permits required to ensure the legality of all explosive magazines. The mine management of Ulco will implement a review of blasting methods and procedures to determine if and where improvements can be made. <ul style="list-style-type: none"> The review will be documented. 	The environmental goal during drilling operations is to contain dust created as a result of drilling operations. The environmental goals and objectives of blasting operations are to maintain an insignificant impact on surrounding land owners as a result of the blast vibrations, air blast and noise while achieving the desired fragmentation of the rock.	LOM

Mining Department: Loading and hauling



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
5.1	Fauna and Flora	Mining Department: Loading and hauling	Road kill. Animals crossing the haul roads could be run over by vehicles.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control and modify	Road kills: <ul style="list-style-type: none"> Should the mine manger determine an increase in road kill compared to historic incidents, a specialist will be employed to identify the specific management measures which can be implemented to reduce the incidents of road kill. 	Zero road kill.	LOM
5.2	Air quality	Mining Department: Loading and hauling	Fuel consumption The haulage of material results in use of a non-renewable resource (fuel). The impact of the use of a fuel are mainly realised off site.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	High significance			Control	Fuel consumption: <ul style="list-style-type: none"> Fuel consumption in all vehicles will be monitored. Should the consumption of individual vehicles increase by more than 20% month on month (per hour travelled), an investigation to the cause of the increase will be implemented and action taken based on the outcome of the investigation. AfriSam will continually research opportunities to ensure that its haulage fleet is fuel efficient. <ul style="list-style-type: none"> Economically viable options will be implemented. 	To plan the mining operation to minimise climb of loaded vehicles	LOM
5.3	Air quality	Mining Department: Loading and hauling	Dust Dust is generated during the material handling activities and the transport of the blasted rock along haul roads to the primary crusher. Dust can also be generated by the aggregate crushing plant located with the quarry area.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	Managing dust from vehicle movement. <ul style="list-style-type: none"> Speed limits will be maintained on the haul roads. The generation of dust from active haul roads will be reduced through wetting the roads in use. Ulco will investigate the possibility of a second water truck. Spot inspection of dust suppression measures both during the day and night will be undertaken. Improvements to dust suppression techniques on haul roads will be discussed and if necessary investigated. <ul style="list-style-type: none"> Economically feasible options will be implemented. 	To minimise the amount of dust from vehicle entrainment along haul roads.	LOM
5.4	Noise, Blasting and Vibration	Mining Department: Loading and hauling	Noise Noise is created as a result of the vehicle movements. However due to the remote location of the mine, it is not expected for the noise to impact on anyone. Noise can also be generated by the aggregate crushing plant located with the quarry area.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	Upkeep of mine vehicles / Noise control: <ul style="list-style-type: none"> All vehicles used in loading and hauling will be maintained in a good condition as per a maintenance schedule. All vehicles / equipment used in mining to be fitted with appropriate silencers which will be maintained to ensure continued effectiveness. Through vehicle maintenance the mine must ensure that reverse hooters (required for safety reasons) are directional. 	To minimise the amount of dust from vehicle entrainment along haul roads.	LOM
Mining Department: Crushing												
6.1	Surface water	Mining Department: Crushing	Water pollution Storm water runoff from the crushing plant could be affected through oil spillages, diesel leaks and higher sediment loads in surface water runoff. Contamination can	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance			Control	<ul style="list-style-type: none"> Routine checks of the crusher to ensure that there are no oil / hydrocarbon leakages. <ul style="list-style-type: none"> Any spill discovered to be cleaned up as per generic hydrocarbon spill management measure. 	To avoid water pollution.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
			also be generated by the aggregate crushing plant located with the quarry area.							<ul style="list-style-type: none"> Maintenance of crushing plant according to maintenance plan. Cleaning around the crushers will be undertaken to ensure that the build-up of fines is prevented. 		
6.2	Air quality	Mining Department: Crushing	Dust Dust is generated during crushing, screening and material handling activities at the crushing plant specifically if the dust extraction equipment at the primary crusher and aggregate crushing plant is malfunctioning.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance	Control	Dust and noise: <ul style="list-style-type: none"> Controlled at the crushing plants by: <ul style="list-style-type: none"> Water sprays will be activated during initial tipping of material. Crusher house will be kept enclosed. Roofing / side panel on conveyor belts will be maintained. Transfer points enclosed. Dust extraction systems at discharge points of the crusher will be used and maintained. Appropriate dust control measures will be implemented at the SAQ dump. 	To reduce the noise and dust resulting from crushing and screening operations.	LOM	
6.3	Noise, Blasting and Vibration	Mining Department: Crushing	Noise Noise is created as a result of crushing activities at the primary crusher and aggregate crushing plant. .	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance	Control	Dust and noise: <ul style="list-style-type: none"> Controlled at the crushing plants by: <ul style="list-style-type: none"> Water sprays will be activated during initial tipping of material. Crusher house will be kept enclosed. Roofing / side panel on conveyor belts will be maintained. Transfer points enclosed. Dust extraction systems at discharge points of the crusher will be used and maintained. Continuous monitoring will be undertaken. Appropriate dust control measures will be implemented at the SAQ dump. 	To reduce the noise and dust resulting from crushing and screening operations.	LOM	
Mining Department: Conveying and Stockpiling												
7.1	Surface water	Mining Department: Conveying and Stockpiling	Water pollution Should the stockpiles not be protected from storm water runoff potentially water with a high sediment load from the stockpile areas could impact on the runoff from the area.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance	Control and modify	Storm water management around limestone stockpiles: <ul style="list-style-type: none"> All storm water will be directed away from the stockpile area by implementation of appropriate (trench and berm around the stockpile area) storm water management system, including around the dolerite stockpile areas.. Storm water management channels will be checked for build-up of fines and if necessary cleaned. See monitoring for indication of water monitoring requirements. 	To reduce dust, to reduce the likelihood of contamination of storm water and to ensure stockpiling takes place in a manner that is ideal for clinker production.	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
7.2	Air quality	Mining Department: Conveying and Stockpiling	Dust Dust will be created at the transfer points from the crushing operation to the stockpiled. The fact that the conveyor is covered reduces the likelihood of dust being generated.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	Dust: <ul style="list-style-type: none"> Ensure all transfer points on the conveyor system are enclosed. Ensure that the integrity of the conveyor system is complete at all times through monthly visual inspections. <ul style="list-style-type: none"> If there is apparent abnormal dust from the conveyor system, the cause of the dust must be investigated and the appropriate mitigation measure to mitigate the cause of the dust emissions must be implemented. Use of variable height stackers so that the stockpiling of limestone / shale is undertaken where the drop is limited, thereby reducing dust generation. 	To reduce dust, to reduce the likelihood of contamination of storm water and to ensure stockpiling takes place in a manner that is ideal for clinker production.	LOM
Mining Department: Mining of the SAQ dump												
8.1	Surface water	Mining Department: Mining of the SAQ dump	Water pollution Storm water runoff from the SAQ dump could be affected through oil spillages, diesel leaks and higher sediment loads in surface water runoff.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> Routine checks of the crusher / screen to ensure that there are no oil / hydrocarbon leakages. <ul style="list-style-type: none"> Any spill discovered to be cleaned up as per generic hydrocarbon spill management measure. Maintenance of crushing / screening plant according to maintenance plan. Cleaning around the crusher / screening will be undertaken to ensure that the build-up of fines is prevented. 	To reduce the noise and dust resulting from crushing operations.	LOM
8.2	Air quality	Mining Department: Mining of the SAQ dump	Dust Dust is generated during screening and material handling activities.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	Dust and noise: <ul style="list-style-type: none"> Appropriate dust suppression measures are to be undertaken by: <ul style="list-style-type: none"> Dust suppression around the dump.. Fitting the crusher with sprayers. 	To reduce the noise and dust resulting from crushing operations.	LOM
8.3	Noise, Blasting and Vibration	Mining Department: Mining of the SAQ dump	Noise Noise is created as a result of screening and vehicle movement activities.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	Dust and noise: <ul style="list-style-type: none"> Controlled at the crushing plants by: <ul style="list-style-type: none"> Mining will take place in a manner that the crushing / screening plant is protected from wind by the remaining SAQ dump. Mining activities will be temporarily halted in windy conditions. 	To reduce the noise and dust resulting from crushing operations.	LOM
Mining Department: Concurrent rehabilitation												
9.1	Fauna and Flora	Mining Department: Concurrent rehabilitation	Alien vegetation / bush encroacher removal. The removal of alien vegetation / bush encroachers allows indigenous species to	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> A five year concurrent rehabilitation plan will be developed and implemented. The purpose of the plan is to detail the concurrent rehabilitation requirements for the following 5 years. This plan must be reviewed annually during quarry planning meetings 	To make concurrent rehabilitation an integral part of day to day mining activities. To reduce the ecological impacts associated with the mine	Reviewed annually and updated every 5 years



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
			establish and eradicate the negative impacts associated with alien vegetation / bush encroachers. Creation of Habitats The recreation of a habitat will encourage the return of indigenous faunal species.							<ul style="list-style-type: none"> The following 5 year plan must be developed prior to the expiry of the current plan. <p>Fire management:</p> <ul style="list-style-type: none"> The mine will implement fire management which will include: <ul style="list-style-type: none"> Burning of fire breaks in conjunction with neighbouring landowners. Burning of fire blocks. All fire sequence events will be recorded. <p>Grootkloof:</p> <ul style="list-style-type: none"> The Grootkloof area will be maintained as a conservation area Annual inspections will be undertaken to ensure the area remains pristine. 	through the implementation of concurrent rehabilitation.	LOM
											LOM	
9.2	Surface water	Mining Department: Concurrent rehabilitation	Water pollution (reduced) Through the vegetation of disturbed area, there is less likely to be high sediment load runoff which could impair on the quality of storm water.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance		Control	<ul style="list-style-type: none"> A five year concurrent rehabilitation plan will be developed and implemented. The purpose of the plan is to detail the concurrent rehabilitation requirements for the following 5 years. This plan must be reviewed annually during quarry planning meetings The following 5 year plan must be developed prior to the expiry of the current plan. <p>Fire management:</p> <ul style="list-style-type: none"> The mine will implement fire management which will include: <ul style="list-style-type: none"> Fire breaks are cleared using earthmoving machinery or manual labour where required. Burning of fire blocks. All fire sequence events will be recorded. <p>Grootkloof:</p> <ul style="list-style-type: none"> The Grootkloof area will be maintained as a conservation area Annual inspections will be undertaken to ensure the area remains pristine. 	To make concurrent rehabilitation an integral part of day to day mining activities. To reduce the ecological impacts associated with the mine through the implementation of concurrent rehabilitation.	Reviewed annually and updated every 5 years	
											LOM	
9.3	Air quality	Mining Department: Concurrent rehabilitation	Dust (reduced) Less exposed areas results in less dust generated from the site during the windy months.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium-high significance		Control	<ul style="list-style-type: none"> A five year concurrent rehabilitation plan will be developed and implemented. The purpose of the plan is to detail the concurrent rehabilitation requirements for the following 5 years. This plan must be reviewed annually during quarry planning meetings The following 5 year plan must be developed prior to the expiry of the current plan. <p>Fire management:</p> <ul style="list-style-type: none"> The mine will implement fire management which will include: <ul style="list-style-type: none"> Burning of fire breaks in conjunction with neighbouring landowners. 	To make concurrent rehabilitation an integral part of day to day mining activities. To reduce the ecological impacts associated with the mine through the implementation of concurrent rehabilitation.	Reviewed annually and updated every 5 years	
											LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> All fire sequence events will be recorded 		
										<p>Grootkloof:</p> <ul style="list-style-type: none"> The Grootkloof area will be maintained as a conservation area Annual inspections will be undertaken to ensure the area remains pristine. 		LOM
9.4	Visual	Mining Department: Concurrent rehabilitation	Visual improvement A rehabilitated mine is more visually appealing.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)			Medium significance	Control	<ul style="list-style-type: none"> A five year concurrent rehabilitation plan will be developed and implemented. The purpose of the plan is to detail the concurrent rehabilitation requirements for the following 5 years. This plan must be reviewed annually during quarry planning meetings The following 5 year plan must be developed prior to the expiry of the current plan. <p>Fire management:</p> <ul style="list-style-type: none"> The mine will implement fire management which will include: <ul style="list-style-type: none"> Burning of fire breaks in conjunction with neighbouring landowners. Burning of fire blocks. All fire sequence events will be recorded. <p>Grootkloof:</p> <ul style="list-style-type: none"> The Grootkloof area will be maintained as a conservation area. Annual inspections will be undertaken to ensure the area remains pristine 	To make concurrent rehabilitation an integral part of day to day mining activities. To reduce the ecological impacts associated with the mine through the implementation of concurrent rehabilitation.	Reviewed annually and updated every 5 years
												LOM
												LOM
Mining Department: Mining supporting services: (Fuel depot / Vehicle parking area)												
10.1	Topography, Soils Land use and land capability.	Mining Department: Mining supporting services: (Fuel depot / Vehicle parking area)	Soil pollution Continuous small spillages around the fuel dispensing area will result in localised soil contamination.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)			Medium significance	Control	<ul style="list-style-type: none"> All employees refuelling vehicles will be trained annually on the procedure to follow to ensure that the risk of spills is minimal. Records of the training will be maintained for auditing purposes. Suitable absorbent material will be available at the fuel depot to be used in the case of a spill. Should a spill occur it will be cleaned up immediately as per hydrocarbon spill procedure and lodged as a non-conformance. The hydrocarbon spill procedure will be included in the annual induction training. The refuelling area will be visually checked and any spills and contaminated soils will be dug up and disposed as hazardous waste. The mine will concrete and implement appropriate storm water management around the refuelling area. 	To ensure that no soil or ground water pollution emanates from fuel depot area in the quarry.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> A bund will be developed at the offloading area to prevent storm water from entering the effluent drain and oil trap, thereby reducing the potential for overflows. 		
10.2	Surface water	Mining Department: Mining supporting services: Fuel depot	Water quality Small spills and leaks of diesel from the refuelling process or from leaks on the vehicles could result in polluting storm water.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> All employees refuelling vehicles will be trained annually on the procedure to follow to ensure that the risk of spills is minimal. Records of the training will be maintained for auditing purposes. Suitable absorbent material will be available at the fuel depot to be used in the case of a spill. Should a spill occur it will be cleaned up immediately as per hydrocarbon spill procedure and lodged as a non-conformance. The hydrocarbon spill procedure will be included in the annual induction training. The refuelling area will be visually checked and any spills and contaminated soils will be dug up and disposed as hazardous waste. The mine will concrete and implement appropriate storm water management around the refuelling area. A bund will be developed at the offloading area to prevent storm water from entering the effluent drain and oil trap, thereby reducing the potential for overflows. 	To ensure that no soil or ground water pollution emanates from fuel depot area in the quarry.	LOM
10.3	Surface water	Mining Department: Mining supporting services: Vehicle parking area	Water quality Small spills and leaks of diesel from the refuelling process or from leaks on the vehicles could result in polluting storm water.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> The area used to park mine vehicles will be inspected for signs of hydrocarbon spills. Vehicle operators to inspect under the vehicles at the parking area for signs of oil leaks. If discovered the oil spill must be cleaned up and the vehicle serviced. Any spills discovered will be dug up, placed in a drum and moved to the temporary hazardous waste store for disposal into the kiln. 	To ensure that there is no potential for pollution of surface water runoff from hydrocarbon spills in the vehicle parking area.	LOM
Mining Department: Mining supporting services: Waste dump site												
11.1	Groundwater	Mining Department: Mining supporting services: Waste dump site	Water quality Should hazardous waste be dumped, then with the Infiltration of rain water there may be an impact on the quality of the ground water.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> The conditions of the approval of the waste disposal site permit must be implemented Only domestic inert waste will be allowed to be disposed of in the waste dump. Access to the waste dump will be controlled by the mining department. A portable toilet will be placed at the waste area to prevent the gate operator from having to leave the post for any extended period of time. The waste dump site will be fenced. The sides of the waste dump will be rehabilitated through the disposing of garden refuse over the sides. 	To reduce the chance of water pollution from the waste dump and to ensure that there is no visual impacts associated with the dump.	LOM LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> The waste dump will be monitored for signs of water pollution which could be associated with the waste dump. 		
11.2	Visual	Mining Department: Mining supporting services: Waste dump site	Visual impact Poor management and access control of the waste dump could lead to uncontrolled dumping of waste which would then have a visual impact.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance			Control	<ul style="list-style-type: none"> Waste cells will be dug for the disposal of the waste. As and when a cell is full, it will be filled in and a new cell dug 	To reduce the chance of water pollution from the waste dump and to ensure that there is no visual impacts associated with the dump.	As and when required
Mining Department: Mining supporting services: Vehicle maintenance												
12.1	Topography, Soils Land use and land capability.	Mining Department: Mining supporting services: Vehicle maintenance	Water / soil pollution Oil and diesel spillages at the workshop not being contained properly and running off concreted areas resulting in both potential soil and water pollution. Reduce likelihood of a spillage Through implementing the maintenance activities, it is reducing the likelihood of a spillage or leak occurring during the use of the vehicle for its intended purposes.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> All vehicles will be maintained as per the preventative maintenance schedule. A maintenance record will be kept for each vehicle. All vehicle maintenance will be conducted within the concreted workshop facility which has the correct storm water control measures and an oil trap in place. Drip trays to be used to capture used oil which can be recycled. If emergency maintenance is required and the vehicle cannot be brought to the workshop facilities, then drip trays must be used to capture oil leaks. Workshop facilities will have spill kits available to clean up oil spills. All old / used oil to be collected and recycled. All used oil tanks will be kept in a bunded area which has 110% the capacity of the tank. Bunded area to be kept clean of debris. The capacity of the new oil/ lubricant bund will be determined and the oil/ lubricant stored accordingly (110% of capacity of liquid stored). Water accumulated in bunded area if clean must be drained, and if polluted must be contained within drums and removed as hazardous waste. All oil spills must initially be contained and then cleaned up as described in generic management measures. Oil filters, oil contaminated rags, oil contaminated sweepings must be accumulated in drums and stored within the concreted area before being collected and disposed of in the kiln. Batteries in the workshop to be stored on a concreted area. <ul style="list-style-type: none"> All old batteries will be returned to the supplier for recycling. Any spillages from a battery will be diluted with 10 parts water before disposal. 	To prevent pollution of surface water resources from the vehicle / plant servicing activities that take place in the workshop. To prevent pollution from the small servicing activities that take place at the quarry workshop	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
12.2	Surface water	Mining Department: Mining supporting services: Vehicle maintenance	Water / soil pollution Oil and diesel spillages at the workshop not being contained properly and running off concreted areas resulting in both potential soil and water pollution.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance	Control	<ul style="list-style-type: none"> All vehicles will be maintained as per the preventative maintenance schedule. A maintenance record will be kept for each vehicle. All vehicle maintenance will be conducted within the concreted workshop facility which has the correct storm water control measures and an oil trap in place. Drip trays to be used to capture used oil which can be recycled. If emergency maintenance is required and the vehicle cannot be brought to the workshop facilities, then drip trays must be used to capture oil leaks. Workshop facilities will have spill kits available to clean up oil spills. All old / used oil to be collected and recycled. All used oil tanks will be kept in a bunded area which has 110% the capacity of the tank. Bunded area to be kept clean of debris. The capacity of the new oil/ lubricant bund will be determined and the oil/ lubricant stored accordingly (110% of capacity of liquid stored). Water accumulated in bunded area if clean must be drained, and if polluted must be contained within drums and removed as hazardous waste. All oil spills must initially be contained and then cleaned up as described in generic management measures. Oil filters, oil contaminated rags, oil contaminated sweepings must be accumulated in drums and stored within the concreted area before being collected and disposed of in the kiln. Batteries in the workshop to be stored on a concreted area. <ul style="list-style-type: none"> All old batteries will be returned to the supplier for recycling. Any spillages from a battery will be diluted with 10 parts water before disposal. 	To prevent pollution of surface water resources from the vehicle / plant servicing activities that take place in the workshop. To prevent pollution from the small servicing activities that take place at the quarry workshop.	LOM	
12.3	Air quality	Mining Department: Mining supporting services: Vehicle maintenance	Improve fuel efficiency Through implementing the maintenance activities, the fuel efficiency of the vehicle is maximised.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	High	significance	Control	<ul style="list-style-type: none"> All vehicles will be maintained as per the preventative maintenance schedule. A maintenance record will be kept for each vehicle. All vehicle maintenance will be conducted within the concreted workshop facility which has the correct storm water control measures and an oil trap in place. Drip trays to be used to capture used oil which can be recycled. If emergency maintenance is required and the vehicle cannot be brought to the workshop facilities, then drip trays must be used to capture oil leaks. 	None identified	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> ▪ Workshop facilities will have spill kits available to clean up oil spills. ▪ All old / used oil to be collected and recycled. ▪ All used oil tanks will be kept in a bunded area which has 110% the capacity of the tank. Bunded area to be kept clean of debris. ▪ The capacity of the new oil/ lubricant bund will be determined and the oil/ lubricant stored accordingly (110% of capacity of liquid stored). ▪ Water accumulated in bunded area if clean must be drained, and if polluted must be contained within drums and removed as hazardous waste. ▪ All oil spills must initially be contained and then cleaned up as described in generic management measures. ▪ Oil filters, oil contaminated rags, oil contaminated sweepings must be accumulated in drums and stored within the concreted area before being collected and disposed of in the kiln. ▪ Batteries in the workshop to be stored on a concreted area. <ul style="list-style-type: none"> ○ All old batteries will be returned to the supplier for recycling. ○ Any spillages from a battery will be diluted with 10 parts water before disposal. 		
12.4	Air quality	Mining Department: Mining supporting services: Vehicle maintenance	Reduce tailpipe emissions Through implementing the maintenance activities, the tailpipe emissions are controlled.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance	Control	<ul style="list-style-type: none"> ▪ All vehicles will be maintained as per the preventative maintenance schedule. A maintenance record will be kept for each vehicle. ▪ All vehicle maintenance will be conducted within the concreted workshop facility which has the correct storm water control measures and an oil trap in place. ▪ Drip trays to be used to capture used oil which can be recycled. ▪ If emergency maintenance is required and the vehicle cannot be brought to the workshop facilities, then drip trays must be used to capture oil leaks. ▪ Workshop facilities will have spill kits available to clean up oil spills. ▪ All old / used oil to be collected and recycled. ▪ All used oil tanks will be kept in a bunded area which has 110% the capacity of the tank. Bunded area to be kept clean of debris. ▪ The capacity of the new oil/ lubricant bund will be determined and the oil/ lubricant stored accordingly (110% of capacity of liquid stored). ▪ Water accumulated in bunded area if clean must be drained, and if polluted must be contained within drums and removed as hazardous waste. 	None identified	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> All oil spills must initially be contained and then cleaned up as described in generic management measures. Oil filters, oil contaminated rags, oil contaminated sweepings must be accumulated in drums and stored within the concreted area before being collected and disposed of in the kiln. Batteries in the workshop to be stored on a concreted area. <ul style="list-style-type: none"> All old batteries will be returned to the supplier for recycling. Any spillages from a battery will be diluted with 10 parts water before disposal. 		
Process department: Entire processing department												
13.1	Surface water	Process department: Entire processing department	<p>Surface water pollution</p> <p>The dust created as a result of the processing of the material to produce clinker could result in fines been washed away in storm water. In addition pollution from industrial activities could impact on storm water.</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control and modify	<p>Storm water:</p> <ul style="list-style-type: none"> A storm water management plan for the plant must be completed. <ul style="list-style-type: none"> The recommendations to ensure separation of clean and dirty water systems within the management plan must be implemented. The recommendations to handle "dirty water" within the management plan must be implemented. Storm water channels will be checked and if necessary cleaned. Ulco will develop a maintenance roster for the cleaning of the drains at the packaging plant. Storm water will be diverted away from potentially polluting areas such as: <ul style="list-style-type: none"> the open air clinker store Workshops Stores Fuel tanks & Oil stores Alternative Raw Materials handling areas• 	None identified	LOM
13.2	Air quality	Process department: Entire processing department	<p>Dust</p> <ul style="list-style-type: none"> Dust is generated from the following point associated with the Process Department: <ul style="list-style-type: none"> Raw material stockpiles Product spillages on exposed surfaces All conveyors and transfer points The raw mills, coal mills & cement mills Over pressure from the preheater Kiln, clinker and cement silos 	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<p>Dust control equipment:</p> <ul style="list-style-type: none"> Dust control equipment includes, bag houses and ESP, enclosure of transfer points, water sprays at transfer points etc. The equipment will be operated effectively by ensuring those employees responsible for the equipment are trained. Dust control equipment will be maintained in accordance with a preventative maintenance schedule. During times of maintenance or process disruptions, the effect of the equipment being off line will be reduced by adapting the process accordingly. 	None identified	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
			<ul style="list-style-type: none"> Open air clinker stockpile 						<ul style="list-style-type: none"> If there is a failure of the dust control equipment, maintenance activities will be implemented immediately. <p>Atmospheric emissions reporting:</p> <ul style="list-style-type: none"> All legally required emissions reports will be compiled and submitted to the relevant authorities as and when required. <p>Atmospheric emissions levels:</p> <ul style="list-style-type: none"> Ulco will comply with the conditions and requirements contained in the Atmospheric Emission License. Ulco will ensure that all unit processes and apparatus used, and all appliances and mitigation measures for preventing or reducing atmospheric emissions, are properly maintained and operated. Ulco will maintain an atmospheric emission inventory which includes; <ul style="list-style-type: none"> List of all types of atmospheric emissions; The point of emission; and The abatement device. This inventory must be updated regularly or when there is a change to the process that impacts on emissions. Prior approval will be sought from the licensing authority should any changes in the process be required. Prior approval will be sought from the licensing authority should any changes to the type and quantities of input material, production equipment and treatment facilities be required. Ulco will maintain a complaints register at the site. Ulco will complete and submit an annual report to the licensing authority. The annual report will include: <ul style="list-style-type: none"> Pollutant emissions trend; Compliance audit report(s); Major upgrade projects (i.e. abatement equipment or process equipment); and Greenhouse gas emissions. All gaseous emission levels will be kept within the legal limits. Any non-compliance to the emissions levels set within the AEL will be recorded as a non-conformance and applicable actions will be implemented to prevent future exceedance of emission levels. Ulco will investigate the implementation of additional/ updated technology to reduce emission levels. <ul style="list-style-type: none"> Economically viable technology will be implemented. 		<p>LOM</p> <p>LOM</p>	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
13.3	Noise, Blasting and Vibration	Process department: Entire processing department	Noise Noise from the general running of the plant.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	Noise: <ul style="list-style-type: none"> Noise will be reduced by ensuring that equipment is maintained to ensure that noise levels are not excessive. If the noise emissions from equipment are determined to be rising (determined either through normal hearing or through noise monitoring performed for occupational health and safety reasons), the equipment will be maintained. 	None identified	LOM
										Health and safety: <ul style="list-style-type: none"> All noise zones will be advertised. Employees working in noisy areas (as determined by the occupational health and safety monitoring) will be issued with the appropriate hearing protection. All employees will be issued with and instructed to wear the appropriated PPE. Employees handling the Alternative Raw Materials will be provided and trained to handle the Alternative Raw Materials and use the correct PPE. 		LOM
13.4	Visual	Process department: Entire processing department	Visual impact The plant is visual from approximately 25km. However due to the remote location of the mine, this visual impact is not regarded as significant.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	Good housekeeping / Visual impacts: <ul style="list-style-type: none"> Housekeeping in the plant area will be maintained by implementing the following: <ul style="list-style-type: none"> Uncontaminated (by other raw products) spillages of raw materials must be returned to their respective stockpiles. Spilt mixed raw material, to the extent where the material identity is unknown, is to be removed as waste. Clinker spills to be recycled back to the clinker open area store or temporary clinker stockpile next to the shunting yard. Cement spillages will be temporarily stockpiled at the open area clinker stockpile and recycled back to the cement mills via the clinker transport system. Bins to be provided around the processing department in order to implement waste management. Bins to be emptied and waste to be removed as per waste management plan. The area around the plant will be kept free of build-up of fines through implementing general cleaning activities. The plant area will ensure the implementation of the greening of exposed areas in the plant. 	None identified	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
13.5	Socio-economic	Process department: Entire processing department	Electrical usage High electrical needs through the running of the plant (specifically the mills and the kiln) results in significant offsite impacts associate with the generation of electricity	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	High significance			Control	<p>Encourage efficiency of the plant:</p> <ul style="list-style-type: none"> Electrical efficiency of the plant will be encouraged through the implementation of a preventative maintenance schedule by the Engineering Department and optimisation of unit outputs. 	None identified	Daily
Process department: Raw materials delivery and storage												
14.1	Surface water	Process department: Raw materials delivery and storage	Surface water pollution Surface water could be polluted from storm water runoff coming into contact with the respective stockpiles.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> The following management measures are specifically designed to reduce the impact on surface water / ground water as a result of material handling. <ul style="list-style-type: none"> All spills under transfer points will be cleaned up and moved to the respective stockpiles. Maintenance of a storm water management system that directs surface water away from stockpile areas. The effectiveness of storm water control will be checked during rain events. Any evidence of storm water running through a stockpile will be rectified. SPL will be stored within a covered store with a concreted base which has the appropriate storm water controls in place. Implementing of a surface water and groundwater monitoring programme to ensure that there are no significant impacts associated with the raw material stores. 	Reduce dust generation when handling raw materials. Minimise loss of raw materials through correct handling procedures. All spills to be recycled.	Monthly
14.2	Groundwater	Process department: Raw materials delivery and storage	Groundwater pollution If the material is not stored on a protected surface, then groundwater could potentially become polluted through infiltration of water through the stockpiles. This is particularly applicable for the Alternative Raw Materials and the coal stockpile area.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> The following management measures are specifically designed to reduce the impact on surface water / ground water as a result of material handling. <ul style="list-style-type: none"> All spills under transfer points will be cleaned up and moved to the respective stockpiles. Maintenance of a storm water management system that directs surface water away from stockpile areas. The effectiveness of storm water control will be checked during rain events. Any evidence of storm water running through a stockpile will be rectified. SPL will be stored within a covered store with a concreted base which has the appropriate storm water controls in place. Implementing of a surface water and groundwater monitoring programme to ensure that there are no significant impacts associated with the raw material stores. 	Reduce dust generation when handling raw materials. Minimise loss of raw materials through correct handling procedures. All spills to be recycled.	Monthly
14.3	Air quality	Process department: Raw materials delivery and storage	Dust Small amounts of dust will be generated during the material handling of the raw materials.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	The following management measures are specifically designed to reduce dust generation as a result of raw material delivery and storage:	Reduce dust generation when handling raw materials. Minimise loss of raw materials through correct handling	Monthly



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
									<ul style="list-style-type: none"> Operators will be trained on best techniques to handle raw materials in a manner that reduces dust generation such as reducing drop heights. Visual checks to ensure that all the various raw materials (including Alternative Raw Materials) are stored within their designated areas. Visual check to ensure that there is no build-up of fines that could act as a source of dust at transfer points. Where there is a build-up, it will be cleaned immediately. 	procedures. All spills to be recycled.		
14.4	Visual	Process department: Raw materials delivery and storage	Visual Impact The raw material stockpiles are elevated and could represent a minimal visual impact.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	<ul style="list-style-type: none"> Implement good housekeeping in and around transfer points and the stockpile area. 	Reduce dust generation when handling raw materials. Minimise loss of raw materials through correct handling procedures. All spills to be recycled.	LOM
14.5	Air quality	Process department: Recovery of raw material and raw milling	Dust Dust will be generated during the material handling operations.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance	Control	<p>Reduce dust:</p> <ul style="list-style-type: none"> A variable height reclaimer will be used to reclaim limestone from its stockpile. Conveyors will be partially covered to reduce wind-blown dust generation. Transfer points will be enclosed. Implementation of good housekeeping. 	<ul style="list-style-type: none"> Emissions from the raw mill will be drawn through a dust extraction unit. Any spillages of raw meal will be recycled through the limestone stockpiles. The mine will investigate specific point source of dust created through the reclaiming of the raw material. <ul style="list-style-type: none"> The purpose of the investigations will be to see if there is economically viable means of reducing dust levels during handling of material. A record of the discussions will be kept. Viable solutions will be implemented 	To ensure that 100% of the raw material is used to create raw meal.	LOM	
								LOM				
Process department: Coal milling												
15.1	Air quality	Process department: Coal milling	Dust Dust will be generated during the material handling operations.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance	Control	The potential for dust will be reduced by: <ul style="list-style-type: none"> Drawing the emissions from the coal mill through dust extraction equipment. 	<ul style="list-style-type: none"> All coal spillages will be recycled back onto the coal stockpile 	To ensure coal resources are not wasted and to reduce the likelihood of dust from coal milling.	LOM	
								The loss of coal resources will be reduced by: <ul style="list-style-type: none"> All coal spillages will be recycled back onto the coal stockpile 			Daily	
Process department: Alternative fuel sources – Alternative Raw Materials												



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
16.1	Surface water	Process department: Alternative fuel sources – Alternative Raw Materials	Surface water pollution If the Alternative Raw Materials or the other alternative fuel sources are not protected from surface water run off, then the material could potentially pollute the runoff from the site.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> Alternative Raw Materials will be stored in a designated store which is covered and has a concrete floor. This store will be protected from storm water flow. This will be confirmed during rain events. The Alternative Raw Materials area will be monitored to ensure that no Alternative Raw Materials falls outside its designated location. 	To ensure that the handling of the Alternative Raw Materials or other alternative fuels do not result in any environmental impacts and to encourage the future use of additional alternative fuels.	LOM
16.2	Groundwater	Process department: Alternative fuel sources – Alternative Raw Materials	Groundwater pollution If there is infiltration of water which has come into contact with the Alternative Raw Materials, then there could be an impact on the quality of the groundwater.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> Alternative Raw Materials will be stored in a designated store which is covered and has a concrete floor. This store will be protected from storm water flow. This will be confirmed during rain events. The Alternative Raw Materials area will be monitored to ensure that no Alternative Raw Materials falls outside its designated location. 	To ensure that the handling of the Alternative Raw Materials or other alternative fuels do not result in any environmental impacts and to encourage the future use of additional alternative fuels.	LOM
16.3	Air quality	Process department: Alternative fuel sources – Alternative Raw Materials	Air pollution Should the quantities of either the Alternative Raw Materials or other alternative fuels used within the kiln be above acceptable limits, then there could be an impact on the quality of the emissions from the kiln.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control and remedy	<ul style="list-style-type: none"> Ulco will investigate additional alternative fuel resources which can be used instead of coal for generating the heat in the kilns. <ul style="list-style-type: none"> Any viable alternative fuel must include undertaking the relevant air quality specialist studies and the relevant authorisations. The implementation of additional alternative fuel co-processing will only be commissioned upon the granting of all the relevant environmental authorisations. <ul style="list-style-type: none"> Management measures documented within the environmental authorisation will be implemented by Ulco. 	To ensure that the handling of the Alternative Raw Materials or other alternative fuels do not result in any environmental impacts and to encourage the future use of additional alternative fuels.	LOM
Process department: Clinker production												
17.1	Air quality	Process department: Clinker production	Dust and PM10 In addition to gases, particulates (dust) are released during the process.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<p>Reduce dust:</p> <ul style="list-style-type: none"> Particulate emissions from the kilns will be drawn through dust extraction equipment. All dust extraction equipment will be maintained as per the preventative maintenance schedule. 	To ensure legal compliance of the atmospheric emissions resulting from clinker production.	LOM
17.2	Air quality	Process department: Clinker production	Carbon dioxide emissions Carbon dioxide is released during the calcination process. This carbon dioxide is released into the environment. Carbon dioxide is one of the main contributors to greenhouse gases and global warming. Other off gaseous emissions	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	High	significance		Control	<p>Measure emissions:</p> <ul style="list-style-type: none"> To ensure emissions levels are maintained within the set standards Ulco has installed continuous emission monitors to measure the following emissions: <ul style="list-style-type: none"> PM, SO₂, CO and NO_x. Particulate emissions are monitored at the following stacks: <ul style="list-style-type: none"> Kiln Cooler stack 	To ensure legal compliance of the atmospheric emissions resulting from clinker production.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
			Other gases such as NOx, SOx, dioxins and furans are release during the burning process. These gaseous emissions can potentially have a significant impact to the environment.							<ul style="list-style-type: none"> o Coal mill stack o Cement mill stack ▪ All emissions measuring equipment is calibrated as required for each equipment. ▪ Isokinetic monitoring will be implemented on all stacks. ▪ Emission limit value is set and monitored in the control room for particulates, PM, SO2 and NOx. ▪ To ensure emission levels are maintained within the permitted levels Ulco will: <ul style="list-style-type: none"> o Evaluate raw materials used in the clinker/cement process to identify risks of increasing air emission (as an example NOx, SOx and volatile metals). o Ensure that all dust abatement equipment are available. o Implement process control, where possible, to reduce the formation of NOx and SOx.. ▪ If emission levels exceed permitted conditions Ulco will: <ul style="list-style-type: none"> o Evaluate the situation and implement appropriate remedial actions. o Record the exceeded incident as a non-conformance immediately and report it to the authority in the quarterly report. ▪ If necessary, Ulco will shut down production and implement maintenance activities. ▪ Unexpected problems associated with the kiln and production which may result in high emissions will be limited by: <ul style="list-style-type: none"> o Implementing a preventative maintenance programme for all parts associated with the plant. ▪ Unexpected problems associated with the kiln and production which may result in high emissions will be limited by: <ul style="list-style-type: none"> o Implementing a preventative maintenance programme for all parts associated with the plant. 		LOM
										As and when emissions are exceeded.		
											LOM	
											LOM	
17.3	Visual	Process department: Clinker production.	Visual The silo's, pre-heater towers, mill are all housed in buildings which rise considerably above the natural topography. These buildings are visual.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	<ul style="list-style-type: none"> ▪ Implement good housekeeping in and around the plant area. 	To ensure legal compliance of the atmospheric emissions resulting from clinker production.	LOM

Process department: Clinker milling and cement storage



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
18.1	Air quality	Process department: Clinker milling and cement storage	Dust Dust will be generated during the milling process.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	Reduce dust: <ul style="list-style-type: none"> Emissions from the cement mills will be drawn through dust extraction equipment. Any spillages will be recycled through the cement mills. 	To produce cement within the specification of AfriSam standards while maintaining the lowest possible clinker factor and reducing potential impacts on water and the atmosphere.	LOM
18.2	Air quality	Process department: Clinker milling and cement storage	Reduce the amount of CO2 per ton of cement If the amount of clinker required to generate a ton of cement is reduced through the addition of an extender, effectively the amount of CO2 per ton of cement is reduced. This is referred to as reducing the clinker factor.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	High	significance		Control	<ul style="list-style-type: none"> Reduce the clinker factor through the addition of extenders: <ul style="list-style-type: none"> Ulco will reduce the amount of clinker to produce cement through the addition of extenders (such as secondary limestone). Extenders will be added to the point where by the quality of the cement is not adversely affected as determined by the AfriSam standards. On-going investigations by AfriSam will be implemented on ways to reduce the clinker factor while maintaining the quality of the cement. <ul style="list-style-type: none"> Viable solutions will be implemented. 	To produce cement within the specification of AfriSam standards while maintaining the lowest possible clinker factor and reducing potential impacts on water and the atmosphere.	LOM
Process department: Process supporting services: Fuel Tank												
19.1	Topography, Soils Land use and land capability	Process department: Process supporting services: Fuel Tank	Water and soil pollution The fuel tank is already contained within a bunded facility and hence the likelihood of a spill affecting the environment is extremely low.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium	significance		Control	<ul style="list-style-type: none"> The fuel tanks will be kept within a bunded area with a capacity of at least 110% of the capacity of the tank. The valve on the bunded area will be kept locked unless needed in the case of a spill or heavy downpour of rain. Bunded area to be kept clean of debris. The integrity of the bunded area to be checked and if necessary reinforced. The location of the outlet pipe of the fuel tank will be inspected for signs of pollution. If noted, plans must be implemented to clean up the pollution and prevent future pollution. 	To ensure that no surface water pollution emanates from the fuel depot.	LOM
										<ul style="list-style-type: none"> All employees using the fuel for the kiln start-up will be trained on the procedure to follow to minimise the risk of spills. Suitable absorbent material will be available at the diesel tanks to be used in the case of a spill. Should a spill occur it will be cleaned up as per the generic management measure and logged as a non-conformance. 		LOM
19.2	Surface water	Process department: Process supporting	Water and soil pollution The fuel tank is already contained within a bunded facility and hence the likelihood of a spill affecting the environment is extremely low.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium	significance		Control	<ul style="list-style-type: none"> The fuel tanks will be kept within a bunded area with a capacity of at least 110% of the capacity of the tank. The valve on the bunded area will be kept locked unless needed in the case of a spill or heavy downpour of rain. Bunded area to be kept clean of debris. 	To ensure that no surface water pollution emanates from the fuel depot.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
		services: Fuel Tank								<ul style="list-style-type: none"> The integrity of the bunded area to be checked and if necessary reinforced. The location of the outlet pipe of the fuel tank will be inspected for signs of pollution. If noted, plans must be implemented to clean up the pollution and prevent future pollution. All employees using the fuel for the kiln start-up will be trained on the procedure to follow to minimise the risk of spills. Suitable absorbent material will be available at the diesel tanks to be used in the case of a spill. Should a spill occur it will be cleaned up as per the generic management measure and logged as a non-conformance. 		LOM
Process department: Process supporting services: Grinding Aid												
20.1	Surface water	Process department: Process supporting services: Grinding Aid	Water pollution Should there be a spill of the grinding media used in the cement mills, this could result in pollution of the storm water leaving the site.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> Grinding aid / Strength enhancer: <ul style="list-style-type: none"> Ulco will make use of a grinding aid / strength enhancer during the cement mill process. The capacity of the grinding aid bund will be determined and the grinding aid stored accordingly (110% of capacity of liquid stored). On arrival of grinding aid to Ulco, it will be transferred immediately to its designated facility. Any spillage of grinding aid must first be contained (prevented from entering into any storm water system) and then cleaned up as indicated on its MSDS. 	To prevent any surface water pollution as a result of poor storage and handling of grinding aid.	LOM
Process department: Kiln shutdown / maintenance												
21.1	Air quality	Process department: Kiln shutdown / maintenance	Other off gaseous emissions Other gases such as NOx, SOx, dioxins and furans are released during the cooling down and heating up process. These gaseous emissions can potentially have a significant impact to the environment.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium-high significance			Control	<ul style="list-style-type: none"> The kilns will be maintained during scheduled maintenance shutdowns. Should it become necessary, due to equipment failure, additional shutdown events during the year can be planned. As and when kiln bricks are replaced, the old bricks will either be sold or internalised. Ulco will ensure that the capacity of the brick store is large enough to store sufficient bricks required for a major scheduled maintenance. 	To ensure the efficiency of kiln through the implementation of preventative maintenance.	LOM
21.2	Air quality	Process department: Kiln shutdown / maintenance	Dust and PM10 In addition to gases, particulates (dust) are released during the process.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance			Control	<ul style="list-style-type: none"> The kilns will be maintained during scheduled maintenance shutdowns. Should it become necessary, due to equipment failure, additional shutdown events during the year can be planned. As and when kiln bricks are replaced, the old bricks will either be sold or internalised. 	To ensure the efficiency of kiln through the implementation of preventative maintenance.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> Ulco will ensure that the capacity of the stores is large enough to store the chemicals required for major scheduled maintenance activities. 		
Packaging and dispatch: Entire Packaging and dispatch												
22.1	Surface water	Packaging and dispatch: Entire Packaging and dispatch	<p>Surface water pollution</p> <p>The fine dust created as a result of the small cement spills could result in fines been washed away in rain water during storm events.</p>	<p>Construction, Operational, Decommissioning and Closure.</p> <p>Construction, Operational, Decommissioning and Closure.</p>	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<p>Good housekeeping:</p> <ul style="list-style-type: none"> Housekeeping will be maintained by implementing the following: <ul style="list-style-type: none"> Raw material spills to be recycled back onto respective stockpiles. Cement spills to be internalised and recycled. Bins to be provided to implement waste management. Bins to be checked and if necessary emptied. Open areas to be cleaned on a regular basis. The packing plant area will ensure the implementation of the greening of exposed areas. <p>Storm water:</p> <ul style="list-style-type: none"> The storm water management plan must be completed. <ul style="list-style-type: none"> The recommendations to ensure separation of clean and dirty water systems within the management plan must be implemented. The recommendations to handle “dirty water” within the management plan must be implemented. Storm water channels will be checked and if necessary cleaned. 	To prevent, minimise or mitigate impacts associated with the Packing and Dispatch Department.	<p>LOM</p> <p>Monthly</p>
22.2	Air quality	Packaging and dispatch: Entire Packaging and dispatch	<p>Dust</p> <p>Dust is generated from the following point associated with the packaging and dispatch department:</p> <ul style="list-style-type: none"> Tippler and stockpiles Cement loading activities Packaging plant Exposed surfaces Product spillages on exposed surfaces All conveyors and transfer points Vehicle movement on internal roads 	<p>Construction, Operational, Decommissioning and Closure.</p> <p>Construction, Operational, Decommissioning and Closure.</p>	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<p>Emissions:</p> <ul style="list-style-type: none"> All emissions from the packing plant will be drawn through dust extraction equipment. The dust extraction equipment will be maintained as per a planned maintenance schedule. <p>On-going improvements:</p> <ul style="list-style-type: none"> The departments will evaluate all sections to identify where improvements can be made to reduce dust generation. <ul style="list-style-type: none"> Focus will be given to reduce the amount of handling of the cement spills e.g. using mobile skips to collect cement spills during operation and sweeping cement off the floor. Viable options will be implemented. 	To prevent, minimise or mitigate impacts associated with the Packing and Dispatch Department.	<p>LOM</p> <p>Annually</p>
22.3	Visual	Packaging and dispatch: Entire Packaging and dispatch	<p>Visual impact</p> <p>The silos are visual from approximately 25km. However due to the remote location of the mine, this visual impact is not regarded as significant.</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	<p>Good housekeeping:</p> <ul style="list-style-type: none"> Housekeeping will be maintained by implementing the following: <ul style="list-style-type: none"> Raw material spills to be recycled back onto respective stockpiles. Cement spills to be internalised and recycled. Bins to be provided to implement waste management. Bins to be checked and if necessary emptied. 	To prevent, minimise or mitigate impacts associated with the Packing and Dispatch Department.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> o Open areas to be cleaned on a regular basis. ▪ The packing plant area will ensure the implementation of the greening of exposed areas. o Targets will be set for the greening and planting of indigenous trees in and around the packing plant, with these targets being met during the following year. 		
Packaging and dispatch: Receipt of material from the tippler												
23.1	Surface water	Packaging and dispatch: Receipt of material from the tippler	Water pollution If the stockpiles are not protected from surface water runoff, then the surface water could potentially become polluted from the coal / Low Grade Fuel stockpile.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control, remedy and modify	Storm water management around coal stockpiles: <ul style="list-style-type: none"> ▪ The coal / char stockpile area should be managed as a separate catchment within the stockpile area. ▪ All storm water falling outside the coal stockpile catchment will be directed away from the catchment area by implementation of appropriate (trench and berm around the stockpile area). ▪ Storm water management structures will be checked for build-up of fines and if necessary cleaned. ▪ Both surface and ground water from this area will be tested as part of the water monitoring campaign. Should the results of the water monitoring campaign raise any concerns, appropriate management measures will be implemented to remedy the concern. 	Reduce dust emissions during the delivery of raw materials. Ensure that all raw materials are transferred to their respective stockpile. Ensure that the potential for water pollution is reduced through the appropriate management measures around the stockpiles.	LOM
23.2	Groundwater	Packaging and dispatch: Receipt of material from the tippler	Groundwater If there is infiltration of water which has come into contact with the coal / Low Grade Fuel stockpiles, then there could be an impact on the quality of the groundwater.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	Storm water management around coal stockpiles: <ul style="list-style-type: none"> ▪ The coal / char stockpile area should be managed as a separate catchment within the stockpile area. ▪ All storm water falling outside the coal stockpile catchment will be directed away from the catchment area by implementation of appropriate (trench and berm around the stockpile area). ▪ Storm water management structures will be checked for build-up of fines and if necessary cleaned. ▪ Both surface and ground water from this area will be tested as part of the water monitoring campaign. Should the results of the water monitoring campaign raise any concerns, appropriate management measures will be implemented to remedy the concern. 	Reduce dust emissions during the delivery of raw materials. Ensure that all raw materials are transferred to their respective stockpile. Ensure that the potential for water pollution is reduced through the appropriate management measures around the stockpiles.	LOM
23.3	Air quality	Packaging and dispatch: Receipt of material from the tippler	Dust Dust will be generated during the material handling operations and at the transfer points.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control	Off-loading of raw material / conveying to stockpiles: <ul style="list-style-type: none"> ▪ All raw materials delivered by rail will be offloaded at the tippler. ▪ The weight of the material is measured prior to off-loading. ▪ The tippler will be adapted to be able to handle vehicle off loadings as well as off-loading from train wagons. ▪ Material will be conveyed from the tippler to its respective stockpile immediately after offloading. 	Reduce dust emissions during the delivery of raw materials. Ensure that all raw materials are transferred to their respective stockpile. Ensure that the potential for water pollution is reduced through the appropriate management measures around the stockpiles.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> After completion of offloading, the various transfer points will be cleaned up of any small spillages and material returned to the respective stockpile. <ul style="list-style-type: none"> At no time will there be excessive spillages of any material at the transfer points. 		
23.4	Visual	Packaging and dispatch: Receipt of material from the tippler	Visual The stockpiles are visible.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance		Control	Off-loading of raw material / conveying to stockpiles: <ul style="list-style-type: none"> All raw materials delivered by rail will be offloaded at the tippler. The weight of the material is measured prior to off-loading. The tippler will be adapted to be able to handle vehicle off loadings as well as off-loading from train wagons. Material will be conveyed from the tippler to its respective stockpile immediately after offloading. After completion of offloading, the various transfer points will be cleaned up of any small spillages and material returned to the respective stockpile. <ul style="list-style-type: none"> At no time will there be excessive spillages of any material at the transfer points. 	Reduce dust emissions during the delivery of raw materials. Ensure that all raw materials are transferred to their respective stockpile. Ensure that the potential for water pollution is reduced through the appropriate management measures around the stockpiles.	LOM	
Packaging and dispatch: Bulk loading												
24.1	Air quality	Packaging and dispatch: Bulk loading	Dust There is a chance of numerous small spillages during the bulk loading process resulting in fines acting as a source of dust.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance		Control	<ul style="list-style-type: none"> Dust resulting from bulk loading activities is reduced through the following measures: <ul style="list-style-type: none"> De-dusting systems are fitted and operated at the bottom of all bulk loading points. Bulk loading takes place on a weighbridge and is automatically stopped based on weight (prevents overfilling). A sensor which determines when a bulk container is full acts as a backup. When filling a tanker, visual inspections by the bulk loader operator will ensure that the seal between the bulk loading point and the tanker is effective and minimal cement escapes. When a container is full it will be sealed by the operator. Any clinker or cement spillages at the bulk loading points will be recycled immediately back into the system. Good housekeeping around bulk loading transfer points will be implemented. Regular maintenance of all dust suppression equipment, and the bulk loading process will be implemented by the engineering department 	To reduce the amount of spillages / dust as a result of bulk loading activities.	LOM	
Packaging and dispatch: Packaging and palletising												



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
25.1	Air quality	Packaging and dispatch: Packaging and palletising	Dust The packaging process results in dust emissions from cement spillages and broken bags.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance	Control	<ul style="list-style-type: none"> Dust extraction equipment on the packers will be used to reduce dust levels. Its effectiveness will be maintained through the implementation of appropriate maintenance activities. All spilt cement will be recycled back into the system. 	Ensure the weight of bags is correct and to reduce dust levels at the packer.	LOM	
									<ul style="list-style-type: none"> All cement bag loads onto vehicles will be covered by tarpaulins to prevent dust during transportation. This mitigation is not necessary where pallets have been shrink wrapped. 		LOM	
Packaging and dispatch: Railway activities												
26.1	Surface water	Packaging and dispatch: Railway activities	Water pollution Hydrocarbon spillages from diesel locomotives on rail ballast can act as a source of pollution on storm water runoff.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance	Control	Rail activities: <ul style="list-style-type: none"> The maintenance and up keep of the rail activities will include; <ul style="list-style-type: none"> Ensuring there are no excessive spills of diesel / oil from the diesel engines. Diesel engines will be maintained as per maintenance schedule. The location where diesel engines spend most time on site will be inspected. If regular spills are noted in one position, Ulco will implement measures in the area to catch future spills. Polluted ballast must either be cleaned with a suitable environmentally friendly chemical or replaced. If removed, polluted ballast to be regarded and disposed of as hazardous waste. Build-up of fines along the railway lines will be kept to a minimum through appropriate cleaning. Private railway lines will be kept clear of vegetation growth. 	Reduce dust and noise emissions during the delivery of raw materials. To ensure that diesel spills from the locomotives do not result in unacceptable water pollution.	LOM	
26.2	Air quality	Packaging and dispatch: Railway activities	Dust The process of both unloading from the tippler and loading rail wagons could result in dust emissions.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium	significance	Control	Shunting / Tippler area: <ul style="list-style-type: none"> Keep tippler area clear of build-up of material. Keep temporary clinker stockpile area clear and ensure material stays in designated area. Ensure the integrity of the tippler is maintained 	Reduce dust and noise emissions during the delivery of raw materials and loading of clinker and/or cement. To ensure that diesel spills from the locomotives do not result in unacceptable water pollution.	LOM	
26.3	Noise, Blasting and Vibration	Packaging and dispatch: Railway activities	Noise Shunting exercises of the rail wagons are noisy, however due to the remote location of the mine, the impact of this noise is limited.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low	significance	Control	Shunting / Tippler area: <ul style="list-style-type: none"> Keep tippler area clear of build-up of material. Keep temporary clinker stockpile area clear and ensure material stays in designated area. Ensure the integrity of the tippler is maintained. 	Reduce dust and noise emissions during the delivery of raw materials and loading of clinker and/or cement. To ensure that diesel spills from the locomotives do not result in unacceptable water pollution.	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
Packaging and dispatch: Road activities												
27.1	Air quality	Packaging and dispatch: Road activities	Dust Dust can be created from fines blowing off a truck in transit and from vehicle movement on roads which have a build-up of fines.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> All product transport vehicles (including aggregate trucks) will be covered with a tarpaulin to reduce the chance of dust escaping during the transportation of cement or clinker. 	To minimise the impacts of the vehicles leaving Ulco on the regional road network.	LOM
27.2	Noise, Blasting and Vibration	Packaging and dispatch: Road activities	Noise Noise created from vehicle traffic.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium significance			Control and stop	<ul style="list-style-type: none"> Ulco will prohibit any access to vehicles emitting excessive noise or fumes or leaking oil. 	To minimise the impacts of the vehicles leaving Ulco on the regional road network.	LOM
27.3	Socio-economic	Packaging and dispatch: Road activities	Social impacts Deterioration of local roads due to traffic associated with the mine and speeding trucks representing a safety hazard.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control and stop	<ul style="list-style-type: none"> All product transport vehicles (including aggregate trucks) leaving Ulco will be weighed prior to leaving the site. <ul style="list-style-type: none"> Any product transport vehicle determined to be overloaded will be prohibited from leaving the site until within acceptable weigh limits. 	To minimise the impacts of the vehicles leaving Ulco on the regional road network.	Annually
Packaging and dispatch: Vehicle parking area												
28.1	Surface water	Packaging and dispatch: Vehicle parking area	Water pollution Water pollution can result from hydrocarbon spillages from poorly maintained vehicles and through vehicles disposing of waste.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> The vehicle parking area will be inspected for signs of oil/fuel spills and product spills. <ul style="list-style-type: none"> Spills in the parking area will be added to the security checklist. Any signs of oil/fuel spills will be cleaned with absorbents and removed as hazardous waste. Any product spills will be cleaned up based on the nature of the product. All general waste will be removed and disposed of in the Ulco waste management system. 	To control dust from this area and to ensure that no potential hydrocarbon spillages could impair storm water.	Monthly
28.2	Air quality	Packaging and dispatch: Vehicle parking area	Dust Dust created from vehicle movement on the exposed surfaces.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> During dry windy months dust from the vehicle parking area will be minimised through the use of water. 	To control dust from this area and to ensure that no potential hydrocarbon spillages could impair storm water.	LOM
Packaging and dispatch: Packaging and dispatch supporting services: Pallet repair and wood chipper												
29.1	Topography, Soils Land use and land capability	Packaging and dispatch: Packaging and dispatch supporting services: Pallet repair and wood chipper	Recycling The implication of undertaking pallet repair is a positive impacts based on the reuse of broken pallets. In addition, the wood chipper allows the pallets which cannot be recycled to act as a source of organic material for concurrent rehabilitation projects.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium-high significance			Control	<ul style="list-style-type: none"> Should pallets be damaged, they will be repaired for re-use. Where wood slats are beyond repair, the wood will be processed through a wood chipper. The wood chips will be used to aid concurrent rehabilitation requirements 	To reuse all pallets and where wood is deemed not usable, to chip it up to make it possible to use in concurrent rehabilitation	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
Packaging and dispatch: Packaging and dispatch supporting services: Waste pit												
30.1	Surface water	Packaging and dispatch: Packaging and dispatch supporting services: Waste pit	Water pollution Water pollution can result from uncontrolled handling of the waste within the waste pit area.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control and modify	<ul style="list-style-type: none"> All inert waste from the rail wagons will temporarily be stored in the waste pit. Any waste from rail wagons of which the identity is unknown will not be cleaned from the rail wagon. Storm water controls will be constructed to divert storm water from flowing into the pit. As and when the capacity of the pit is full, the inert waste will be removed to the waste disposal site. 	To ensure that waste is controlled within the pit and disposed of appropriately.	LOM
Packaging and dispatch: Packaging and dispatch supporting services: Forklift maintenance												
31.1	Topography, soils Land use and land capability	Packaging and dispatch: Packaging and dispatch supporting services: Forklift maintenance	Reduce likelihood of a spillage Through implementing the maintenance activities, it is reducing the likelihood of a spillage or leak occurring during the use of the forklift for its intended purposes.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> All forklift maintenance will be performed as per the maintenance plan. Forklift maintenance will take place on a concreted protected area. Any new or old oils will be stored within a bunded protected area. The capacity of the bund will be determined and the oil stored accordingly. All forklift operators will undertake a pre-shift inspection to ensure the forklift is in good working order prior to the shift. 	To ensure that the forklifts are maintained in an acceptable standard that does not result in unnecessary pollution.	LOM
31.2	Topography, soils Land use and land capability	Packaging and dispatch: Packaging and dispatch supporting services: Forklift maintenance	Water / soil pollution Oil and diesel spillages at the forklift maintenance area not been contained properly and running off the concreted area resulting in both potential soil and water pollution.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> All forklift maintenance will be performed as per the maintenance plan. Forklift maintenance will take place on a concreted protected area. Any new or old oils will be stored within a bunded protected area. The capacity of the bund will be determined and the oil stored accordingly. All forklift operators will undertake a pre-shift inspection to ensure the forklift is in good working order prior to the shift. 	To ensure that the forklifts are maintained in an acceptable standard that does not result in unnecessary pollution.	LOM
31.3	Surface water	Packaging and dispatch: Packaging and dispatch supporting services: Forklift maintenance	Water / soil pollution Oil and diesel spillages at the forklift maintenance area not been contained properly and running off the concreted area resulting in both potential soil and water pollution.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> All forklift maintenance will be performed as per the maintenance plan. Forklift maintenance will take place on a concreted protected area. Any new or old oils will be stored within a bunded protected area. The capacity of the bund will be determined and the oil stored accordingly. All forklift operators will undertake a pre-shift inspection to ensure the forklift is in good working order prior to the shift. 	To ensure that the forklifts are maintained in an acceptable standard that does not result in unnecessary pollution.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
31.4	Air quality	Packaging and dispatch: Packaging and dispatch supporting services: Forklift maintenance	Improve fuel efficiency Through implementing the maintenance activities, the fuel efficiency of the forklift is maximised.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<ul style="list-style-type: none"> All forklift maintenance will be performed as per the maintenance plan. Forklift maintenance will take place on a concreted protected area. Any new or old oils will be stored within a bunded protected area. The capacity of the bund will be determined and the oil stored accordingly. All forklift operators will undertake a pre-shift inspection to ensure the forklift is in good working order prior to the shift. 	To ensure that the forklifts are maintained in an acceptable standard that does not result in unnecessary pollution.	LOM
31.5	Air quality	Packaging and dispatch: Packaging and dispatch supporting services: Forklift maintenance	Reduce tailpipe emissions Through implementing the maintenance activities, the tailpipe emissions are controlled.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium	significance		Control	<ul style="list-style-type: none"> All forklift maintenance will be performed as per the maintenance plan. Forklift maintenance will take place on a concreted protected area. Any new or old oils will be stored within a bunded protected area. The capacity of the bund will be determined and the oil stored accordingly. All forklift operators will undertake a pre-shift inspection to ensure the forklift is in good working order prior to the shift. 	To ensure that the forklifts are maintained in an acceptable standard that does not result in unnecessary pollution.	LOM
Quality assurance: Quality department												
32.1	Surface water	Quality assurance: Quality department	Water pollution If chemicals disposed of down the sink are not diluted effectively, it may impact on the quality of water discharged from the sewage plant.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<p>The laboratory will reduce the chance of an impact on surface water quality by:</p> <ul style="list-style-type: none"> Ensuring that all chemicals disposed down the sink are diluted to a point where by there is no significant impact. Periodic testing of the wastewater at the sewage plant will be undertaken to prove there is no impact on water quality from the laboratory activities. <ul style="list-style-type: none"> Should the results of water testing indicate the water quality is of unacceptable quality compared to applicable guideline document then Ulco will implement amended management practices. 	To ensure that the quality of the cement is in line with EN specifications and to ensure that all chemicals are handled and disposed of in the correct manner.	LOM
										<p>The likelihood of a spillage will be reduced through:</p> <ul style="list-style-type: none"> Ensuring chemicals are stored within a locked store room and only those trained in the use of the chemicals have access to the store room. <p>The impacts associated with a spillage will be reduced by ensuring:</p> <ul style="list-style-type: none"> All personnel in the laboratory are trained on the procedures to implement clean ups, depending on the chemical that is spilled. 		LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
32.2	Air quality	Quality assurance: Quality department	Fumes Small amounts of fumes are created during the quality assurance testing process.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium	significance		Control	<ul style="list-style-type: none"> All activity in the laboratory that results in noxious fumes will be performed within an operational fume cupboard. 	To ensure that the quality of the cement is in line with EN specifications and to ensure that all chemicals are handled and disposed of in the correct manner.	Daily
Engineering: Maintenance department												
33.1	Topography, Soils Land use and land capability	Engineering: Maintenance department	Water / soil pollution From hydrocarbon spillages when implementing maintenance activities.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<p>Oil spills:</p> <ul style="list-style-type: none"> The Engineering Department will maintain a supply of suitable absorbent to soak up oil spills. The quantity of absorbent available will depend on the volume of oil stored. Should a spill occur the following steps will be implemented: <ul style="list-style-type: none"> The source of the spill will be stopped. The spill will be contained using suitable absorbent. Once contained the spill and absorbent will be dug up and disposed of in a drum and temporarily moved to the hazardous waste store until disposed of in the kiln. 	None Identified	LOM
33.2	Surface water	Engineering: Maintenance department	Water / soil pollution From hydrocarbon spillages when implementing maintenance activities.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<p>Oil spills:</p> <ul style="list-style-type: none"> The Engineering Department will maintain a supply of suitable absorbent to soak up oil spills. The quantity of absorbent available will depend on the volume of oil stored. Should a spill occur the following steps will be implemented: <ul style="list-style-type: none"> The source of the spill will be stopped. The spill will be contained using suitable absorbent. Once contained the spill and absorbent will be dug up and disposed of in a drum and temporarily moved to the hazardous waste store until disposed of in the kiln. 	None Identified	LOM
33.3	Surface water	Engineering: Maintenance department	Reduce likelihood of hydrocarbon pollution. Reducing the chance of water pollution through broken equipment by ensuring on-going effectiveness of equipment.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<p>Calibration checks:</p> <ul style="list-style-type: none"> Inspection of maintenance equipment and the water flow meters will be performed as and when required. Ulco will maintain a spreadsheet for water meter purchase and expiry/ replacement. Details on the requirements for inspection of equipment / flow meters will be kept on the computerised maintenance management system. Equipment used to calibrate, will be labelled to indicate the next time it needs to be calibrated. 	None Identified	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
33.4	Air quality	Engineering: Maintenance department	<p>Improve dust management.</p> <p>Reducing the chance of the dust control equipment not working and hence reducing the likelihood of excessive emissions.</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium	significance		Control	<p>Special projects:</p> <ul style="list-style-type: none"> ▪ The support sub-department will assess process re-engineering options, to improve both the efficiency of the plant and the overall environmental performance of the mine. The environmental impacts recognised as the most significant, and therefore receive most attention in terms of reducing impacts will included, but not limited to: <ul style="list-style-type: none"> ○ Emissions ○ Energy use (both coal and electricity) ○ Fuel usage ○ Dust generation ○ Water use / reuse ○ Minimising / recycling waste products ▪ Economically viable options will be implemented. ▪ If necessary, legal permits and permissions will be obtained prior to the implementation of a new process. 	None Identified	LOM
33.5	Socio-economic	Engineering: Maintenance department	<p>Radiation</p> <p>In the unlikely chance there is a radiation leak from the equipment maintained, it could cause radiation poisoning.</p>	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low-Medium	significance		Control	<p>Radioactive sources:</p> <ul style="list-style-type: none"> ▪ Ulco will at all times have an appointed radiation protection officer whose duties will include: <ul style="list-style-type: none"> ○ Ensure that all persons who may work near the installation are fully aware of the associated radiation hazard and are familiar with correct work procedures. ○ Ensure that radioactive sources are appropriately sign posted. ○ The transfer of a radioactive measuring system from one place to another must take place under the guidance of the radiation protection officer. ○ When the radioactive source is removed from service, the radiation protection officer must ensure that it is immediately removed from site by an approved contractor. ○ No person is allowed to do maintenance work on a radioactive measuring system which directly involves the radioactive source (e.g. replacing defective sources). • Stock levels to be check and audited and stock forms submitted to the Department of Health. 	None Identified	<p>LOM</p> <hr/> <p>At least biennially</p> <hr/> <p>When required.</p>



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										has to be disposed of in an orderly manner where by a disposal trail is documented and recorded. <ul style="list-style-type: none"> The company shall not dispose of a sealed source, or a radioactive measuring system containing a sealed source without the written approval of the Department of Health. "Dispose" here includes the sale, lending, donation, exchange, as well as the return of the source to the supplier. 		
33.6	Socio-economic	Engineering: Maintenance department	Improve electrical efficiency. Maintaining equipment to run at its optimal capacity ensures efficient use of all raw materials and electricity.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	High significance		Control	Transformers / PCB contaminated oils: <ul style="list-style-type: none"> All transformers will be checked for PCB contamination. <ul style="list-style-type: none"> If there is no contamination, the appropriate labelling will be shown. If there is PCB contamination, then the contractor must remove the oil and replace it will clean oil. When transformer oils are cleaned by a contractor it must be assured that the equipment used by the contractor is absolutely free of PCB's. Oil contaminated with PCB's will be drained and sealed in 210l drums and to be stored in the temporary hazardous waste store. Safe disposal procedure for these PCB's to be followed. Energy savings: <ul style="list-style-type: none"> Engineering will be responsible to measures energy consumption. Discussion concerning possible energy saving measures that can be implemented in the different section of the mine will be held, recorded and filed. Implement any viable energy saving measures resulting from the discussions. Ulco will undertake an analysis of power demand and supply of all major energy consuming units. 	None Identified	LOM	
Administration / stores: Administration department												
34.1	Topography, Soils Land use and land capability	Administration / stores: Administration department	Water / pollution soil From hydrocarbon spillages / spillages of hazardous chemicals during the storage and distribution process.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance		Control	Oil spills: <ul style="list-style-type: none"> The Department will maintain a supply of suitable absorbent to soak up oil spills. The quantity of absorbent available will depend on the volume of oil stored. Should a spill occur the following steps will be implemented: <ul style="list-style-type: none"> The source of the spill will be stopped. The spill will be contained using suitable absorbent. Once contained the spill and absorbent will be dug up and disposed of in a drum and temporarily moved to the hazardous waste store until disposed of in the kiln. 	Ulco will ensure that it has a copy of all applicable MSD sheets for all chemicals stored and used on site. The storage, handling and disposal specifications within the MSD sheets will be implemented.	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<p>Storage and distribution of chemicals:</p> <ul style="list-style-type: none"> All chemicals stored on site will be done so in line with the requirements documented in the MSD sheet. All hazardous chemicals will be stored within secure areas and only the responsible person who is aware of the correct handling procedures will have access to this area. The capacity of the liquid hazardous chemicals bund will be determined and chemicals stored accordingly (110% of capacity of liquid stored). The stores will have the capacity to handle the chemicals required for scheduled maintenance activities. No chemicals which could potentially react together will be stored together. Upon delivery of chemicals to be stored, they will be transported into the correct storage area immediately after delivery. Forklift truck drivers who transport hazardous chemicals will be made aware of the potential dangers of spillages of the chemicals. Spill and Hazchem training will be included in the annual induction training. When a chemical is issued, the person receiving the chemical will sign confirmation that they have access to a copy of the relevant MSD sheet in the section where it is used. 		LOM
									<p>Material Safety Data Sheets:</p> <ul style="list-style-type: none"> The Stores Department shall be responsible for the acceptance of all chemicals on the site and no chemical can be brought onto the site without the appropriate MSDS being provided by the supplier. 		None identified	
									<ul style="list-style-type: none"> A master copy of all MSD sheets will be kept by the Stores Department. Copies of the applicable MSD sheets will be kept in all areas which use the applicable chemicals. The Store Department in conjunction with the Quality Assurance Department is responsible to ensure that: <ul style="list-style-type: none"> All chemicals are stored correctly (i.e. in banded areas if necessary) – in accordance with the MSD sheets. No potentially reactive chemicals are stored together. All people who utilize the chemicals have a copy of the MSD sheet and are aware of its content in terms of PPE for use, storage requirements and the acceptable disposal methods of the chemicals. 		LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> Any deficiencies noted during the audit process will be rectified with the applicable training. All personnel who work with hazardous chemical substances shall be trained in the hazards associated with the use of all forms of hazardous chemical substances, and also the actions and reactions in the event of a mishap. Spill and Hazchem training will be included in the annual induction training. 		LOM
34.2	Surface water	Administration / stores: Administration department	Water / pollution soil From hydrocarbon spillages / spillages of hazardous chemicals during the storage and distribution process.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance		Control	<p>Oil spills:</p> <ul style="list-style-type: none"> The Department will maintain a supply of suitable absorbent to soak up oil spills. The quantity of absorbent available will depend on the volume of oil stored. Should a spill occur the following steps will be implemented: <ul style="list-style-type: none"> The source of the spill will be stopped. The spill will be contained using suitable absorbent. Once contained the spill and absorbent will be dug up and disposed of in a drum and temporarily moved to the hazardous waste store until disposed of in the kiln. 	Ulco will ensure that it has a copy of all applicable MSD sheets for all chemicals stored and used on site. The storage, handling and disposal specifications within the MSD sheets will be implemented.	LOM	
									<p>Storage and distribution of chemicals:</p> <ul style="list-style-type: none"> All chemicals stored on site will be done so in line with the requirements documented in the MSD sheet. All hazardous chemicals will be stored within secure areas and only the responsible person who is aware of the correct handling procedures will have access to this area. The capacity of the liquid hazardous chemicals bund will be determined and chemicals stored accordingly (110% of capacity of liquid stored). The stores will have the capacity to handle the chemicals required for scheduled maintenance activities. No chemicals which could potentially react together will be stored together. Upon delivery of chemicals to be stored, they will be transported into the correct storage area immediately after delivery. Forklift truck drivers who transport hazardous chemicals will be made aware of the potential dangers of spillages of the chemicals. Spill and Hazchem training will be included in the annual induction training. When a chemical is issued, the person receiving the chemical will sign confirmation that they have access 		LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										to a copy of the relevant MSD sheet in the section where it is used. Material Safety Data Sheets: <ul style="list-style-type: none"> The Stores Department shall be responsible for the acceptance of all chemicals on the site and no chemical can be brought onto the site without the appropriate MSDS being provided by the supplier. A master copy of all MSD sheets will be kept by the Stores Department. Copies of the applicable MSD sheets will be kept in all areas which use the applicable chemicals. The Store Department in conjunction with the Quality Assurance Department is responsible to ensure that: <ul style="list-style-type: none"> All chemicals are stored correctly (i.e. in bunded areas if necessary) – in accordance with the MSD sheets. No potentially reactive chemicals are stored together. All people who utilize the chemicals have a copy of the MSD sheet and are aware of its content in terms of PPE for use, storage requirements and the acceptable disposal methods of the chemicals. 		LOM
34.3	Visual	Administration / stores: Administration department	Visual impact. Poor housekeeping through improper storage of chemicals	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance		Control	Storage and distribution of chemicals: <ul style="list-style-type: none"> All chemicals stored on site will be done so in line with the requirements documented in the MSD sheet. All hazardous chemicals will be stored within secure areas and only the responsible person who is aware of the correct handling procedures will have access to this area. The capacity of the liquid hazardous chemicals bund will be determined and chemicals stored accordingly (110% of capacity of liquid stored). The stores will have the capacity to handle the chemicals required for scheduled maintenance activities. No chemicals which could potentially react together will be stored together. Upon delivery of chemicals to be stored, they will be transported into the correct storage area immediately after delivery. Forklift truck drivers who transport hazardous chemicals will be made aware of the potential dangers of spillages of the chemicals. Spill and Hazchem training will be included in the annual induction training. When a chemical is issued, the person receiving the chemical will sign confirmation that they have access 	Ulco will ensure that it has a copy of all applicable MSD sheets for all chemicals stored and used on site. The storage, handling and disposal specifications within the MSD sheets will be implemented.	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										to a copy of the relevant MSD sheet in the section where it is used.		
Safety, health and environmental department: Water management												
35.1	Surface water	Safety, health and environmental department: Water management	<p>Water quality</p> <p>Water quality can be impaired through poor management practices such as:</p> <ul style="list-style-type: none"> - Hydrocarbon spills - Ineffective oil traps - Ineffective sewage plant - Poor management of the storm water control structures resulting in poor separation of dirty and clean water streams. - Build-up of fines. - Poor waste management practices 	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)			Medium-high Significance	Control	<ul style="list-style-type: none"> ▪ Ulco will comply with the permit requirements of the approved integrated water use license. ▪ The permit specifications will be reviewed and if necessary revised. ▪ Ulco shall conduct an internal audit on compliance with the conditions of the water use license. <ul style="list-style-type: none"> ○ Ulco shall appoint an independent external auditor to conduct an audit on compliance with the conditions of the water use license. ▪ Where possible, the main water reticulation system (cooling ponds, potable water reticulation and pipelines) will be visibly inspected for signs of leaks. <ul style="list-style-type: none"> ○ Any leaks discovered will be fixed immediately. ▪ Should anybody communicate the discovery of a water leak to any team leader (outside of the monthly inspection), the leak will be fixed immediately. ▪ Process water for the plant will be obtained from treated Vaal water. ▪ All process water will be treated to make it suitable to act as a coolant. ▪ Where possible water for dust suppression purposes will be obtained from storm water captured within the sumps within the mining area. ▪ If not possible water from the Vaal will be used ▪ Ulco will investigate the water use / reticulation system and identify where improvements can be made in terms of minimising water use / reusing water. The findings will be documented. <p>Waste water treatment plants:</p> <ul style="list-style-type: none"> ▪ The on-going management of the sewage plant will be implemented as per the design specifications. ▪ Operators of the sewage plant will be regularly trained on operational management requirements. ▪ Ulco will monitor and record the volumes of waste water entering the plant. ▪ Ulco will monitor the volumes of treated effluent that are released to the environment at the point of discharge. ▪ Ulco will monitor the quality of treated effluent at the point of discharge. ▪ Ulco will investigate the feasibility/ value add of adding a meter to the incoming water pipe. 	Ulco will ensure that all current water uses at the mine are legal and will implement measures to ensure that any future water use is legalised, if required.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> ○ To identify areas of high water consumption and wastage, ○ To identify and quantify imbalances, ○ Locate and quantify sources of seepage and leakage, ○ Identify and quantify pollution sources, ○ Assist with the design and verification of storage requirements and minimising the risk of spillage, ○ Assist with the design and optimisation of the water monitoring system, ○ Assist in the planning of any future expansion and rehabilitation projects, and ○ Assist in decision-making. ▪ The mine will record the flow of water using flow meters. ▪ If necessary additional flow meters will be positioned to indicate water use by the various departments of the mine and to determine the amount of water discharged from the site. The flow meters will complement the water balance diagram. ▪ Flow meters will be maintained by the Engineering Department as and when required. ▪ Ulco will develop a map of water lines and associated meters to ensure that all water meters match the water balance. ▪ The water balance diagram will be updated based on the readings from the flow meters (which will be recorded) and feedback from water monitoring. After updating the water balance diagram the mine will: <ul style="list-style-type: none"> ▪ Ensure that overall water usage remains within permitted amounts ▪ Identify the monthly variable in water use. ▪ After 1 year of readings from the flow meters Ulco will establish targets for water use (water preservation). ▪ Should there be an increase on water usage from the set targets (as determined over time as records are kept), the mine will; <ul style="list-style-type: none"> ○ Investigate the cause of the fluctuation. ○ Once the cause of the increased usage is determined, the mine will implement a plan to reduce the usage. ▪ The water balance diagram will be reviewed and if necessary updated. ▪ The pipe line between the Vaal River pump station and the Mine will be checked for leaks. ▪ The pump system is also designed to monitor the water pressure in the pipes. If the pressure is reduced dramatically, such as would occur if there was a major leak, the pump will switch off. 		



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
Safety, health and environmental department: Waste management												
36.1	Topography, Soils Land use and land capability	Safety, health and environmental department: Waste management	Soil pollution From hydrocarbon / other chemical spillages which are not cleaned.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)			Medium significance	Control	<p>Waste handling facilities:</p> <ul style="list-style-type: none"> ▪ Ulco will ensure that the following is available for the implementation of effective waste management: <ul style="list-style-type: none"> ○ Appropriate signage / colour coding of the different types of waste receptacles to encourage the separation of waste at source. ○ Suitable number of waste receptacles for all waste collection. ○ Bunded tanks for recycling of old oil drained from vehicles and equipment. ▪ Waste processing areas including: <ul style="list-style-type: none"> ○ A salvage yard area for potential salvageable material. Any salvage material which is oily will be stored over drip trays or in a concreted bunded area. ○ Skip(s) for scrap metal – located on concreted areas. ○ Skips for domestic waste prior to disposal at the waste dump site. ○ A recycling area for glass, cans and paper, respectively. ○ Temporary hazardous waste store area with appropriate concreting, bunding and covering to protect it from rain. ○ An old oil store with appropriate concreting, covering and bunding. ○ Store for old tyres and conveyor belts. ▪ Ulco will investigate the old oil tank at the workshop to ensure that it is not leaking. ▪ The capacity of the waste processing facilities must be large enough to handle the waste generated on site prior to disposal. ▪ The waste processing facility will be inspected to ensure that all waste is being stored correctly prior to disposal. ▪ Ulco will developed a hazardous waste register to capture information on the delivery of waste. ▪ Hazardous waste processing areas will be covered. ▪ Waste processing facilities will have the appropriate storm water management system which keeps “clean water” out of the waste storage area and “dirty water” within the storage area. <ul style="list-style-type: none"> ○ The storm water diversion channels will be monitored for effectiveness. Inadequacies will be rectified as and when discovered. 	To reduce the generation of waste, to where possible, recycle material and thirdly if recycling is not possible then to temporarily store and dispose of waste in a legally acceptable manner.	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<p>Hazardous waste requirements:</p> <ul style="list-style-type: none"> ▪ To demonstrate legal disposal of hazardous waste, Ulco must document the movement of hazardous material from their use, through to their final disposal. Such a documented system must provide for the following aspects: <ul style="list-style-type: none"> ○ All hazardous chemical substances in storage or distribution must be identified, classified and handled in accordance with SANS 0228 and SANS 10229. ○ Records of waste generated (including quantities, class and hazard rating). ○ The manner in which such waste is stored prior to disposal. ○ Proof that the hazardous waste is transported to the hazardous landfill site in compliance with the Road Traffic Act. ○ The name and designation of the person charged with the responsibility of ensuring that waste is correctly handled, stored and disposed of. ○ A mechanism whereby waste generated and waste disposed can be reconciled. ○ Adequate documentation to verify the safe disposal of all hazardous waste removed from the site. ▪ Disposal records of hazardous waste will be kept. <p>Management of historic waste sites (Contaminated land):</p> <ul style="list-style-type: none"> ▪ “contaminated” means the presence in or under any land, site, building or structure of a substance or micro-organism above the concentration that is normally present in or under that land, which substance or micro-organism directly or indirectly affects or may affect the quality of soil or the environment adversely. ▪ Ulco will systematically take soil samples adjacent to known historically contaminated land to identify the normal baseline conditions. ▪ Ulco will continue to monitor contaminated land sites to ensure that its rehabilitation is effective and resembles the surrounding conditions. ▪ Soil and water monitoring samples around the contaminated land sites will be taken on an adhoc basis and tested to prove no pollution is emanating from the area. <ul style="list-style-type: none"> ○ Should pollution be identified during the monitoring, measures will be implemented based on the type and extent of the pollution identified. 		LOM
36.2	Surface water	Safety, health and	Water pollution	Construction, Operational,	Existing Mining Operations				Control	Waste handling facilities:	To reduce the generation of waste, to where	LOM



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
		environmental department: Waste management	From hydrocarbon / other chemical spillages which are not cleaned and then pollute storm water runs off from the mine.	Decommissioning and Closure.	(refer to extent provided in Figure 12)			Medium significance		<ul style="list-style-type: none"> ▪ Ulco will ensure that the following is available for the implementation of effective waste management: ▪ Appropriate signage / colour coding of the different types of waste receptacles to encourage the separation of waste at source. <ul style="list-style-type: none"> ○ Suitable number of waste receptacles for all waste collection. ○ Bunded tanks for recycling of old oil drained from vehicles and equipment. ▪ Waste processing areas including: <ul style="list-style-type: none"> ○ A salvage yard area for potential salvageable material. Any salvage material which is oily will be stored over drip trays or in a concreted bunded area. ○ Skip(s) for scrap metal – located on concreted areas. ○ Skips for domestic waste prior to disposal at the waste dump site. ○ A recycling area for glass, cans and paper, respectively. ○ Temporary hazardous waste store area with appropriate concreting, bunding and covering to protect it from rain. ○ An old oil store with appropriate concreting, covering and bunding. ○ Store for old tyres and conveyor belts. ▪ Ulco will investigate the old oil tank at the workshop to ensure that it is not leaking. ▪ The capacity of the waste processing facilities must be large enough to handle the waste generated on site prior to disposal. ▪ The waste processing facility will be inspected to ensure that all waste is being stored correctly prior to disposal. ▪ Ulco will developed a hazardous waste register to capture information on the delivery of waste. ▪ Hazardous waste processing areas will be covered. ▪ Waste processing facilities will have the appropriate storm water management system which keeps “clean water” out of the waste storage area and “dirty water” within the storage area. <ul style="list-style-type: none"> ○ The storm water diversion channels will be monitored for effectiveness. Inadequacies will be rectified as and when discovered. 	possible, recycle material and thirdly if recycling is not possible then to temporarily store and dispose of waste in a legally acceptable manner.	
									<p>Hazardous waste requirements:</p> <ul style="list-style-type: none"> ▪ To demonstrate legal disposal of hazardous waste, Ulco must document the movement of hazardous material from their use, through to their final disposal. 		LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<p>Such a documented system must provide for the following aspects:</p> <ul style="list-style-type: none"> o All hazardous chemical substances in storage or distribution must be identified, classified and handled in accordance with SANS 0228 and SANS 10229. o Records of waste generated (including quantities, class and hazard rating). o The manner in which such waste is stored prior to disposal. o Proof that the hazardous waste is transported to the hazardous landfill site in compliance with the Road Traffic Act. o The name and designation of the person charged with the responsibility of ensuring that waste is correctly handled, stored and disposed of. o A mechanism whereby waste generated and waste disposed can be reconciled. o Adequate documentation to verify the safe disposal of all hazardous waste removed from the site. ▪ Disposal records of hazardous waste will be kept. <p>Management of historic waste sites (Contaminated land):</p> <ul style="list-style-type: none"> ▪ “contaminated” means the presence in or under any land, site, building or structure of a substance or micro-organism above the concentration that is normally present in or under that land, which substance or micro-organism directly or indirectly affects or may affect the quality of soil or the environment adversely. ▪ Ulco will systematically take soil samples adjacent to known historically contaminated land to identify the normal baseline conditions. ▪ Ulco will continue to monitor contaminated land sites to ensure that its rehabilitation is effective and resembles the surrounding conditions. ▪ Soil and water monitoring samples around the contaminated land sites will be taken and tested to prove no pollution is emanating from the area. o Should pollution be identified during the monitoring, measures will be implemented based on the type and extent of the pollution identified. 		
36.3	Visual	Safety, health and environmental department: Waste management	Visual Poor waste management results in an aesthetical impact and creates a perception of poor housekeeping which in itself manifest as “not caring” about the environment by employees. Good waste	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Low significance		Control	<p>General waste requirements:</p> <ul style="list-style-type: none"> ▪ Ulco will continuously seek alternative methods of reducing / recycling waste. This will be achieved through a review of the current waste management measures and identifying where improvements can be made. 	To reduce the generation of waste, to where possible, recycle material and thirdly if recycling is not possible then to temporarily store and	LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
			management encourages good implementation of environmental management measures.							<ul style="list-style-type: none"> ○ Example of such an initiative includes the “wood chipping” of broken pallets and use of this material as organic matter for rehabilitation requirements. ▪ As and when new waste products are generated, Ulco will include the waste in the waste management procedure. This procedure will document the legally required handling and disposal methods of all waste streams generated at Ulco. ○ The volume and classification of the different waste streams created will be recorded on the waste management spreadsheet. ▪ Disposal records of waste being removed from site will be maintained as proof of legally acceptable removal. ▪ Copies of the valid permits / permissions of the landfill sites that accept the waste from Ulco must be maintained on site. ▪ Waste receptacles will be placed in strategic locations around the mine and will be appropriately labelled with obvious signage / colour coding to ensure separation of waste streams (domestic, hazardous, scrap etc.) at source. ▪ The need for waste separation will be covered in environmental awareness training. ▪ Waste receptacles will be checked and if necessary emptied. ▪ Any domestic waste which has been contaminated with hazardous waste will be treated and disposed of as hazardous waste. ▪ Good housekeeping will be maintained by ensuring that all waste is stored within its designated place prior to disposal. No waste will be left lying around the mine. ○ Good waste management will be encouraged through the implementation of housekeeping competitions that focuses on waste management. ○ Ulco will raise awareness of waste management at their green area meetings. ▪ Any new waste management procedures / measures implemented on the mine will be assessed against the requirements of the National Environmental Management: Waste Act 59 of 2008. ○ If necessary an applicable waste permit will be obtained. 	dispose of waste in a legally acceptable manner.	
									<p>Waste handling facilities:</p> <ul style="list-style-type: none"> ▪ Ulco will ensure that the following is available for the implementation of effective waste management: 		LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> o Appropriate signage / colour coding of the different types of waste receptacles to encourage the separation of waste at source. o Suitable number of waste receptacles for all waste collection. o Bunded tanks for recycling of old oil drained from vehicles and equipment. ▪ Waste processing areas including: <ul style="list-style-type: none"> o A salvage yard area for potential salvageable material. Any salvage material which is oily will be stored over drip trays or in a concreted bunded area. o Skip(s) for scrap metal – located on concreted areas. o Skips for domestic waste prior to disposal at the waste dump site. o A recycling area for glass, cans and paper, respectively. o Temporary hazardous waste store area with appropriate concreting, bunding and covering to protect it from rain. o An old oil store with appropriate concreting, covering and bunding. o Store for old tyres and conveyor belts. ▪ Ulco will investigate the old oil tank at the workshop to ensure that it is not leaking. ▪ The capacity of the waste processing facilities must be large enough to handle the waste generated on site prior to disposal. ▪ The waste processing facility will be inspected to ensure that all waste is being stored correctly prior to disposal. ▪ Ulco will developed a hazardous waste register to capture information on the delivery of waste. ▪ Hazardous waste processing areas will be covered. ▪ Waste processing facilities will have the appropriate storm water management system which keeps “clean water” out of the waste storage area and “dirty water” within the storage area. <ul style="list-style-type: none"> o The storm water diversion channels will be monitored for effectiveness. Inadequacies will be rectified as and when discovered. 		
									<p>Hazardous waste requirements:</p> <ul style="list-style-type: none"> ▪ To demonstrate legal disposal of hazardous waste, Ulco must document the movement of hazardous material from their use, through to their final disposal. Such a documented system must provide for the following aspects: 		LOM	



No.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	STANDARD TO BE ACHIEVED	TIME PERIOD FOR IMPLEMENTATION
						Probability	Magnitude	Significance				
										<ul style="list-style-type: none"> o All hazardous chemical substances in storage or distribution must be identified, classified and handled in accordance with SANS 0228 and SANS 10229. o Records of waste generated (including quantities, class and hazard rating). o The manner in which such waste is stored prior to disposal. o Proof that the hazardous waste is transported to the hazardous landfill site in compliance with the Road Traffic Act. o The name and designation of the person charged with the responsibility of ensuring that waste is correctly handled, stored and disposed of. o A mechanism whereby waste generated and waste disposed can be reconciled. o Adequate documentation to verify the safe disposal of all hazardous waste removed from the site. ▪ Disposal records of hazardous waste will be kept. <p>Management of historic waste sites (Contaminated land):</p> <ul style="list-style-type: none"> ▪ “contaminated” means the presence in or under any land, site, building or structure of a substance or micro-organism above the concentration that is normally present in or under that land, which substance or micro-organism directly or indirectly affects or may affect the quality of soil or the environment adversely. ▪ Ulco will systematically take soil samples adjacent to known historically contaminated land to identify the normal baseline conditions. ▪ Ulco will continue to monitor contaminated land sites to ensure that its rehabilitation is effective and resembles the surrounding conditions. ▪ Soil and water monitoring samples around the contaminated land sites will be taken and tested to prove no pollution is emanating from the area. o Should pollution be identified during the monitoring, measures will be implemented based on the type and extent of the pollution identified. 		
Safety, health and environmental department: Air conditioners												
37.1	Air quality	Safety, health and environmental department: Air conditioners	Global warming Ozone depletion gases being potentially released and resulting in global warming.	Construction, Operational, Decommissioning and Closure.	Existing Mining Operations (refer to extent provided in Figure 12)	Medium significance			Control	<ul style="list-style-type: none"> ▪ As and when air conditioners require replacing, they will be replaced with ozone friendly air conditioners. 	Reduce the use of ozone depleting gases in air conditioners.	LOM



7.5.2 Proposed Bergville Project

Table 24: Impacts and Risks identified including mitigation/management measures for the proposed Bergville Project

NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
1a	Geology	Opencast Mining	The limestone will be removed by opencast mining methods, permanently altering the geological sequence.	Irreversible	High Degree	Operational, Decommissioning	Within the 220.63 Ha	4	2	Medium	Stop	Removal of material should be limited to limestone only and material that must be removed to access the mineral.	2	1	Low	Geology to be mined to be kept at a minimum.	Comply to the conditions of the Mining Right in terms of the MPRDA.	20 years
1b	Geology	Surface infrastructure	There are no impacts identified to Geology as a result of the construction and operation of the surface infrastructure.															
2a	Topography, Soils Land use and land capability	Opencast Mining	Removing of limestone will impact on overlying geological strata, alter topography and/or reduce land capability, as well as cause an increased risk of erosion within wetlands.	Reversible	Low Degree	Operational, Decommissioning and Closure.	Within the 220.63 Ha	3	2	Medium	Control	Vegetation and topsoil stripped ahead of the mining face should be moved to the designated topsoil dump. When overburden is encountered it should be stripped separately to the topsoil and used immediately as fill material for concurrent rehabilitation requirements on the mine.	2	1	Low	To prevent loss of soil.	Adherence to the rehabilitation procedure. Adherence to the mining method as per the Mining Works Programme.	20 years
2b	Topography, Soils Land use and land capability	Surface infrastructure	Temporary stockpiling of topsoil, construction and operation of the surface infrastructure will cause a temporary minor change in topography until the closure of the mine when the infrastructure will be demolished.	Reversible	Low Degree	Construction, Operational, Decommissioning and Closure.	Within the 220.63 Ha	2	2	Medium	Control	The disturbance area for the construction will be kept at a minimum and in the designated areas as per the approved layout plans. Topsoil will be stripped from the proposed footprint areas before construction starts. All topsoil stockpiles should also be protected by berms to prevent erosion of stockpiled material and to divert surface water runoff around the material. Topsoil stockpiles should not have steep slopes that encourage the possibility of erosion Ensure topsoil stockpiles do not exceed a height of 5 metres. Should these stockpiles become a source of windblown dust, they must be covered by plastic sheeting or vegetated with indigenous vegetation.	2	1	Low	To prevent loss of topsoil	Adherence to the rehabilitation procedure.	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											All alien invasive flora should be removed from the stockpiles.						
3a	Fauna and Flora: Ephemeral Drainage line diversion (preferred and alternative)	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> Clearing of vegetation as part of the drainage line diversion leading to a loss of faunal and floral habitat; Loss of faunal and floral species diversity due to vegetation loss; Loss of downstream recharge of the existing drainage line due to the diversion leading to loss of niche habitat and species diversity associated with areas of increased moisture; and Vegetation clearing and desiccation of the downstream drainage line feature within the study area leading to the loss of floral and faunal SCC associated with areas of increased moisture. 	Reversible	Low Degree	Impacts on extended area beyond site boundary (hundreds of metres) as a result of downstream impacts as a result of the altered water flow patterns.	5	4	High	Control	<p>Avoid disturbance of high sensitivity habitat units as far as possible. In this aspect the diversion of the drainage line should be reconsidered;</p> <p>Failing the above, consider incorporating into the engineering designs a method to ensure that would allow for sufficient water flow into the system on a seasonal basis to maintain seasonally moist soil conditions in order to maintain faunal and floral species associated with such conditions,</p> <p>Demarcate the construction footprint, and ensure that all construction activities remain within the designated footprint area whilst ensuring that the footprint area remains as small as possible;</p> <p>Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development;</p> <p>Prior to any construction activities a suitably qualified specialist should conduct a walkdown of the diversion area in order to identify any potential Species of Conservation Concern ("SCC"). Such species will have to be relocated once the necessary permits have been acquired from the provincial authorities;</p> <p>No trapping of faunal species or faunal SCC may take place nor the collecting of floral plants (SCC or medicinal) by construction personnel; and</p> <p>No informal fires are allowed by construction personnel outside of the development footprint.</p>	4	3	High	Limit vegetation clearance within ecological sensitive areas to what is absolutely required and prevent the loss of faunal and floral SCC. Limit impacts to the downstream recharge of the drainage line within the study area.	Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity Guidelines into account. Develop and implement an Alien and Invasive Plant Control Plan	



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
3b	Fauna and Flora: Preferred Haul road, crusher plant and conveyor construction	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> Clearing of vegetation along the proposed haul road and conveyor belt routes will lead to the loss of faunal and floral habitat; Decreased habitat will lead to the loss of faunal and floral species diversity as well as the loss of faunal and floral SCC; and Construction of the haul road and conveyor will lead to the fragmentation of faunal habitat within the study area. 	Reversible	Low Degree				High	Control	<p>Avoid increased disturbance footprints within high sensitivity habitat units such as the drainage line;</p> <p>Demarcate the construction footprint, and ensure that all construction activities remain within this footprint area;</p> <p>Ensure that the proposed development footprint areas remain as small as possible and that no footprint creep occurs outside of the demarcated areas;</p> <p>Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the mining activities;</p> <p>No trapping of faunal species or collection of floral species may take place, this is particularly pertinent to faunal and floral SCC as well as medicinal plants;</p> <p>Floral SCC species observed within the footprint areas of the haul road and conveyor are to be rescued and relocated by a suitably qualified specialist once the appropriate permits have been obtained from the relevant authorities;</p> <p>No fires are allowed by construction personnel;</p> <p>Employ appropriate dust suppression techniques to minimise dust fallout to the surrounding natural areas;</p> <p>Develop and implement an Alien and Invasive Plant (AIP) control plan aimed at controlling current alien plant species whilst minimising their spread into the disturbed and surrounding natural areas;</p> <p>It is recommended that the lowest part of the conveyor be approximately 50cm above</p>	3	3	Medium	Limit vegetation clearance to what is absolutely necessary whilst managing edge effects and alien plant proliferation.	<p>Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist).</p> <p>General implementation of activities taking Mining and Biodiversity Guidelines into account.</p> <p>Develop and implement an Alien and Invasive Plant Control Plan</p>	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											ground so as to allow for movement of faunal species under the conveyor line, thereby limiting habitat fragmentation and decreasing the impact of the infrastructure on faunal species movement; and As the conveyor will be constructed overland, it is recommended that vegetation within the conveyor footprint area be cut, as opposed to complete removal, as this help retain a small semblance of habitat and species diversity, whilst also stabilising the soil, preventing erosion, limiting alien plant proliferation in bare areas and minimising the need for revelation during rehabilitation activities.						
3c	Fauna and Flora: Vegetation clearing of mining footprints (preferred and alternative)	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> Clearing of vegetation within the mining footprints leading to significant habitat loss for faunal and floral species; Loss of faunal and floral species diversity due to habitat loss and increased mining activities; and Loss and or displacement of faunal and floral SCC. 	Reversible	Low Degree	Impact on local scale / adjacent sites (km's). Loss of faunal species habitat will have long term and widespread effects on population numbers, notably SCC.	5	5	High	Control	Vegetation clearance should be done in phases in accordance with mining plans, only clearing that which is necessary so as to avoid extended and unnecessary areas of bare soil. This will further allow for faunal species to naturally move out of the affected areas ahead of clearing activities; Only areas that are to be mined as per the mining plan are to be cleared of vegetation whilst strictly monitoring edge effects and footprint creep; All floral and faunal SCC observed are to be rescued and relocate by a specialist once the relevant removal permits have been obtained from the provincial authorities if necessary; Restrict vehicles to travelling only on designated roadways and within areas of existing disturbance to limit the ecological disturbance footprint;	5	4	High	Limit habitat loss through unnecessary vegetation clearance activities beyond that of the footprint areas. Limit edge effects and alien plant proliferation in order to promote habitat integrity of the remaining areas.	Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity Guidelines into account. Develop and implement an Alien and Invasive Plant Control Plan	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
											Alien plants are to be removed / controlled as per the AIP control plan; No trapping of faunal species or collection of floral species may take place; No informal fires are allowed; and Employ appropriate dust suppression techniques to minimise dust fallout to the surrounding natural areas;						
3d	Fauna and Flora: Original haul road, crusher plant and conveyor construction	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> Clearing of vegetation along the proposed haul road and conveyor belt routes will lead to the loss of faunal and floral habitat; Decreased habitat will lead to the loss of faunal and floral species diversity as well as the loss of faunal and floral SCC; and Construction of the haul road and conveyor will lead to the fragmentation of faunal habitat within the study area. 	Reversible	Low Degree	Effect limited to the activity and its immediate surroundings (tens of metres). Impacts are likely to be associated with the areas along the proposed routes, however edge effects may impact on the surrounding sites as well. The crusher plant is located within the Year 5 footprint and as such will not be associated with further habitat loss.	4	3	High	Control	Avoid increased disturbance footprints within high sensitivity habitat units such as the drainage line; Demarcate the construction footprint, and ensure that all construction activities remain within this footprint area; Ensure that the proposed development footprint areas remain as small as possible and that no footprint creep occurs outside of the demarcated areas; Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the mining activities; No trapping of faunal species or collection of floral species may take place, this is particularly pertinent to faunal and floral SCC as well as medicinal plants; Floral SCC species observed within the footprint areas of the haul road and conveyor are to be rescued and relocated by a suitably qualified specialist once the appropriate permits have been obtained from the relevant authorities; No fires are allowed by construction personnel;	4	3	High	Limit vegetation clearance to what is absolutely necessary whilst managing edge effects and alien plant proliferation. Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity Guidelines into account. Develop and implement an Alien and Invasive Plant Control Plan	20 years	



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											Employ appropriate dust suppression techniques to minimise dust fallout to the surrounding natural areas; Develop and implement an Alien and Invasive Plant (AIP) control plan aimed at controlling current alien plant species whilst minimising their spread into the disturbed and surrounding natural areas; It is recommended that the lowest part of the conveyor be approximately 50cm above ground so as to allow for movement of faunal species under the conveyor line, thereby limiting habitat fragmentation and decreasing the impact of the infrastructure on faunal species movement; and As the conveyor will be constructed overland, it is recommended that vegetation within the conveyor footprint area be cut, as opposed to complete removal, as this help retain a small semblance of habitat and species diversity, whilst also stabilising the soil, preventing erosion, limiting alien plant proliferation in bare areas and minimising the need for revegetation during rehabilitation activities.							
3e	Fauna and Flora: Mining and expansion of opencast pits	Mining within the proposed mining footprints (preferred and alternative) as per the mine schedule (Year 1, Year 5, Year 10 and Post 10 years); and Operation of the crusher,	<ul style="list-style-type: none"> Loss of floral and faunal habitat, diversity and SCC due to mining operations and the expansion of the opencast pits in line with the current proposed mining schedule; Loss of habitat connectivity as a result of the construction of the haul road as well as the conveyor belt; Noise and dust pollution to the receiving environment from blasting and vehicle movement will lead to the displacement of faunal species whilst dust fallout on plants may reduce the photosynthetic rate leading to slower plant growth and vegetation recovery. 	Reversible	Low Degree	Operational	The impact is not limited to proposed footprint areas but can extend to the surrounding natural areas with possible dust pollution beyond	4	4	High	Control	Demarcate the various operational footprints and ensure that all operational activities remain within these footprint areas; Employ appropriate dust suppression techniques to minimise dust fallout to the surrounding natural areas; Restrict operational vehicles to travelling only on designated roadways to limit the impact on the receiving environment;	4	4	High	Prevent the disturbance of faunal ecology especially avifaunal species beyond the infrastructure footprint area and limit the negative impact on the game breeding project within the MRA.	Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		conveyor belt and haul road;				that of the study area.					No collecting of plant material, floral or faunal SCC, medicinal plants or trapping/hunting of faunal species by operational personnel; Mine vehicles must be limited to only travel 40km/h on designated roads so as to limit the probability of vehicle collisions with faunal species; Employ a suitable environmental education program to educate mine staff about the ecological sensitivity of the environment and the importance of protecting the remaining fauna and flora within the study area; Implement the AIP control plan throughout the operation phase; and Concurrent rehabilitation techniques should be investigated so as to limit disturbed areas where alien plant proliferation is likely to occur.				Guidelines into account. Develop and implement an Alien and Invasive Plant Control Plan		
3f	Fauna and Flora: Crusher plant, haul road and conveyor operation (preferred layout)	Mining within the proposed mining footprints (preferred and alternative) as per the mine schedule (Year 1, Year 5, Year 10 and Post 10 years); and Operation of the crusher, conveyor belt and haul road;	<ul style="list-style-type: none"> Operation of the crusher plant; Vehicle related faunal mortalities may occur as a result of mining vehicles moving along haul and mine roads; Night glow from operational lights will lead to altered nocturnal species movement patterns, notably to species that are light sensitive and/or attracted to light sources; and Increased levels of dust and noise pollution as a result of the operations of the crusher and conveyor leading to the displacement of faunal species whilst dust fallout on plants may reduce the photosynthetic rate leading to slower plant growth and vegetation recovery. 	Reversible	Low Degree	Operational	Impacts on extended area beyond site boundary (hundreds of metres) Noise, dust and light pollution are likely to extend beyond that of the study area.	4	3	High	Control	If operations are to run at night downward lighting is to be used so as to limit night glow. This will also help limit the amount of insects and subsequently predatory species, particularly bats, that will be attracted to the mining infrastructure areas. This will help mitigate bat and other faunal species mortalities that may arise from collisions with mining infrastructures and direct human conflict; Restrict maintenance and operational vehicles to travelling only on designated roadways to limit the ecological disturbance footprint; Dust suppression should be employed on all dirt roads and bare soils areas to limit the	3	3	Medium	Limit vegetation clearance within ecological sensitive areas to what is absolutely required, prevent indiscriminate driving within natural areas outside of the development footprint Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity Guidelines into account. Develop and implement an Alien and Invasive Plant Control Plan	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											impacts of dust on the surrounding environment; Monitor the haul road for roadkill and if areas of high mortalities are noted investigate measures to limit faunal species movement across the road by using raised berms/barriers to divert species to other crossing point. Culverts can be constructed under the haul road to allow for the safe movement of faunal species, notably smaller species such as small mammals and reptiles; Continue with AIP control plan and regularly monitor and control alien plant species within the mine infrastructure areas as well as within the study area; and All areas of disturbed and compacted soils need to be ripped, reprofiled and reseeded with indigenous vegetation to limit and control the establishment of alien and invasive species.						
3g	Fauna and Flora: Crusher plant, haul road and conveyor operation (original layout)	Mining within the proposed mining footprints (preferred and alternative) as per the mine schedule (Year 1, Year 5, Year 10 and Post 10 years); and operation of the crusher, conveyor belt and haul road;	<ul style="list-style-type: none"> • Operation of the crusher plant. • Vehicle related faunal mortalities may occur as a result of mining vehicles moving along haul and mine roads; • Night glow from operational lights will lead to altered nocturnal species movement patterns, notably to species that are light sensitive and/or attracted to light sources; and • Increased levels of dust and noise pollution as a result of the operations of the crusher and conveyor leading to the displacement of faunal species whilst dust fallout on plants may reduce the photosynthetic rate leading to slower plant growth and vegetation recovery. 	Reversible	Low Degree	Operational	Impacts on extended area beyond site boundary (hundreds of metres) Noise, dust and light pollution are likely to extend beyond that of the study area.	4	3	High	Control	If operations are to run at night downward lighting is to be used so as to limit night glow. This will also help limit the amount of insects and subsequently predatory species, particularly bats, that will be attracted to the mining infrastructure areas. This will help mitigate bat and other faunal species mortalities that may arise from collisions with mining infrastructures and direct human conflict; Restrict maintenance and operational vehicles to travelling only on designated roadways to limit the ecological disturbance footprint; Dust suppression should be employed on all dirt roads and bare soils areas to limit the	4	3	High	Limit vegetation clearance within ecological sensitive areas to what is absolutely required, prevent indiscriminate driving within natural areas outside of the development footprint Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity Guidelines into account. Develop and implement an Alien and	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											impacts of dust on the surrounding environment; Monitor the haul road for roadkill and if areas of high mortalities are noted investigate measures to limit faunal species movement across the road by using raised berms/barriers to divert species to other crossing point. Culverts can be constructed under the haul road to allow for the safe movement of faunal species, notably smaller species such as small mammals and reptiles; Continue with AIP control plan and regularly monitor and control alien plant species within the mine infrastructure areas as well as within the study area; and All areas of disturbed and compacted soils need to be ripped, reprofiled and reseeded with indigenous vegetation to limit and control the establishment of alien and invasive species.					Invasive Plant Control Plan	
3h	Fauna and Flora: Removal of mining related infrastructure and site rehabilitation	Demolishing of all surface infrastructure (Crusher and conveyor); and Rehabilitation of opencast pits, haul road and conveyor route.	<ul style="list-style-type: none"> Loss of remaining faunal habitat, diversity and SCC in the surrounding natural areas. Removal of infrastructure and rehabilitation may result in a loss of faunal habitat, diversity and faunal SCC, if not performed according to a detailed closure and rehabilitation plan. 	Irreversible	High degree	Decommissioning	Effect limited to the site (metres) but can extend to the surrounding natural areas.	3	3	Medium	Control	Footprint areas of demolition activities must be kept as small as possible; Rehabilitation of disturbed areas must be implemented and grass seeds of species indigenous to the area must be used in order to reinstate a natural herbaceous layer and habitat; Active dust suppression must be employed at all times; Areas of compaction need to be ripped and rehabilitated using indigenous plant species common to the area in order to reinstate a semblance of natural habitat within the historically disturbed and cleared areas;	3	3	Medium	Prevent any further disturbance to habitat considered sensitive or in a good ecological condition and ensure effective rehabilitation of disturbed areas. Develop an effective and ecologically suitable rehabilitation plan for the remaining opencast pits. Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity Guidelines into account. Develop and implement an Alien and	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											Suitably engineer and plan the recreation of the new pan wetland within the mining footprint with the approval of the Department of Water Affairs; Rehabilitation activities are to be monitored for a period of 5 years post mining or until such a time that natural ecological processes have begun to take over; and Care must be taken when rehabilitation activities are performed within the drainage line and associated buffer zones as these areas are of increased sensitivity. In such instances manual labour is the preferred option over heavy machinery.					Invasive Plant Control Plan		
3i	Fauna and Flora: Alien plant proliferation in disturbed areas	Demolishing of all surface infrastructure (Crusher and conveyor); and Rehabilitation of opencast pits, haul road and conveyor route.	<ul style="list-style-type: none"> Increase in alien species proliferation; and Ineffective rehabilitation of disturbed areas may result in alien and invasive plant proliferation, which might spread to surrounding undisturbed areas and will result in further habitat and terrestrial species diversity loss. 	Irreversible	High degree	Decommissioning	Within the 220.63 Ha	4	4	High	Control	Monitoring and continued control of AIPs must be done during the decommissioning and closure phase; All management measures and recommendations set out in the AIP control plan must be adhered to; AIP plant control measures should continue for a period of 5 years post closure / decommissioning; Seed dispersal of AIP must be prevented as far as possible. As such, where AIP's have been cut and remove, the material is not to be disposed of in the surrounding habitat but disposed of at a registered waste / disposal facility; and AIP control must be carried out by a registered contractor.	2	3	Medium	Ensure effective rehabilitation of disturbed areas and the effective and continued control of alien plant species beyond mine closure.	Rehabilitation monitoring to be undertaken by suitably qualified rehabilitation specialist (in consultation with ecologist). General implementation of activities taking Mining and Biodiversity Guidelines into account. Develop and implement an Alien and Invasive Plant Control Plan	20 years
4a1	Surface water	<u>Opencast Mining:</u> Grading, vegetation	There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, carbonaceous materials or other pollutants generated during the construction phase of the proposed Bergville Project. The sediment	Reversible	Low Degree	Construction	Within the 220.63 Ha	3	2	Medium	Control	Soil stockpiles must be placed in designated areas. The laydown area must be kept as small as reasonably possible.	2	1	Low	To minimise the extent of disturbance of the natural surface	Surface water quality monitoring (monthly).	20 year



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		clearing and soil stripping.	load within surface water runoff may increase if not prevented or mitigated, or the chemistry of surface water may be altered. <u>Surface water quality:</u> Siltation of water resources causes deterioration of water quality, affecting the use of surface water as a natural resource.								Construct a diversion berm upstream of the construction site (as recommended in the storm water management measures above).				water environment. To limit degeneration of ecological integrity and functioning.		
4a2	Surface water	Opencast Mining: Operation of an opencast mining pit.	The opencast mining pit will reduce clean water runoff, with subsequent impacts on the catchment reserve. Additionally, clean water that drains into the opencast pit will come in contact with the mine floor and side walls, which could pollute the clean water. <u>Surface water quantity:</u> There will be a decrease in clean water runoff reporting to the catchment and potential impact on the availability of water to downstream users. <u>Surface water quality:</u> Deterioration of water quality is expected, affecting the use of surface water as a natural resource.	Reversible	Low Degree	Operational, Decommissioning and Closure Within the 220.63 Ha	3	2	Medium	Control	Divert all upstream clean water runoff away from the opencast mining pit to limit the impact of the opencast pit footprint (as recommended in the storm water management measures above). The clean water diversion berms should be inspected regularly to ensure integrity is maintained at all times.	2	1	Low	To minimise the extent of disturbance of the natural surface water environment. To limit degeneration of ecological integrity and functioning.	Surface water quality monitoring (monthly).	20 year
4b1	Surface water	Surface infrastructure : Use of hazardous materials	Spillages of hazardous materials used during the construction of the proposed Bergville Project may impact on the surrounding clean water environment. <u>Surface water quality</u> Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource.	Reversible	Low Degree	Construction Within the 220.63 Ha	2	2	Low	Control	Regular maintenance of all equipment. Any spills detected must be clean up immediately. Ensure that all hazardous chemicals are stored in designated, bunded areas of which access is controlled. All vehicle and equipment usage should be limited to designated areas only.	1	1	Low	To minimise the extent of disturbance of the natural surface water environment. To limit degeneration of ecological integrity and functioning.	Surface water quality monitoring (monthly).	20 year
4b2	Surface water	Surface infrastructure : Maintenance of vehicles and equipment during construction	Maintenance activities resulting in spillage of oil, fuel and / or grease at construction sites. <u>Surface Water quality:</u> Spillages of substances that contains hydrocarbons may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Reversible	Low Degree	Construction Within the 220.63 Ha	2	2	Low	Control	Treat all hydrocarbon spills as hazardous waste and dispose of accordingly. Store fuel and oil in designated bunded areas. Emergency spills to be cleaned up quickly and effectively with approved absorbent material.	1	2	Low	To minimise the extent of disturbance of the natural surface water environment. To limit degeneration of ecological integrity and functioning.	Surface water quality monitoring (monthly).	20 year



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
						Reversibility	Irreplaceable loss	Probability			Magnitude	Significance	Probability			
4b3	Surface water	Surface infrastructure : Cement and concrete mixing	Washing of concrete delivering trucks and cement equipment on site as well as cement / concrete mixing outside of demarcated areas and the incorrect disposal of excess cement and concrete may impact on the surrounding clean water environment. <u>Surface water quality:</u> Incorrect cement / concrete handling practises during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource.	Construction	Within the 220.63 Ha	2	2	Low	Control	Ensure that mixing practices are conducted on impermeable surfaces. Ensure that all contractors are properly trained in terms of disposal of excess cement. Site supervisors to ensure that correct disposal procedures are followed. Ensure that concrete delivery trucks are washed in designated areas.	1	1	Low	To minimise the extent of disturbance of the natural surface water environment. To limit degeneration of ecological integrity and functioning.	Surface water quality monitoring (monthly).	20 year
4b4	Surface water	Surface infrastructure : Storage of fuel and refuelling construction vehicles	Accidental spillages of fuel on site and incorrect storage practises may impact on the surrounding clean surface water environment. <u>Surface water quality:</u> Incorrect fuel storage, handling and accidental spillages during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Construction	Within the 220.63 Ha	2	2	Low	Control	Fuel storage tanks should be within a bunded area. The bunded area should be able to contain 110% of the storage capacity. Emergency spills kits should be available.	1	1	Low	To minimise the extent of disturbance of the natural surface water environment. To limit degeneration of ecological integrity and functioning.	Surface water quality monitoring (monthly).	20 year
4b5	Surface water	Surface infrastructure : Operation of a haul road	Clean water transported within the drainage line could enter the existing opencast mining pit at the haul road crossing (due to the haul road passing through a slot in the limestone wall of the existing pit). Clean water that drains into the existing opencast pit will decrease the volume of water available for the catchment yield. Clean water that comes in contact with the mine floor and side walls, could become polluted. Additionally, clean water from the upstream catchment will pond against the haul road, with subsequent impacts on the catchment reserve. <u>Surface water quantity:</u> There will be a decrease in clean water runoff reporting to the catchment and potential impact on the availability of water to downstream users. <u>Surface water quantity:</u> Deterioration of water quality is expected, affecting the use of surface water as a natural resource.	Operational	Within the 220.63 Ha	4	4	High	Control	Divert the drainage line underneath the haul road crossing and discharge the runoff to the clean downstream environment. The discharge point must be equipped with adequate erosion controls. Construct the drainage line diversion when mining activities start to impact on the drainage line. The design and sizing requirements of the proposed road crossing and river diversion should be determined by qualified engineers. Install culverts along the length of the haul road to allow the haul road to be free draining. The crossing and culvert should be inspected regularly	2	2	Low	To minimise the extent of disturbance of the natural surface water environment. To limit degeneration of ecological integrity and functioning.	Surface water quality monitoring (monthly).	20 year



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
			Reversibility	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											for the accumulation of debris, especially during the rainy season.							
5a	Groundwater	Opencast Mining: and Surface infrastructure :	Site clearing and removal of topsoil, may lead to ponding of surface water in the cleared areas during the wet season and could potentially lead to increased infiltration to aquifers. Groundwater quality impacts during the construction phase are expected to be insignificant if the proposed management measures are implemented. The stripping and stockpiling of topsoil and subsoil from the pit and infrastructure surface areas is considered negligible since no chemical interaction is envisaged that could have an adverse impact on groundwater quality. The stripping of topsoil may result in a very slight increase in groundwater recharge, which is a slight positive effect on the groundwater environment. The duration of the activity is however so limited that the effect will not be measurable. The construction of the above-mentioned infrastructure will cause a very small reduction in recharge to the aquifer due to the compaction of the surface area. This impact is countered by the fact that vegetation clearing may result in ponding and slight increases in recharge. Runoff water will contribute to the catchment yield.	Reversible Low Degree		Construction	Site and Immediate surrounds	2	2	Low	Control	Run-off from roads will be diverted and contained in the dirty water system. Implement traffic rules and train employees on correct procedures. Implement vehicle maintenance. Install oil collection pans in or under vehicles. Report and fix leaking appliances as soon as possible. Initiate baseline water quality and water quantity monitoring prior to commencement of mining activities.	2	1	Low	To minimise the extent of disturbance of the aquifer. To degeneration limit of groundwater quality.	Groundwater monitoring (quarterly)	20 years
5b	Groundwater	Opencast Mining: and Surface infrastructure .	The localised dewatering of the aquifer on cannot be prevented. Since the water table is expected to be shallow, mining will occur below the static groundwater levels. Farmers' boreholes will have to be monitored to verify whether the dewatering will impact on their boreholes. Given the nature of the limestone/dolomitic aquifer, aquifer hydraulic properties may vary considerably. Where the aquifer and preferential flow paths (fractures) are well developed, the cone of depression may impact a large area.	Reversible Low Degree		Operational	Site and Immediate surrounds	3	3	Medium	Control	Groundwater levels near the planned mine should be monitored on a regular basis throughout construction, operation and post closure phases. The monitoring programme should be updated after one year of mining initiation and every three (3) years thereafter by a professional geohydrologist. Update the hydrocensus every three years. If impact is confirmed by monitoring, impacts to the community's and farmers' water supply must be mitigated.	3	2	Medium	To minimise the extent of disturbance of the aquifer.	Groundwater monitoring (quarterly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											Routinely refine, update and validate the conceptual and numerical models by incorporation of ongoing monitoring data.							
5c	Groundwater	Opencast Mining: and Surface infrastructure	If pollutants have reached groundwater it is very difficult and costly to remediate. However, because of the highly alkaline nature of the limestones, this material will not have an acid leachate impact on the local or regional water quality. No sulphidic minerals are known to be present in the ore to be mined that could result in acidity of drainage or mine water. However, salinity and possibly nitrogen contamination may result from the mining activities and stockpiling of ore and overburden. Good housekeeping practices and effective blasting and stormwater management should keep quality impacts to the minimum.	Reversible	Low Degree	Operational, Decommissioning and Closure	Site and Immediate surrounds	2	3	Medium	Control	Implement and maintain proper storm water management infrastructure. Monitoring of groundwater quality through strategically positioned groundwater monitoring boreholes to ensure early detection of negative impacts. Monitoring of groundwater should be conducted as per the monitoring programme in Section 9 of the groundwater study. Groundwater infiltration should be controlled and can be achieved through installation of liners and adequate surface drainage. Monitor groundwater quality. If ambient quality is adversely affected, the mine is to come to an arrangement with the affected users. Update groundwater model (flow and transport) when new data becomes available. Update hydrocensus every three (3) years.	2	2	Low	To minimise the extent of disturbance of the aquifer.	Groundwater monitoring (quarterly)	20 years
6a	Sensitive landscapes (including wetlands): Ephemeral Drainage Line (EDL)	Diversion of the ephemeral drainage line by means of a berm-and-trench channel from where it enters the western boundary of the new mining area and will be	<ul style="list-style-type: none"> Clearing of riparian vegetation for the placement of the berm; Altered drainage patterns, leading to the change in the pattern flow and timing of water in the landscape, potentially impacting on the riparian vegetation composition; Loss of riparian habitat due to the diversion of the drainage line, and failure of riparian habitat to establish in the new diversion channel to offset the loss of the original drainage line habitat; 	Reversible	Medium Degree	Construction	Impacts on extended area beyond site boundary (hundreds of metres) – The impact of the diversion of the drainage line would affect the	4	3	High	Control	It is considered imperative that all works be undertaken during the dry period to limit surface water contamination and the need for any surface water diversion during the construction works. The design of the diversion channel should ensure adequate flow connectivity between the upstream and downstream reaches of the drainage line;	4	2	Medium	Minimise the loss of riparian habitat and ecological structure, changes to ecological and social-cultural services provision and alteration of the hydrological functioning and sediment balance of the drainage line, beyond the	Wetland monitoring every 3 years	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		released back into the natural drainage line on the eastern portion of the new mining area. The drainage line will be crossed by the new access haul road via a culvert crossing or by means of an aqueduct supported by concrete columns over the access road. For the duration of the diversion channel, the riparian habitat provided by the original reach of the drainage line will be lost.	<ul style="list-style-type: none"> Potential inadequate design of the diversion channel and aqueduct, leading to alteration of the pattern flow and timing of water in the drainage line as well as erosion and sedimentation of the downstream freshwater environment. 			downstream reach of the drainage line beyond the boundary of the investigation area.					<p>The diversion channel must be sloped at a maximum of 1:3 slope, as this would prevent erosion of the channel (primarily due to the high erosive nature of the soils in the area) but also allow for animals to enter into and out of the diverted channel, thus retaining its ecological connectivity and migratory properties;</p> <p>The diversion channel should be sized to accommodate a 1:100 year flood;</p> <p>Excavated materials from the new diversion channel should not be contaminated and it should be ensured that the minimum surface area is taken up when stockpiled, and the stockpiles may not exceed 5m in height. Mixture of the lower and upper layers of the excavated soil should be kept to a minimum, so as for usage for the berm or as part of rehabilitation activities;</p> <p>Material to be used for the berm may not be stockpiled within the 32m Zone of Regulation of the drainage line unless its material excavated from the diversion channel that will be used to create the berm. Alternatively, imported soil for the berm should be transported immediately from the laydown area to the area where it will be placed. This will prevent the sedimentation of the drainage line;</p> <p>All stockpiled soils must be protected for the duration of the construction (if they were to be stockpiled for a few months) by vegetating them with indigenous grasses to prevent erosion and sedimentation of the drainage line;</p>				extent of the diverted reach.		



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
											<p>After the construction of the berm, it should immediately be revegetated with indigenous riparian species such as the species that are associated with the natural upstream reach of the drainage line. This will allow that the riparian habitat lost by the original drainage line be replaced to some degree, to provide refuge and migratory corridors for smaller mammals and avifauna;</p> <p>To prevent erosion of the drainage line during super critical flows, the channel must be lined with rip-rap (preferably in situ material) where applicable.</p> <p><u>Key mitigation measures applicable to concrete mixing on site, associated with the construction of the aqueduct (it is assumed that the concrete columns supporting the aqueduct will be located outside of the diverted drainage line. The following mitigation measures are applicable to avoid any potential edge effects to the diverted EDL):</u></p> <p>Concrete and cement-related mortars can be toxic to freshwater environments. Proper handling and disposal should minimize or eliminate discharges into the drainage line. High alkalinity associated with cement, which can dramatically affect and contaminate both soil and ground water.</p> <p>No mixed concrete may be deposited outside of the designated construction footprint. The following recommendations must be adhered to:</p>						



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
											<ul style="list-style-type: none"> - Fresh concrete and cement mortar should not be mixed near the drainage line. Mixing of cement may be done within the construction camp/laydown area, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to use ready mix concrete; - No mixed concrete shall be deposited directly onto the ground within the drainage line or its associated riparian habitat. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited while it awaits placing; - A washout area should be designated outside of the delineated boundary of the drainage line, and wash water should be treated on-site or discharged to a suitable sanitation system; - Cement bags must be disposed of in the demarcated hazardous waste receptacles (such as the Ulco onsite waste landfill site). <p>Concrete spillage outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.</p> <p><u>Key mitigation measures applicable to the discharge point of the diversion channel into the downstream reach of the drainage line:</u></p> <p>Erosion should be prevented where the diversion channel ties into the natural downstream reach of the drainage line. This can be achieved by the placement of rip-rap at the diversion channel outlet and by ensuring that the</p>						



NO	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION			
	ASPECTS AFFECTED	ACTIVITY			Impact Description	Reversibility	Irreplaceable loss			Probability	Magnitude	Significance				Probability	Magnitude	Significance
6b	Sensitive landscapes (including wetlands): All watercourses	The construction of clean and dirty water management systems around the open cast pit footprint areas during the LOM	<ul style="list-style-type: none"> Loss of catchment yield that would otherwise have entered the watercourses within the new mining area; This could lead to alteration of the wetting pattern of the pan wetland and flow in the ephemeral drainage line (EDL), leading to changes in the habitat it provides. 	Reversible	Medium Degree	Construction	Impacts on extended area beyond site boundary (hundreds of metres) – as the clean and dirty water system will extend beyond the Year 10 footprint, the catchment runoff from that area will not enter the drainage line, which will impact on the downstream reach of the drainage line beyond the boundary of the investigation area.	3	3	Medium	Control	<p>Since the EDL is largely hydrologically driven by inflow from the larger upstream catchment, the containment of the stormwater associated within the mining footprint is expected to limit surface runoff to enter the EDL, thus impacting on its hydrological regime. It is recommended that diversion of clean water into the catchment of the drainage line be considered as an offset alternative to ensure hydrological functioning thereof</p> <p>Clean and dirty water separation systems must be implemented and be kept separate in line with the GN704 Regulatory Requirements, and maintained to ensure that any contaminated water does not reach the watercourses (specifically during year 1 to 10 when the pan wetland and depression wetland are still located in the new mining area);</p> <p>Runoff from areas within the dirty water area should be captured in sumps and pumped to a storage facility before being re-used as process water of the mine as required;</p>	3	2	Medium	Prevent impacts to the hydrological functioning of the watercourses within the new mining area.	Wetland monitoring every 3 years	20 years.



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											Stormwater infrastructure should be regularly inspected to prevent the failure thereof and the spilling of contaminated water into the clean water areas or the watercourses.						
6c	Sensitive landscapes (including wetlands): Pan and depression	Site clearing, removal of vegetation and topsoil stripping within the GN509 Zone of Regulation of the pan wetland (year 1 to 10) and the entire extent of the pan wetland and depression (post year 10). This mix of topsoil and vegetation will be moved to the topsoil stockpile. Since there is little to no overburden over the limestone, when it is encountered it will be stripped separately to the topsoil and used soon after as fill material for concurrent rehabilitation requirements on the mine.	<ul style="list-style-type: none"> Removal of vegetation (primarily terrestrial vegetation) and associated disturbances (vehicle movement) within the pan wetland and depression; Earthworks, leading to the exposure of soils, and potentially to increased runoff, erosion and incision of the pan wetland and depression; Potential for increased sedimentation of the pan wetland can lead to altered freshwater habitat and potentially altering surface water quality (if present) during year 1 to 10; Soil stockpiling; Decreased ecoservice provision by the pan wetland and depression; and Proliferation of alien vegetation due to disturbances. 	Irreversible	High Degree	Impacts on extended area beyond site boundary (hundreds of metres) – the proposed mining area would extend over the largest extent of the new mining area, into the pan wetland and depression (post year 10).	5	3	High	Stop	<p>As the mining plan entails a 1 Year, 5 Year and a 10 Year mining plan, the site clearing associated with each of the footprint areas for the allocated years, should be limited to the proposed layout footprint. This would limit disturbance to the buffer zone surrounding the pan wetland, and in turn prevent alteration to the natural drainage patterns of the local catchment and prevent the sedimentation of the pan wetland during the construction phase for the period of year 1 to 10. The impact of the clearing of vegetation during this period is expected to be lower than that of the same activities during the post year 10 mining, since these activities would not encroach on the pan wetland and depression.</p> <p>As mining will occur in the pan wetland and depression post year 10, all vegetation will be removed, this impact cannot be mitigated during this period. However, a watercourse rehabilitation plan, which provides a revegetation strategy must be compiled (with inputs from a freshwater specialist) to ensure revegetation of the area after the operational activities (as part of the decommissioning and closure phase).</p> <p>As per the geohydrological study compiled by Scholtz (2019) the stripping and stockpiling of topsoil and subsoil is considered negligible</p>	5	3	High	Minimise impacts from occurring on the pan wetland and depression during year 1 to 10. This will ensure limited changes to the hydrological regime and service provisioning of the watercourses during the first 10 years.	Wetland monitoring every 3 years	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											<p>since no chemical interaction is envisaged that could have an adverse impact on groundwater quality given the duration of the activity. The material to be mined does not have the potential to generate acidic leachate. The stripping of topsoil may result in a very slight increase in groundwater recharge, which is a slight positive effect on the groundwater environment (hydrological driver of the pan wetland) and thus on the pan wetland. The duration of the activity is so limited that the effect will not be measurable (Scholtz, 2019);</p> <p>Nevertheless, the topsoil stockpiles must be located outside of the 500m GN509 Zone of Regulation of the pan wetland during year 1 to 10. These stockpiles should preferably be used as part of the concurrent rehabilitation activities or as material for the diversion berm or as material for the clean and dirty water separation system berms.</p> <p>The footprint area of the topsoil stockpiles should be limited in height (a maximum of 5m high) with a limited footprint area.</p> <p>All alien and invasive species must be eradicated from the construction footprint area. The eradicated alien and invasive species may not be stockpiled within the GN509 Zone of Regulation of the pan wetland, and must be disposed of at a registered disposal facility (it is not recommended for these to be burned or buried, as the seeds may disperse and/or the plants may re-establish).</p>							
6d	Sensitive landscapes (including wetlands):	Construction of the preferred layout	<ul style="list-style-type: none"> Clearing of riparian and/or terrestrial vegetation surrounding the diverted drainage line; 	Reversible	Low Degree	Construction	Effect limited to the site (metres) –	3	3	Medium	Control	Careful planning of the placement of the support structures, taking into consideration the locality of the	2	2	Low	Prevent impacts from occurring on the diverted ephemeral	Wetland monitoring every 3 years	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
	Diverted ephemeral drainage line, pan wetland and depression	crusher within the Year 5 open cast pit footprint area (outside all zones of regulation associated with all of the watercourses within the new mining area) or construction of the alternative layout crusher within approximately 160m of the pan wetland (within its GN509 zone of regulation). The conveyor belt will however be constructed across the diverted ephemeral drainage line. Once the crusher has been constructed, a conveyor belt will be constructed along the haul road route to transport the product to the existing mining operations. Since the crusher complex (of the preferred layout or the	<ul style="list-style-type: none"> The construction of overland conveyor entails the excavation of pits for the supporting structures, which may potentially generate dust and increase the sediment load of the drainage line; and Potential contamination of surface water (if present) due to the use of concrete (mixing and casting of concrete for the foundations of the supporting structure of the conveyor) within close vicinity thereof. 			the conveyor will only cross the width of the diverted ephemeral drainage line.					diverted drainage line and as much as possible, avoid placement of the supporting structures within its 32m NEMA Zone of Regulation. If at all possible, all supporting structures should be constructed outside the 32m Zone of Regulation (NEMA) of the drainage line, or as far as possible from its edge; Excavated material should be stockpiled as far as possible to the diverted drainage line (a minimum of at least 10m from the drainage line, pending locality of supporting structure placement), upgradient of the excavated pit. The stockpiled material must be used as backfill once the supporting structure has been put in place. If there are remaining soils after the backfilling of the pits, these soils must then be stockpiled within the open cast pit footprint area, outside of the 32m NEMA zone of Regulation of the diverted drainage line; No indiscriminate crossing of the drainage line (with construction vehicles) may be permitted during the construction activities. Use of existing access roads should be made.				drainage line, to ensure its ongoing ecological functioning.		



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
		alternative layout) will be located outside of all GN704 zones of regulation associated with all of the watercourses within the new mining area, the construction thereof is not envisioned to impact on the key drivers and receptors (hydrology, water quality, geomorphology, habitat and biota) of the watercourses located within the new mining area.																
6e	Sensitive landscapes (including wetlands): Ephemeral Drainage Line	Operation of the diverted ephemeral drainage line.	<ul style="list-style-type: none"> Potential for riparian vegetation not to establish within the diversion channel causing a loss of riparian habitat and ecological services; and Erosion of the diversion channel or failure of the berm can cause sedimentation of the downstream reach of the drainage line. 	Reversible	Low Degree	Operational	Effect limited to the activity and its immediate surroundings (tens of metres).	4	3	High	Control	<p>The berm and diversion channel should be regularly inspected for failure or damage, especially after significant rainfall events. If failure of the berm is noted, the berm or diversion channel must immediately be stabilised to prevent future bank failure. If failure does occur, the recommended berm stabilisation control measures should be implemented;</p> <p>Alternatively, for areas where erosion is still limited in extent, it should immediately be rehabilitated through infilling and revegetation;</p> <p>Any silt built up within the aqueduct/within the culvert crossing should be regularly removed to prevent sediment from entering the downstream reach of the drainage line. Care</p>	4	2	Medium	Ensure hydrological functioning of the diverted drainage line for it to sustain riparian vegetation which provides habitat to a variety of small mammals and avifaunal species.	Wetland monitoring every 3 years	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											must be taken to not disturb the established riparian habitat during the removal process (i.e. no excessive vegetation clearing is to be permitted); During these maintenance activities, maintenance personnel should not be allowed to enter the diversion channel, unless necessary; It should be ensured that the diverted drainage line has the same hydrological regime as that of the drainage line prior to it being diverted. This will ensure that habitat conditions provided by the diverted drainage line offer the same habitat requirements as the original drainage line; The diverted drainage line should be inspected for the establishment of alien and invasive vegetation species. If these species are noted, they should immediately be eradicated with minimal disturbance to the berm or established riparian species.							
6f	Sensitive landscapes (including wetlands): Pan and depression	Mining of limestone will be on a blast, load and haul back under the R31 road basis to the existing crusher south of the new mining area.	<ul style="list-style-type: none"> Blasting activities associated with the mining of limestone may contaminate surface water runoff into the watercourses. The mining of the limestone will encroach on the entire extent of the pan wetland and depression. Localised dewatering of the shallow aquifer within the open cast pit area (Schultz, 2019); This will result in a cone of depression and a decline in water levels with a subsequent loss of the hydrological head which drives the hydrological functioning of the pan wetland (year 1 to 10). The extent of the cone of depression will depend on aquifer characteristics such as abstraction rates (by the local surrounding farmers), transmissivity and the effective porosity of the subsurface. Previous studies have indicated that these properties may be substantial (Schultz, 	Irreversible	High Degree	Operational	Impacts on extended area beyond site boundary (hundreds of metres) – this will impact on the entire extent of the pan wetland and depression (post year 10).	5	4	High	Stop	In applying the impact assessment, it was assumed that the mitigation hierarchy as advocated by the DEA et al. would be followed, i.e. the impacts would first be avoided. As the proposed post year 10 open cast pit is located within the pan wetland and depression, which will be lost, this is not feasible and these watercourses would be lost. Unless its practical and feasible to reinstate this wetland post-closure (to at least a PES Category C), rehabilitation (post-closure) or offsetting thereof is recommended. All other watercourses within the larger MRA as identified in the SAS 2018 study must be	5	4	High	N/A	Wetland monitoring every 3 years	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			2019). Due to the shallow groundwater table expected, the presence of water in the pan wetland may be partly due to a fluctuating water table. Seasonally, this pan wetland does provide habitat for a variety of species which rely on the presence of surface water. The associated dewatering activities and cone of depression could therefore also impact on its habitat, albeit only seasonally.								maintained in their current PES in order to prevent any degradation to any other watercourses within the surrounding area of the pan wetland and depression. These watercourses will provide refuge for species which were dependant on the pan wetland and depression.						
6g	Sensitive landscapes (including wetlands): Diverted ephemeral drainage line (Note: the pan wetland and depression has been removed at this point due to the open cast mining activities)	Rehabilitation of mining footprint areas, including the backfilling of the open cast pit area, removal of stormwater management infrastructure, including the diversion of the EDL and contouring and revegetation of the new mining area to conform to the natural topography	<ul style="list-style-type: none"> • Compaction of soils due to vehicular movement as part of backfilling of the open cast pit; • Latent impacts of vegetation losses, where vegetation is failing to establish as part of the rehabilitation the new mining area and in part to allow the establishment of a new wetland in the same locality as that of the previous pan wetland; • Increased runoff volumes and formation of preferential surface flow paths as a result of compacted soils, leading to increased sedimentation and erosion. 	Reversible	Low Degree	Effect limited to the activity and its immediate surroundings. (tens of metres)	3	3	Medium	Control	<p>Material from the stockpiles located on site must be used to backfill the opencast pit;</p> <p>The final backfilled opencast topography must be free draining. The post-closure recharge of the catchment should also be as near natural as possible to allow for the recharge of the EDL;</p> <p>A watercourse reinstatement and rehabilitation plan must be developed by a freshwater specialist to guide the process of reinstatement of watercourses in the new mining area;</p> <p>Ensure that soils are replaced in the correct layers, ripped and re-profiled post-closure, and that vegetation is restored to a point where succession will lead to the same conditions as the pre-mining state as a minimum;</p> <p>Bare areas should be revegetated within suitable indigenous vegetation species;</p> <p>Rehabilitation measures stipulated in Maintenance and Management Plan (MMP) must be implemented. Implementation must be overseen by a suitably qualified Environmental Site Officer (ESO) with watercourse rehabilitation experience and the ESO must sign off the rehabilitation before the relevant contractors leave site;</p>	3	2	Medium	Rehabilitated the new mining area to its pre-development land-use, that is, allow for the reinstatement of the lost (pan wetland and depression) and altered (EDL) watercourses, to their predevelopment PES.	Wetland monitoring every 3 years	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											Post-closure monitoring of the watercourses is recommended to be undertaken. This should be determined by an appropriately qualified geohydrological specialist.						
7a	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> Health impacts on susceptible groups⁴⁰ within the town of Ulco, considering the cumulative impact of the existing mining and processing operation. 	Reversible	Low Degree	1000m buffer around the proposed pit area	4	3	High	Control	Wind fences installed around construction sites to slow wind speed. Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. Develop and maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. Periodic PM10 and PM2.5 monitoring in the town of Ulco.	3	2	Medium	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years

⁴⁰ Susceptible groups include the elderly, infants, persons with chronic cardiopulmonary disease, -pneumonia, -influenza and -asthma.



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
7b	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco. 	Reversible	Low Degree	1000m buffer around the proposed pit area	3	2	Medium	Control	Wind fences installed around construction sites to slow wind speed. Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: Loading and unloading confined to the leeward (downwind) side of the pile; and Drop height reduction etc. Develop and maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. Periodic PM10 and PM2.5 monitoring in the town of Ulco.	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years
7c	Air Quality	The generation of dust by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> Nuisance impact of dust on residences in Ulco, considering the cumulative impact of the existing mining and processing operation. 	Reversible	Low Degree	1000m buffer around the proposed pit area	3	3	Medium	Control	Wind fences installed around construction sites to slow wind speed. Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example:	3	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
											-Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. Develop and maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register.						
7d	Air Quality	The generation of dust by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> Nuisance impact of dust on residences within a 10 km radius of the proposed project, outside the town of Ulco. 	Reversible	Low Degree	1000m buffer around the proposed pit area	2	2	Low	Control	Wind fences installed around construction sites to slow wind speed. Dust suppression on unpaved roads and speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. Develop and maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register.						
7e	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	<ul style="list-style-type: none"> Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation. 	Reversible	Low Degree	1000m buffer around the proposed pit area	3	2	Medium	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets; maintenance records; and service records.	3	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years
7f	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	<ul style="list-style-type: none"> Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco. 	Reversible	Low Degree	1000m buffer around the proposed pit area	2	2	Low	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets; maintenance records; and service records.	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years
7g	Air Quality	The generation of small	The impact on the ambient air quality, considering:	Reversible	Low Degree	1000m buffer around the	4	3	High	Control	Wind fences installed around construction sites to slow wind speed.	3	2	Medium	Activities remain compliant with air quality legislation.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		particulates (e.g. PM10 & PM2.5) by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities.	<ul style="list-style-type: none"> The proposed site falls outside declared airshed priority areas, however, the Northern Cape province is concerned about particulates air pollution in the area and the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; The Ulco cement operation is near the proposed Bergville project; Ulco's current mining, crushing and milling activities are major sources of dust and fine particulates (PM10 and PM2.5) and present a risk of a cumulative impact on the area; Ulco fugitive dust management plan specifies dust suppression using water for the emissions from its unpaved roads and its crushing and milling operations are fitted with bagfilters; and A survey conducted by Health & Occupational Hygiene Laboratory CC, found PM10 and PM2.5 to fall below their respective NAAQS. 			proposed pit area					Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. Develop and maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. Periodic PM10 and PM2.5 monitoring in the town of Ulco.				To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.		
7h	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	The impact on the ambient air quality, considering: <ul style="list-style-type: none"> The proposed site falls outside declared airshed priority areas, however, the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; The Ulco cement operation is near the proposed Bergville project; Ulco's kiln is a major source of combustion gases and presents a risk of a cumulative impact on the area; and 	Reversible	Low Degree	1000m buffer around the proposed pit area	3	2	Medium	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets;	3	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
			Ulco's kiln is fitted with an electrostatic precipitator and a bagfilter.								maintenance records; and service records.						
7i	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Reversible	Low Degree	1000m buffer around the proposed pit area	5	4	High	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Enclosure of the overland conveyor and fixing chutes to the conveyor transfer points. Enclosure of the crusher (Or any alternative control measure with the same level of control efficiency). Concurrent rehabilitation to reduce wind erosion as mine progresses. Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the	3	2	Medium	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
											entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken. Periodic PM10 and PM2.5 monitoring in the town of Ulco.						
7j	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Reversible	Low Degree	Operational	1000m buffer around the proposed pit area	3	2	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Enclosure of the overland conveyor and fixing chutes to the conveyor transfer points. Enclosure of the crusher (Or any alternative control measure with the same level of control efficiency). Concurrent rehabilitation to reduce wind erosion as mine progresses. Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken. Periodic PM10 and PM2.5 monitoring in the town of Ulco.						
7k	Air Quality	The generation of dust by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Nuisance impact of dust on residences in Ulco, considering the cumulative impact of the existing mining and processing operation.	Reversible	Low Degree	1000m buffer around the proposed pit area	4	3	High	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Enclosure of the overland conveyor and fixing chutes to the conveyor transfer points. Enclosure of the crusher (Or any alternative control measure with the same level of control efficiency). Concurrent rehabilitation to reduce wind erosion as mine progresses.	3	2	Medium	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude				Significance
											Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken.							
71	Air Quality	The generation of dust by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Nuisance impact of dust on residences within a 10 km radius of the proposed project, outside the town of Ulco.	Reversible	Low Degree	Operational	1000m buffer around the proposed pit area	3	2	Medium	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Enclosure of the overland conveyor and fixing chutes to the conveyor transfer points.	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION		
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance					
											Enclosure of the crusher (Or any alternative control measure with the same level of control efficiency). Concurrent rehabilitation to reduce wind erosion as mine progresses. Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken.								
7m	Air Quality	The generation of combustion gases from blasting activities, vehicle/equipment exhaust emissions.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Reversible	Low Degree	1000m buffer around the proposed pit area	4	3	High	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the	3	2	Medium	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years		



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
											above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets; maintenance records; and service records.						
7n	Air Quality	The generation of combustion gases from blasting activities, vehicle/equipment exhaust emissions.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Reversible	Low Degree	1000m buffer around the proposed pit area	3	2	Medium	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets; maintenance records; and service records.	3	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years
7o	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	The impact on the ambient air quality, considering: <ul style="list-style-type: none"> The proposed site falls outside declared airshed priority areas, however the Northern Cape province is concerned about particulates air pollution in the area and the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; The Ulco cement operation is near the proposed Bergville project; Ulco's current mining, crushing and milling activities are major sources of dust and fine particulates (PM10 and PM2.5) and present a risk of a cumulative impact on the area; Ulco fugitive dust management plan specifies dust suppression using water for the emissions from its unpaved roads and its crushing and milling operations are fitted with bagfilters; and A survey conducted by Health & Occupational Hygiene Laboratory CC, found	Reversible	Low Degree	1000m buffer around the proposed pit area	4	3	High	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Enclosure of the overland conveyor and fixing chutes to the conveyor transfer points. Enclosure of the crusher (Or any alternative control measure with the same level of control efficiency). Concurrent rehabilitation to reduce wind erosion as mine progresses.	3	1	Medium	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
			PM10 and PM2.5 to fall below their respective NAAQS.								Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken. Periodic PM10 and PM2.5 monitoring in the town of Ulco.						
7p	Air Quality	The generation of combustion gases from blasting activities, vehicle/equipment exhaust emissions.	The impact on the ambient air quality, considering: <ul style="list-style-type: none"> The proposed site falls outside declared airshed priority areas, however, the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; The Ulco cement operation is near the proposed Bergville project; Ulco's kiln is a major source of combustion gases and presents a risk of a cumulative impact on the area; and Ulco's kiln is fitted with an electrostatic precipitator and a bagfilter.	Reversible	Low Degree	1000m buffer around the proposed pit area	3	2	Medium	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets;	3	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude				Significance
											maintenance records; and service records.							
7q	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by wind erosion and rehabilitation activities.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Reversible	Low Degree	Decommissioning and Closure	1000m buffer around the proposed pit area	4	3	High	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Concurrent rehabilitation to reduce wind erosion as mine progresses. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints	3	2	Medium	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
											should be investigated, and remedial steps taken. Periodic PM10 and PM2.5 monitoring in the town of Ulco.						
7r	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by wind erosion and rehabilitation activities.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Reversible	Decommissioning and Closure	1000m buffer around the proposed pit area	3	2	Medium	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward (downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Concurrent rehabilitation to reduce wind erosion as mine progresses. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											complaint was registered and all air quality related complaints should be investigated, and remedial steps taken. Periodic PM10 and PM2.5 monitoring in the town of Ulco.							
7s	Air Quality	The generation of dust by wind erosion and rehabilitation activities.	Nuisance impact of dust on residences in Ulco, considering the cumulative impact of the existing mining and processing operation.	Reversible	Low Degree	Decommissioning and Closure	1000m buffer around the proposed pit area	3	3	Medium	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets; maintenance records; and service records.	3	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years
7t	Air Quality	The generation of dust by wind erosion and rehabilitation activities.	Nuisance impact of dust on residences within a 10 km radius of the proposed project, outside the town of Ulco.	Reversible	Low Degree	Decommissioning and Closure	1000m buffer around the proposed pit area	2	2	Low	Control	Use of low sulphur fuels where possible; Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets; maintenance records; and service records.	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.	Dust monitoring (monthly)	20 years
7u	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Reversible	Low Degree	Decommissioning and Closure	1000m buffer around the proposed pit area	3	2	Medium	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward	3	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude				Significance
											(downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Concurrent rehabilitation to reduce wind erosion as mine progresses. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken.				and direct health impact potential.			
7v	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Reversible	Low Degree	Decommissioning and Closure	1000m buffer around the proposed pit area	2	2	Low	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward	2	1	Low	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
											(downwind) side of the pile; and -Drop height reduction etc. The establishment of vegetation on the overburden/topsoil stockpiles. Concurrent rehabilitation to reduce wind erosion as mine progresses. Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence. Maintain a dust management plan, in line with the National Dust Control Regulations. Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. Dustfall monitoring in terms of the National Dust Control Regulations. Maintain a complaint register. The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken.				and direct health impact potential.			
7w	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by wind erosion and	The impact on the ambient air quality, considering: • The proposed site falls outside declared airshed priority areas, however, the Northern Cape province is concerned about particulates air pollution in the area and the FBDM, due to the lack in monitoring data, considers the air quality	Reversible	Low Degree	Decommissioning and Closure	1000m buffer around the proposed pit area	4	3	High	Control	Dust suppression on unpaved roads. Speed limits set at ≤40 km/hr. Good work practices when stockpiling, for example: -Loading and unloading confined to the leeward	3	2	Medium	Activities remain compliant with air quality legislation. To further eliminate/minimise the risks of nuisance impacts	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
		rehabilitation activities.	<p>in the Dikgatlong Local Municipality as poor;</p> <ul style="list-style-type: none"> The Ulco cement operation is near the proposed Bergville project; Ulco's current mining, crushing and milling activities are major sources of dust and fine particulates (PM10 and PM2.5) and present a risk of a cumulative impact on the area; Ulco fugitive dust management plan specifies dust suppression using water for the emissions from its unpaved roads and its crushing and milling operations are fitted with bagfilters; and <p>A survey conducted by Health & Occupational Hygiene Laboratory CC, found PM10 and PM2.5 to fall below their respective NAAQS.</p>								<p>(downwind) side of the pile; and</p> <ul style="list-style-type: none"> -Drop height reduction etc. <p>The establishment of vegetation on the overburden/topsoil stockpiles.</p> <p>Concurrent rehabilitation to reduce wind erosion as mine progresses.</p> <p>Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence.</p> <p>Maintain a dust management plan, in line with the National Dust Control Regulations.</p> <p>Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan.</p> <p>Dustfall monitoring in terms of the National Dust Control Regulations.</p> <p>Maintain a complaint register:</p> <ul style="list-style-type: none"> -The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was registered and all air quality related complaints should be investigated, and remedial steps taken. <p>Periodic PM10 and PM2.5 monitoring in the town of Ulco.</p>				and direct health impact potential.			
7x	Air Quality	The generation of combustion gases from vehicle/	<p>The impact on the ambient air quality, considering:</p> <ul style="list-style-type: none"> The proposed site falls outside declared airshed priority areas, however, the 	Reversible	Low Degree	Decommissioning and Closure	1000m buffer around the	3	2	Medium	Control	Use of low sulphur fuels where possible;	3	1	Low	Activities remain compliant with air quality legislation.	Dust monitoring (monthly)	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Reversibility	Irreplaceable loss			Probability	Magnitude	Significance			Probability	Magnitude	Significance			
		equipment exhaust emissions during decommissioning and rehabilitation.	FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor;	<ul style="list-style-type: none"> The Ulco cement operation is near the proposed Bergville project; Ulco's kiln is a major source of combustion gases and presents a risk of a cumulative impact on the area; and Ulco's kiln is fitted with an electrostatic precipitator and a bagfilter.		proposed pit area					Proper and regular maintenance of vehicles and heavy mobile equipment; and The use of catalytic converters where applicable to reduce exhaust emissions. The following records should be tracked to ensure that the above-mentioned mitigation measures are implemented: fuel use receipts; vehicle inspection sheets; maintenance records; and service records.				To further eliminate/minimise the risks of nuisance impacts and direct health impact potential.		
8a	Noise, Blasting and Vibration	Mining operations	Reversible	Low degree	Construction, Operational, Decommissioning and Closure	Surrounding area	2	1	Low	Control	Ensure all equipment and vehicles are serviced regularly to prevent excessive noise. Vehicles and equipment generating excessive noise should be fitted with appropriate noise abatement measures. Construction workers must be provided with the appropriate personal protection equipment in areas required as per the Mine Health and Safety Act (No. 29 of 1996) (MHSA). Records of the PPE supplied must be maintained for record keeping purposes. A complaints register must be made available the site security office and should any complaints be received, these must be logged in the complaints register and reported to the responsible person on-site. All complaints must be closed out within 14 days. Training and induction requirements must be undertaken. Environmental incidents register, with records of close-out on incidents received.	1	1	Low	To prevent noise nuisance to surrounding environment	Noise Monitoring Adherence to the Mine Health and Safety Act	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude				Significance
											Undertake environmental noise monitoring and keep records of monitoring reports. Personal protective equipment register to be kept Induction training and register to be kept							
8b	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on houses	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	2	1	Low	Control	Reduce Charge Mass/Delay over decreasing distance towards structures and points of interest ("POI's") of concern, Relocate POI's of concern at least 500m	1	1	Low	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years
8c	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on windmill	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	3	2	Medium	Control	Reduce Charge Mass/Delay over decreasing distance towards POI's of concern, Redrill boreholes further away	3	1	Low	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years
8d	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on roads	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	2	1	Low	Control	Reduce Charge Mass/Delay over decreasing distance towards POI's of concern	1	1	Low	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years
8e	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on railway	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	2	1	Low	Control	Reduce Charge Mass/Delay over decreasing distance towards POI's of concern	1	1	Low	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years
8f	Noise, Blasting and Vibration	Blasting operations	Air blast Impact on houses	Reversible	Low degree	Operational	3500m buffer around the	2	1	Low	Control	Reduce Charge Mass/Delay over decreasing distance towards POI's of concern,	1	1	Low	Comply to the United States	Blasting monitoring	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude				Significance
						proposed pit area					Relocate POI's of concern at least 500m				Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.			
8g	Noise, Blasting and Vibration	Blasting operations	Fly Rock Impact on houses	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	3	2	Medium	Control	Increase stemming length, controls put in place for management of stemming lengths, Relocate POI's of concern at least 500m	3	1	Low	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years
8h	Noise, Blasting and Vibration	Blasting operations	Fly Rock Impact on roads	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	3	2	Medium	Control	Increase stemming length, controls put in place for management of stemming lengths	3	1	Low	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years
8i	Noise, Blasting and Vibration	Blasting operations	Fly Rock Impact on railway	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	3	3	Medium	Control	Increase stemming length, controls put in place for management of stemming lengths	3	2	Medium	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years
8j	Noise, Blasting and Vibration	Blasting operations	Impact of Fumes - Houses	Reversible	Low degree	Operational	3500m buffer around the proposed pit area	3	2	Medium	Control	Use correct product, Control product quality, prevent sleep time for charged blast holes, same day charge and blast	2	1	Low	Comply to the United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and the recommendations on air blast.	Blasting monitoring	20 years



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance			
9	Visual	Surface infrastructure	Due to the nature of the topography and the distance from the existing provincial road, the proposed crusher and mining activities will be visible from the provincial road.	Reversible	Low degree	From surrounding area	2	1	Low	Control	<p>Keep disturbed areas to a minimum.</p> <p>No clearing of land to take place outside the demarcated footprint.</p> <p>Only indigenous plant species to be introduced and planted. All areas must be vegetated with a suitable ground cover immediately after construction activities to prevent erosion and mud slides.</p> <p>Buildings and similar structures must be in keeping with the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.</p> <p>Maintain the site during operation of the mine. Inoperative equipment and poor housekeeping, in general, creates a poor image of the activity in the eyes of the public.</p> <p>Implement a rehabilitation plan.</p>	1	1	Low	To preserve the sense of place of the area	Implementation of rehabilitation plan	20 years
10a	Sites of Archaeological and Cultural Importance	Opencast mining and surface infrastructure	The general area is known to contain both Early as well as Later Stone Age sites as well as engraving sites. On the study area, no Stone Age (either Early, Middle or Later) artefacts were observed. Neither were there any engravings or other rock art observed. Furthermore, the area investigated revealed no indication of Iron Age settlement. On and around the farmyard of the property under investigation there remain some buildings and structures related to farming activities that fall under the protection of the heritage law under the 60 year rule. These include a reservoir, a well, a milking shed and several canals related to flood irrigation. The graves observed are those of two white pioneer farmers, as well as approximately 20 other graves that could not be linked to any family as they bear no engraved head stones. These are most probably the graves of labourers on the farm as well as their families. In 10 years' time as the mining progresses, these heritage remains will	irreversible	Low degree	Within the 220.63 Ha	4	4	High	Control	<p>If any heritage resources of significance are exposed during construction, the South African Heritage Resources Authority (SAHRA) should be notified immediately, all development activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) should be notified in order to determine appropriate mitigation measures for the discovered finds. This may include obtaining the necessary authorisation (permits) from SAHRA to conduct the mitigation measures.</p>	1	1	Low	To preserve the cultural heritage of the area.	Adherence to the requirements of the National Heritage Resources Act (No 25 of 1999)	1 year



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT Impact Description	PHASE		SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION	
				Reversibility	Irreplaceable loss		Probability	Magnitude	Significance			Probability	Magnitude	Significance				
			become an impediment and second phase studies may be undertaken and demolition applications could be made at the provincial Heritage Authorities in Kimberley. In the same way, the white pioneer graves and the other 20 labourers' graves may be treated similarly. If they do not impede the mining process they may be left in place. On the other hand, depending on the proposed mining plans, these graves may be relocated to the most suitable position.															
10b	Sites of Archaeological and Cultural Importance (Palaeontological)	Opencast mining and surface infrastructure	The potential impact of the development on fossil heritage in the quaternary age rocks due to earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by development, vehicle traffic, mining, prospecting, and human disturbance.	Irreversible	High degree	Construction, Operational, Decommissioning and Closure	Within the 220.63 Ha	4	4	High	Control	The involvement of a palaeontologist for pre-construction training of the ECO and the ECO must visit and survey site after blasting, excavating and during drilling and construction of infrastructure. If fossils are found, a 30 m barrier will be constructed, construction activities within the 30 m barrier will cease, and SAHRA will be contacted further investigation.	2	2	Low	To preserve the cultural heritage of the area.	Adherence to the requirements of the National Heritage Resources Act (No 25 of 1999)	20 years
10c	Sites of Archaeological and Cultural Importance (Palaeontological)	Opencast mining and surface infrastructure	The potential impact of the development on fossil heritage in the Ulco Formation due to earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by development, vehicle traffic, mining, prospecting, and human disturbance.	Irreversible	High degree	Construction, Operational, Decommissioning and Closure	Within the 220.63 Ha	3	2	Medium	Control	The involvement of a palaeontologist for pre-construction training of the ECO and the ECO must visit and survey site after blasting, excavating and during drilling and construction of infrastructure. If fossils are found, a 30 m barrier will be constructed, construction activities within the 30 m barrier will cease, and SAHRA will be contacted further investigation.	2	2	Low	To preserve the cultural heritage of the area.	Adherence to the requirements of the National Heritage Resources Act (No 25 of 1999)	20 years
11a	Socio-economic	Temporary diversion of the R31	The Level of Service (LOS) currently experienced on the R31 is a Level of Service A, which according to the Highway Capacity Manual (HCM), produced by the Transportation Research Board, represents free-flow conditions and freedom to manoeuvre within the traffic stream. By constructing a detour as per Drawing No. 19020/CL/01 of the traffic impact study the Level of Service will not deteriorate to a lower Level of Service, ultimately ensuring road	Reversible	Low Degree	Construction	Local and regional	3	2	Medium	Control	The detour must have a sealed surface (not gravel). Before the works commence, detailed drawings with regard to the deviation must be submitted for review. Detailed designs for the underpass must also be submitted.	2	2	Low	Ensure traffic flow continues during the construction of the	Implemented as shown on Drawing No. 19020/CL/01 and 19020/SL/01 in accordance with the relevant standards of	6 months



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
			user satisfaction and efficient free-flowing traffic on the R31 past the site.								<p>If a Stop / Go system, or flagmen as an option to temporarily control traffic is implemented during peak hours for any Equipment or Trucks to cross over the detour, the Level of Service will deteriorate to LOS F with an average delay of more than 2 minutes.</p> <p>For drainage purposes, concrete pipe culverts are proposed. The number and position of these culverts needs to be determined by the site engineer.</p> <p>For safety purposes, concrete "New Jersey" Barriers are proposed to protect the construction workers, road users as well as any construction equipment close to the detour.</p> <p>It is also proposed that Yellow Plastic MKII barriers filled with sand or water and are placed with a "Road-Closed" sign to close the existing section of the road for road users, where the detour starts.</p> <p>The speed limit on the R31 will have to be lowered from 120km/h to 60km/h in 200m increments to promote safety for the road users and the construction area, as shown on Drawing No. 19020/SL/01.</p> <p>Temporary road signage will be erected as per the specifications of the South African Road Traffic Signs Manual Vol 2. Roadworks, and as shown on Drawing No. 19020/SL/01.</p>				the SARTSM Vol 2.		
11b	Socio-economic	Proposed Bergville Project	Jobs will be retained, providing income and, therefore, having a further impact on the regional socio-economy aspects of the area, along with other benefits arising from the Social and Labour Plan.	Reversible	Low degree	Operational.	Local and Regional	Positive	Control.	Where possible and feasible, local procurement of labour should be applied to ensure the maximum benefit to the impacted community.	Positive	Prevent socio economic impacts by employment opportunities.	Implementation of approved Social and Labour Plan.	20 years			



NO	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT		PHASE	SIZE AND SCALE OF DISTURBANCE	SIGNIFICANCE IF NOT MITIGATED			MITIGATION TYPE	MITIGATION MEASURES	SIGNIFICANCE IF MITIGATED			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
			Impact Description	Reversibility			Irreplaceable loss	Probability	Magnitude			Significance	Probability	Magnitude			
											Continuous skills and development training will equip low-skilled labourers with experience and advanced skills to work on other mining projects within the area, thus creating long-term employment in the foreseeable future.						



Cumulative impacts refer to the situation where an activity may in itself not have a significant impact but may become significant when added to the existing and potential impacts from similar or different activities in the area. Cumulative impacts can be defined as “changes to the environment that are caused by an action in combination with other past, present and future human actions” (DEAT, 2004). Different types of cumulative impacts can occur, depending on the characteristics thereof, refer Table 25 and Table 26 below presents a summary of these cumulative impacts as per Guideline 5: Assessment of Alternatives and Impacts (DEAT, 2006).

Table 25: Types of Cumulative Impacts

Type		Description
Additive		Where it adds to the impact which is caused by other similar impacts.
Interactive impact	Cumulative	A cumulative impact is caused by different impacts that combine to form a new kind of impact.
	Countervailing	The net adverse cumulative impact is less than the sum of the individual impacts.
	Synergistic	The net adverse cumulative impact is greater than the sum of the individual impacts.

Table 26: Identified cumulative impacts

Environmental component (Aspects affected)	Activity	Potential Impact description
Geology	All mining activities conducted in a regional context.	The proposed and current mining activities may cumulatively have an impact on the regional geological strata.
Topography, Soil, land-use and land capability	Mining activities.	Removing of limestone will impact on overlying geological strata, alter topography and/or reduce land capability, as well as cause an increased risk of erosion within wetlands.
Surface and groundwater	Contaminated surface water runoff as a result of the mining and agricultural activities.	Surface and groundwater resources may become contaminated in the event that contaminated surface water runoff from the mining areas and agricultural areas enter the receiving environment.
Vegetation and Fauna	Mining and agricultural related activities.	The potential destruction of the natural vegetation as well as habitat loss for fauna species, may occur on a cumulative scale, should other activities in the area have a similar impact on the biodiversity of the area.



Environmental component (Aspects affected)	Activity	Potential Impact description
Sensitive landscapes (including wetlands)	Mining and agricultural related activities	The proposed and existing mining activities, as well as the agricultural activities conducted on site, may cumulatively have an impact on the wetlands located on the project site.
Noise	Noise generation from mining activities	No contribution to cumulative impacts associated with the project are foreseen, as the mining activities in the proposed area will commence once the mining activities in the existing operation has ceased. Secondary limestone from the existing quarry will still be taken from time to time to blend further.
Air Quality	Air pollution from mining activities	The inherent air quality of the area is considered poor and is impacted on by the activities of adjacent to the Ulco operation, vehicle use and veld fires.
Socio-Economic	Mining and mining related activities	Jobs will be retained, providing income and, therefore, having a further impact on the regional socio-economy aspects of the area, along with other benefits arising from the Social and Labour Plan.
	Mine Closure	During mine closure, a loss of jobs will occur which may not only impact on the employees but on the socio-economic status of the local community and economy.

7.6. Methodology used in determining and ranking potential environmental impacts and risks

This EIR and EMPr document was compiled to include the proposed Bergville project into the existing EMPr. The methodologies applied in determining and ranking potential environmental impacts and risks are specific to the EMPr and the Environmental Assessment Practitioner responsible for the compilation of the EMPr document.

7.6.1 Methodology applied to the exiting EMPr (approved)

Methodology applied for the existing Ulco Operations EMPR, dated 2005 and compiled by Umhlaba Environmental Consulting Cc.

7.6.1.1. Criteria to Consider when Determining Significance

The ranking of impacts / determination of significance is estimated using two criteria, namely Consequence and Probability. These consider the contributing factors / criteria listed in the legislation. The definitions of each are provided below.

The Consequence of an impact resulting from an aspect is expressed as a combination of:

- Nature of impact: An indication of the extent of the damage (negative impacts) or benefit (positive impacts) the impact inflicts on natural, cultural, and/or social functions (environment).



- Extent of impact: A spatial indication of the area impacted (i.e., how far from activity the impact is realised).
- Duration of impact: A temporal indication of the how long the effects of the impact will persist, assuming the activity creating the impact ceases. For example, the impact of noise is short lived (impact ceases when activity ceases) whereas the impact of removing topsoil exists for a much longer period of time.
- Frequency of the impact occurring: An indication of how often an impact is likely to occur, as a result of an aspect from a particular activity. Note that this does not assess how often the activity occurs. It applies only to the likely frequency of an impact from the aspect of the activities.

The Probability of an impact resulting from an aspect is expressed as:

- Probability of impact occurring: An estimated indication of the potential for an impact to occur based on the specific parameters applicable to each operation. For example a blast will create vibrations however if the closest structure is so far away that it will not be effected by the vibrations, then the probability of an impact is low.

The Significance of an impact: Considering Consequence and Probability (defined above), Significance is an indication of how serious a negative impact is anticipated to be and how beneficial a positive impact may be.

7.6.1.2. Explanation of impact rating

Consequence and Probability

Using the criteria listed in the above, scores are assigned to each the criteria, as outlined in Table 27. The scoring range in the table has been selected to represent the scale in which varying impacts can occur. The combination of scores is then used to determine the Consequence and Probability, as described below. These are then plotted against each other on an xy-scatter chart to determine the Significance Rating of the impact, as shown in Figure 61.

- Consequence is expressed as the sum of all criteria in order to get a scope out of 100.
- Probability of the impact occurring is expressed as a score out of 100.

In Figure 61 the positions of the impact rating boundary curves were defined by trial and error (based on more than 15 years' experience), using qualitative measures of the perceived significance of a wide range of impacts, from catastrophic aspects through to minor nuisances. This rating system is weighted in such a way as to set impacts that are very likely to occur, but have very little consequence, as Low significance. Similarly, impacts with serious consequences but hat are unlikely to occur are rated lower, than impacts with serious consequences that are likely to occur. The significance of an impact is considered to be classified into one of the following; High, Medium-High, Medium, Low- Medium or Low (as shown in the Impact Significance Chart). The definition of each classification is provided below in table Table 28 and focuses on the need for mitigation or management.



Table 27: Scoring for environment impact assessment criteria

Consequence	Nature of Impact:		
	Low	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are not affected.	1
	Low-Medium	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are affected insignificantly.	5
	Medium	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are altered.	10
	Medium-High	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes are severely altered.	15
	High	Impacts affect the environment in such a way that natural, cultural and / or social functions and processes will temporarily or permanently cease.	25
	Extent of Impact:		
	On-site	Impact occurs on-site (within the boundary of the mine).	1
	Neighbouring	Impact occurs within a 5km radius of the site.	5
	Local	Impact occurs within a 20km radius of the site.	10
	Regional	Impact occurs within a 100km radius of the site.	15
	National	Impact occurs within South Africa.	25
	Duration of Impact:		
	Very Short-term	The impact will cease within 1 week if the activity is stopped.	1
	Short-term	The impact will cease within 1 year if the activity is stopped.	5
Medium-term	The impact will cease within 5 years if the activity is stopped.	10	
Long-term	After the operational life of the operation.	15	
Permanent	Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.	25	
Probability	Frequency of Occurrence of the Impact:		
	Annually or less	Impact occurs at least once in a year or less frequently.	1
	6 months	Impact occurs at least once in 6 months.	5
	Monthly	Impact occurs at least once a month.	10
	Weekly	Impact occurs at least once a week.	15
	Daily	Impact occurs daily.	25
	Probability of Occurrence of the Impact:		
	Improbable	The possibility of the impact materialising is very low either because of design or historic experience.	10
	Low	The possibility of the impact materialising is low either because of design or historic experience.	30



Medium	There is a possibility that the impact will occur.	60
High	There is a distinct possibility that the impact will occur.	80
Definite	The impact will occur regardless of any prevention measures.	100

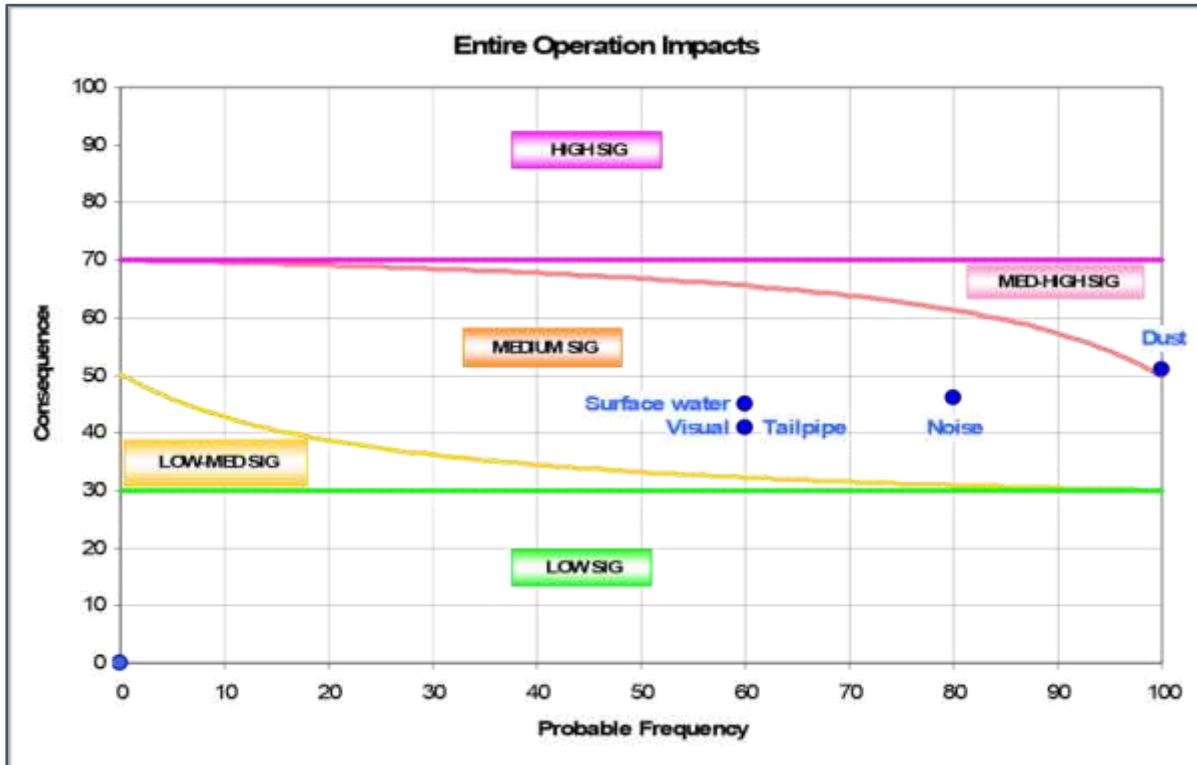


Figure 61: Impact Significance Chart

Table 28: Definition of each classification in need of mitigation or management

Significance:	
Low	Management measures may not be necessary, but in some instances are encouraged to ensure that the impact remains of Low significance.
Low-Medium	Management measures are usually encouraged to ensure that the impacts remain of Low-Medium significance.
Medium	Management measures are required to ensure, at minimum, the significance of the impact does not increase.
Medium-High	Management measures are required to reduce the significance of the impact to, at least, Medium significance.
High	Impact should be avoided, or if not possible, managed to reduce the significance of the impact to, at least, Medium significance (where possible).

7.6.2 Shangoni’s methodology applied for the proposed Bergville project

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk.



Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;
- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

After all impacts have been identified, the nature and scale of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis where the significance of each impact can be determined and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer to Figure 62 below for a model representing the above principle (as contained in the DWA’s Best Practice Guideline: G4 – Impact Prediction).

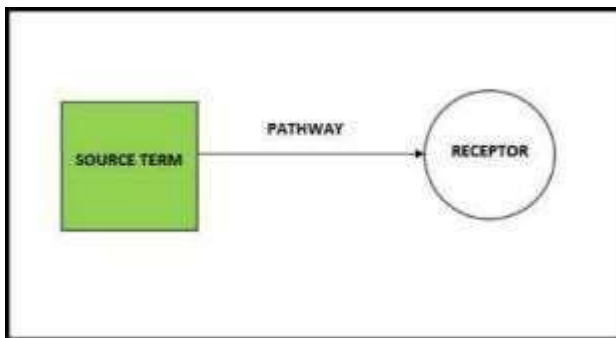


Figure 62: Impact prediction model

Table 29 and Table 30 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 31 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.

Table 29: Determination of Probability of impact

Score	Frequency of Aspect / Unwanted Event	Availability of Pathway from the source to the receptor	Availability of Receptor
1	Never known to have happened, but may happen	A pathway to allow for the impact to occur is never available	The receptor is never available
2	Known to happen in industry	A pathway to allow for the impact to occur is almost never available	The receptor is almost never available



Score	Frequency of Aspect / Unwanted Event	Availability of Pathway from the source to the receptor	Availability of Receptor
3	< once a year	A pathway to allow for the impact to occur is sometimes available	The receptor is sometimes available
4	Once per year to up to once per month	A pathway to allow for the impact to occur is almost always available	The receptor is almost always available
5	Once a month - Continuous	A pathway to allow for the impact to occur is always available	The receptor is always available

Step 1: Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor.



Table 30: Determination of Magnitude of impact

Score	SOURCE			RECEPTOR		
	Duration of impact	Extent	Volume / Quantity / Intensity	Toxicity / Destruction Effect	Reversibility	Sensitivity of environmental component
1	Lasting days to a month	Effect limited to the site. (metres);	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	Non-toxic (e.g. water) / Very low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes will remain unaltered.	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity
2	Lasting 1 month to 1 year	Effect limited to the activity and its immediate surroundings. (tens of metres)	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.
3	Lasting 1 – 5 years	Impacts on extended area beyond site boundary (hundreds of metres)	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).
4	Lasting 5 years to Life of Organisation	Impact on local scale / adjacent sites (km's)	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	Toxic (e.g. diesel & Sodium Hydroxide)	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).
5	Beyond life of Organisation / Permanent impacts	Extends widely (nationally or globally)	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	Highly toxic (e.g. arsenic or TCE)	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, protected habitats etc.)

Step 2: Determine the **MAGNITUDE** of the impact by calculating the average of the factors above



Table 31: Determination of Severity of impact

Environmental Impact Rating / Priority					
Probability	Magnitude				
	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

Step 3: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude.

In terms of section 16(3)(b) of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority.

It is the purpose of the Risk Assessment Report (RAR) to provide the Competent Authority with the detail associated with the impact assessment table (as provided below) and included into the various sections of the EIAR / EMPr.

The following table and column headings (shown in table in Section 7.6.3 below), form part of the Shangoni risk assessment table template. For ease of reference, the various table columns have been incorporated into one integrated risk assessment table, as is presented in the table below.

7.6.3 Shangoni risk assessment table template in relation to the requirements as per the DMR report template

In terms of section 16(3)(b) of the Environmental Impact Assessment (EIA) Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) of the Regulations. The Department of Mineral Resources (“DMR”), therefore, instructed that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, the template provided by the Competent Authority.



It is the purpose of this section of this Risk Assessment Report (“RAR”) to provide the Competent Authority with the detail associated with the impact assessment table template (as provided in this RAR, below) and included into the various sections of the EIAR / EMPr).

The following table and column headings, form part of the Shangoni risk assessment table template, which takes into account the DMR’s EIAR / EMPr template.



NO	POTENTIAL IMPACT					SIGNIFICANCE if not mitigated			MITIGATION TYPE (modify, remedy, control, or stop) through e.g. noise control measures)	SIGNIFICANCE If mitigated			STANDARD TO BE ACHIEVED	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
	ASPECTS AFFECTED	ACTIVITY	Impact Description	Reversibility	Irreplaceable loss	PHASE in which impact is anticipated	SIZE AND SCALE of disturbance	Probability		Magnitude	Significance	Probability			
For referencing purposes	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 3 (i) of Part A Section 1 (e) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 3 (g) (v) of Part A Section 3 (i) of Part A Section 1 (d) (ix) of Part B Section 1 (e) of Part B Section 1 (f) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 3 (g) (v) of Part A Section 3 (i) of Part A Section 1 (e) of Part B Section 1 (f) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 3 (i) of Part A Section 1 (e) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 1(d) (ix) of Part B. 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 3 (g) (v) of Part A Section 3(i) of Part A <p>This also takes <i>Duration</i> into account</p>	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 3 (g) (v) of Part A Section 3 (i) of Part A Section 1 (e) of Part B Section 1 (f) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 1(d) (ix) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 3(g) (v) of Part A Section 3 (i) of Part A <p>This also takes <i>Duration</i> into account</p>	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 1 (e) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 1(d) (ix) of Part B. Section 1 (f) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 1(d) (ix) of Part B. Section 1 (f) of Part B 	<p>As required in the following sections of the DMR EIAR / EMPr template:</p> <ul style="list-style-type: none"> Section 1(d) (ix) of Part B. Section 1 (f) of Part B 		



7.7. Positive and negatives that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and community affected

The positive and negative implication of the proposed Bergville Project and the alternatives identified have been provided below and assessed in terms of the following four categories:

- Environmental.
- Technical/Engineering.
- Economical.
- Social.

Table 32: Advantage and disadvantages of the proposed activities and identified alternatives

Alternative		Advantages	Disadvantages
Mine layout alternatives	Mining layout Crusher sites Road and conveyor crossing points Stream diversion designs R31 crossing designs Stream crossing designs	<p>Environmental: None</p> <p>Technical/Engineering: The preferred location for the crusher and crossing point is located closer to the existing Ulco operation.</p> <p>Economical: The preferred location for the opencast pit ensure optimal mining of the mineral resource within the area.</p> <p>Social: None</p>	<p>Environmental: All mine layout alternatives will have a high impact on the water resources within the study area.</p> <p>Technical/Engineering: The original location for the crusher and crossing point is located on an area requiring more engineering and technical considerations/designs.</p> <p>Economical: The original location for the crusher and crossing point is located further away from the existing Ulco operation.</p> <p>Social: None</p>
	Development versus no-go alternative	<p>Environmental: Status quo of the site will remain as is (no additional environmental impacts will occur as a result of the mining and related activities).</p> <p>Technical/Engineering: No additional machinery and resources required.</p> <p>Economical: None identified</p> <p>Social: No additional environmental impacts will occur as a result of the mining and related activities.</p>	<p>Environmental: The pan and freshwater resources in the area will not be impacted on.</p> <p>Technical/Engineering: Not optimally applying existing infrastructure for further mining of resources.</p> <p>Economical: Loss of income from not mining the mineral reserve.</p> <p>Social: Opportunity lost in expanding the LOM and workforce. Closure of Ulco operation.</p>
Development versus no-go alternative	Mining and related activities (development)	<p>Environmental: None identified</p> <p>Technical/Engineering: Equipment already available.</p> <p>Economical: Capital income from mining additional mineral reserves.</p> <p>Social: Job opportunities will be retained. Benefits arising from the SLP such as LED projects, learnerships will continue.</p>	<p>Environmental: The pan will be mined through and high impact on freshwater resources.</p> <p>Technical/Engineering: Will impact on the existing operating costs and resources.</p> <p>Economical: Additional capital cost required.</p> <p>Social: None.</p>
	No go option	<p>Environmental: Status quo of the site will remain as is (no additional environmental impacts will occur as a result of the mining and related activities).</p> <p>Technical/Engineering: No additional machinery and resources required.</p> <p>Economical: None identified</p> <p>Social: No additional environmental impacts will occur as a result of the mining and related activities.</p>	<p>Environmental: The pan and freshwater resources in the area will not be impacted on.</p> <p>Technical/Engineering: Not optimally applying existing infrastructure for further mining of resources.</p> <p>Economical: Loss of income from not mining the mineral reserve.</p> <p>Social: Opportunity lost in expanding the LOM and workforce. Closure of Ulco operation.</p>



7.8. Possible mitigation measures that could be applied and the level of risk

The impact management measures and level of risk have been included under Section 7.5 of Part A.

Table 33 below provides for a summary of the issues and concerns as raised by affected parties and an assessment of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered.

Table 33: Summary of issues and concerns raised by I&As

Concerns as raised by affected parties	Mitigation measures or site alternative
<p>There will be a decrease in clean water runoff reporting to the catchment and potential impact on the availability of water to downstream users. Deterioration of water quality is expected, affecting the use of surface water as a natural resource. You know about it what are you going to do to minimize this problem?</p>	<p>A detailed risk assessment was undertaken as part of the Environmental Impact Assessment (“EIA”) and Environmental Management programme (“EMPr”), in which the duration, probability, magnitude and reversibility of the impacts will be determined and the significance of the impact calculated. The EIA and EMPr further provide for an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. Refer to Part A Section 7.5 for the mitigations associated with surface water.</p>
<p>The ecological assessment is confined to the study area and does not include the neighbouring and adjacent properties; these were however, consider as part of the desktop assessment. Why not ? If no assessment is done there is no baseline to check the influence of quarry impact on the adjacent properties</p>	<p>The ecological assessment was conducted for the study area and the neighbouring and adjacent properties. The final ecological assessment is included in Annexure D2. As part of the impacts and risks identified (Part A Section 7.5), this cover the study area and identify and address the cumulative impacts the proposed project will have on the ecology of the area.</p>
<p>Environmental: The pan will be mined through and high impact on freshwater resource How will it affect adjacent properties?</p>	<p>A detailed risk assessment was undertaken as part of the Environmental Impact Assessment (“EIA”) and Environmental Management programme (“EMPr”), in which the duration, probability, magnitude and reversibility of the impacts will be determined and the significance of the impact calculated. The EIA and EMPr provides for an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. As part of the impacts and risks identified, this covers the study area and identify and address the cumulative impacts the proposed project will have on all aspects of the environment (including freshwater resources). Refer to Section 7.5 in Part A for the risk assessment</p>



Concerns as raised by affected parties	Mitigation measures or site alternative
<p>The localised dewatering of the aquifer on cannot be prevented. Since the water table is expected to be shallow, mining will occur below the static groundwater levels. Farmers' boreholes will have to be monitor to verify whether the dewatering will impact on their boreholes' yields. If long-term monitoring does indeed indicate such, they must be compensated for the loss.</p> <p>Given the nature of the limestone/dolomitic aquifer, aquifer hydraulic properties may vary considerably. Where the aquifer and preferential flow paths (fractures) are well developed, the cone of depression may impact a large area.</p> <p>When are Afrisam going to start doing the monitoring of adjacent properties borehole limits to get a base line?</p>	<p>AfriSam has appointed a water specialist to identify a monitoring programme for the area. This monitoring programme will be implemented prior to commencement of the project . See Annexure D4 for the monitoring plan.</p>
<p>The farm 176 has free flowing fountain, half the livestock are dependent on fountain water. The same fountain has registered irrigation water for 4 ha.</p>	<p>A detailed risk assessment was undertaken as part of the Environmental Impact Assessment ("EIA") and Environmental Management programme ("EMPr"), in which the duration, probability, magnitude and reversibility of the impacts will be determined and the significance of the impact calculated. The EIA and EMPr provides for an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. As part of the impacts and risks identified, this covers the study area and identify and address the cumulative impacts the proposed project will have on all aspects of the environment (including freshwater resources). Refer to Section 7.5 in Part A for the risk assessment .</p>
<p>The seepage of water under rail line to another vlei land area can also be affected when mining below static ground water level.</p>	<p>As part of the EIA and EMPr the risks on the vlei area adjacent to the proposed site will be identified and should any impacts occur the necessary mitigation measures will be provided for.</p>
<p>The underground water tables will have to be maintained.</p>	<p>A detailed risk assessment was undertaken as part of the Environmental Impact Assessment ("EIA") and Environmental Management programme ("EMPr"), in which the duration, probability, magnitude and reversibility of the impacts will be determined and the significance of the impact calculated. The EIA and EMPr provides for an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. As part of the impacts and risks identified, this covers the study area and</p>



Concerns as raised by affected parties	Mitigation measures or site alternative
	<p>identify and address the cumulative impacts the proposed project will have on all aspects of the environment (including groundwater resources). Refer to Section 7.5 in Part A for the risk assessment</p>
<p>The water users association as Dept requires will have to be motivated.</p>	<p>A water use licence application (“WULA”) will be submitted for all water uses as part of the proposed project. The Water User Association will also be involved during the WULA and the EIA/EMPr process.</p>
<p>In reviewing the Notification, it was established that the proposed project will occur in close proximity to Transnet Property (railway line). Should your application for authorization be granted, please take note of the following:-</p> <p>No disturbance of any Transnet's cadastral boundaries will be allowed. In case of a disturbance of any of the boundary beacons by the activities associated with the proposed project, Transnet must be notified immediately to allow for prompt corrective action to be taken,</p> <p>Further, Transnet wishes to draw your attention to Section 48 (1) of the Minerals and Petroleum Resources Development Act, No. 28 of 2002, which stipulates as follows:-</p> <p>"48. (l) Subject to section 20 of the National Parks Act, 1976 (Act No. 57 of 1976), and subsection (2), no reconnaissance permission, prospecting right, mining right or mining permit may be issued in respect of — (a) land comprising a residential area;</p> <p>(b) any public road, railway or cemetery;</p> <p>(c) any land being used for public or government purposes or reserved in terms of any other law; or</p> <p>(d) areas identified by the Minister by notice in the Gazette in terms of section 49."</p> <p>Therefore, please note that under no circumstances will Transnet permit, grant permission or consent to any reconnaissance, prospecting or mining activities on its properties.</p> <p>With regard to the property adjacent to the railway line, your attention is drawn to Regulation 17 (6) (a) of the Mine Health and Safety Act, No. 29 of 1996 which determines that no mining operations may be carried out under or within a horizontal distance of 100 metres from buildings, roads, railways, reserves, etcetera.</p> <p>It is recommended that all issues raised herein be adequately detailed in the project's final</p>	<p>The proposed project will be located outside of the Transnet Property (railway line). Furthermore, the proposed project will be located outside of the 100-meter buffer from the Transnet railway line. Although there is no intention to touch any of the boundary beacons, AfriSam takes note that should any disturbances of any of the boundary beacons by the activities associated with the proposed project take place, Transnet will be notified immediately.</p> <p>The comments have been included and detailed in the final Scoping Report submitted and this document to be submitted to the Department of Mineral Resources and Energy (“DMRE”).</p>



Concerns as raised by affected parties	Mitigation measures or site alternative
<p>Scoping Report (SR) to be furnished to the competent authority.</p>	
<p>From a Geo-Spatial perspective, we would like to request that all TFR cadastral boundaries must be protected at all times. In case of a disturbance of any boundary beacons, this office must be notified immediately allowing for prompt corrective action to be taken.</p> <p>This office has no objection to the proposal. From the application the proposed area is adjacent to the Transnet land and we only hereby wishes to draw your attention to Section 48 (1) of the Minerals And Petroleum Resources Development Act, 2002 which stipulates as follow:</p> <p>"48. (1) Subject to section 20 of the National Parks Act, 1976 (Act No. 57 of 1976), and subsection (2), no reconnaissance permission, prospecting right, mining right or mining permit may be issued in respect of—</p> <p>(a) land comprising a residential area;</p> <p>(b) any public road, railway and cemetery;</p> <p>(c) areas identified by the Minister by notice in the Gazette in terms of section 49"</p> <p>Please note that under no circumstances will or do Transnet Limited permit, grant permission or consent to any prospecting or mining activities on its properties.</p> <p>As far as the adjacent properties to the railway line is concerned, your attention is drawn to Regulation 17 (6) (a) of the Mine Health and Safety Act, 1996 which determines that no mining operations may be carried out under or within a horizontal distance of 100 metres from buildings, roads, railways, reserves etcetera's.</p> <p>Please also take note of Track Manual requirements within 500m of railway line, the necessary supervision from our department is required.</p> <p>Electrical:</p> <p>Requesting client, to provide written consent that NO TFR level crossings be used, and from the Environmental report received, it was not stipulated how the dust will be controlled. Please provide TFR with the abovementioned requests.</p> <p>Should you have any queries regarding this communication you are welcome to consult this office. Technically speaking, from a Civil point of view, we foresee no objections to the proposal.</p>	<p>Thank you for your comments received in the letter dated 22 October 2019 with regards to the proposed AfriSam Ulco Bergville Project.</p> <p>The proposed project will be located outside of the Transnet Property (railway line). Furthermore, the proposed project will be located outside of the 100-meter buffer from the Transnet railway line. Although there is no intention to touch any of the boundary beacons, AfriSam takes note that should any disturbances of any of the boundary beacons by the activities associated with the proposed project take place, Transnet will be notified immediately.</p> <p>AfriSam is already in the possession of a Mining Right for the area and no new Mining Right application is associated with the proposed project. As mentioned above the proposed project will be located outside of the 100-meter buffer from the Transnet railway line. The track manual requirements will be adhere to. AfriSam confirms that no TFR level crossings will be used for mining purposes as part Bergville project . Dust will be mitigated by dust suppression.</p>



Concerns as raised by affected parties	Mitigation measures or site alternative
Transnet Freight Rail would however, like the opportunity to re-evaluate our position with regards to this proposal once final plans have been prepared.	

7.9. Motivation where no alternative sites were considered

Acceptable secondary limestone reserves in the current mining area at Ulco are starting to run low. The estimated time horizon remaining is less than 5 years. Already quality consistency on the limestone stockpiles is getting more difficult to maintain. Therefore, AfriSam is investigating the possibility of expanding operations onto the north-eastern portion of the farm Bergville 216, which is adjacent to the current operation and part of the existing mining right area.

Limestone resources are available north of Ulco on the opposite side of the R31 provincial road and bounded by the rail line further north. In prospecting terms these resources are referred to as “Indicated” and “Inferred” but not yet a Proven Reserve.

In the latter part of 2017, a prefeasibility study was commissioned to consider the best solutions to confirm these reserves, what legislative requirements there are to access these reserves as well as the most cost-effective solution to mine the limestone. A Ground Penetrating Radar (“GPR”) investigation was done to highlight the area and extent of the deposit and then a much more detailed exploration phase of the project was concluded in 2019.

Two alternatives in terms of mining layout have been identified. After the Ground Penetrating Radar study was completed, more limestone reserves were found south east of the original mine layout. Both the mining layouts will have a similar environmental impact, however, from a mining perspective the preferred layout is ideal.

7.10. The outcome of the Site Selection Matrix. Final site layout plan

The outcome of the final site selection is discussed in Section 13 of Part A and the final layout plan included in Section 11.2 of Part A.

8. Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity.

All impacts and risks as identified are contained within Part A Section 7.5 Impacts and risks identified. As further provided is an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation



measures. The methodology applied in assessing and ranking the impacts and risks on the preferred site is described in Part A Section 7.6.

9. Assessment of each identified potentially significant impact and risk

Refer to the full risk assessment and mitigation measures table provided in Section 7.5 (Part A) above.

10. Summary of specialist reports

Recommendations as provided by specialist have been included in the table below:

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORT	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Air Quality Impact Assessment	<ul style="list-style-type: none"> ▪ Wind fences installed around construction sites to slow wind speed (Construction phase only); ▪ Dust suppression on unpaved roads and speed limits set at 40 km/hr; ▪ Good work practices when stockpiling, for example: <ul style="list-style-type: none"> ○ Loading and unloading confined to the leeward (downwind) side of the pile; and ○ Drop height reduction etc. ▪ The establishment of vegetation on the overburden/topsoil stockpiles; ▪ Enclosure of the overland conveyor and fixing chutes to the conveyor transfer points; ▪ Enclosure of the crusher (Or any alternative control measure with the same level of control efficiency); ▪ Concurrent rehabilitation to reduce wind erosion as mine progresses; ▪ A dust management plan, in line with the National Dust Control Regulations; ▪ Ensure the existing Ulco cement operation remains within its maximum release rates set for the mills, heaters, kilns and coolers, as prescribed in its Atmospheric Emission Licence (NC/AEL/FBDM/AFR01/2012); and ▪ Ensure the existing Ulco cement operation adheres to the mitigation measures prescribed in its Fugitive Dust Management Plan. ▪ The following monitoring measures are recommended to assess the efficacy of the mitigation measures for dustfall and particulates throughout construction, operation and closure phases: <ul style="list-style-type: none"> ▪ Dustfall monitoring in terms of the National Dust Control Regulations; ▪ Maintain a complaint register; The complaints register should be kept with security at the entrance to the site. It should provide space for the following information: complainant name, complaint, physical address, telephone number, date and the time when the complaint was 	X	7.5



LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORT	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	<p>registered and all air quality related complaints should be investigated, and remedial steps taken.</p> <ul style="list-style-type: none"> ■ Periodically, use a combination of particle size analysis and microscans of the dustfall samples as an indirect method to monitor particulates, PM10 and PM2.5; and ■ Periodic PM10 and PM2.5 monitoring in the town of Ulco. ■ The following mitigation measures are recommended to prevent the impacts associated with combustion gases and should be applied during construction, operation and closure phases: <ul style="list-style-type: none"> ○ Use of low sulphur fuels where possible; ○ Proper and regular maintenance of vehicles and heavy mobile equipment; and ○ The use of catalytic converters where applicable to reduce exhaust emissions. 		
Blasting and Vibration study	<p>Regulatory requirements – MHSA Reg. 4.16(2) Regulatory requirements indicate specific requirements for all non-mining structures and installations within 500 m from the mining operation. The mine will have to apply for the necessary authorisations as prescribed in the various acts, and specifically Mine Health and Safety Act Reg 4.16. Table 25 shows list of these installations. Figure 27 below shows the 500 m boundary around the Opencast Pit areas. The location of non-mining installations is clearly observed.</p> <p>Regulatory requirements – MHSA Reg. 17.6(a) Consideration of the Mine Health and Safety act regulation 17.6(a) no mining will be done closer than 100 m from any private installations. A 100 m boundary will be maintained between the railway line, the R31 provincial road and the Gamagara water pipeline.</p> <p>Blast Designs Blast designs should be reviewed prior to first blast planned and done. Due to stripping of topsoil that will take place there may be variances in required final depths and thus design applied to be confirmed.</p> <p>Test Blasting It is always good to conduct a first test blast to confirm levels and ground vibration and air blast. It is recommended that such a blast be done and detail monitoring done and used to help define blasting operations going forward. This test blast can be based on the existing design and only after this blast it may be necessary to define if changes are required or not. Blasting operation in the Main pit or Pit 4 can be used as test blasts and refine the levels of ground vibration and air blast.</p> <p>Stemming length The current proposed stemming lengths used provides for some control on fly rock. Consideration can be given to increase this length for better control. Specific designs where distances between blast and point of concern are known should be considered. Recommended stemming length should range between 20 and 30 times the blast hole diameter. In cases for better fly control this should range between 30 and 34 times the blast holes diameter. Increased stemming lengths will also contribute to more acceptable air blast levels.</p>	X	7.5



LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORT	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	<p>Safe blasting distance and evacuation Calculated minimum safe distance is 296 m. The final blast designs that may be used will determine the final decision on safe distance to evacuate people and animals. This distance may be greater pending the final code of practice of the mine and responsible blaster's decision on safe distance. The blaster has a legal obligation concerning the safe distance and he needs to determine this distance.</p> <p>An evacuation process and plan will be required to manage safe areas specifically for private land owners and structures on the eastern side of the pit. There are a number of households in the vicinity of this pit. This process must be approached with high level of compassion and consideration of the neighbours.</p> <p>Road Closure The R31 Provincial road will require closure during blasting time. It is expected that blasting will be within the mine's safe distance specified. There is not a concern for high levels of ground vibration but the road will be within the unsafe distance from blasting. There may be other smaller farm roads where people and animals may be present that will require consideration as well.</p> <p>Railway management The railway is located within 500 m from the initial pit area. A management process must be started with Transnet to ensure that no trains are present or passing when blasting operations are conducted within 500 m from the railway line. There is no specific ground vibration or air blast concern for the railway line.</p> <p>Photographic Inspections The option of photographic survey of all private house structures up to 1500 m from the pit area is recommended. The mine will be operating for a significant number of years. This will give advantage on any negotiations with regards to complaints from neighbours on structural issues due to blasting. This process can however only succeed if done in conjunction with a proper monitoring program. It is expected that ground vibration levels will be significantly less than proposed limits at 1500 m but this process will ensure record of the pre-blasting status of the nearest structures to the pit areas. At 1500 m the expected level of ground vibration will be perceptible. Figure 28 shows extent of the range of 1500 m around the pit area with POI's identified. It must be noted that a point may represent a group of structures found in the vicinity of the point identified.</p> <p>Heritage Concerns There is some heritage infrastructure identified for the project. Various are found inside the pit greater area. The heritage specialist needs to advice on the process and mitigations required for all identified heritage sites. Blast impact was considered with limits normally applied for heritage sites.</p> <p>Recommended ground vibration and air blast levels The ground vibration and air blast levels limits recommended for blasting operations in this area are provided.</p> <p>Blasting times A further consideration of blasting times is when weather conditions could influence the effects yielded by blasting operations. It is recommended not to blast too early in the morning when it is still cool or when there is a possibility of atmospheric inversion or too</p>		



LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORT	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	<p>late in the afternoon in winter. Do not blast in fog. Do not blast in the dark. Refrain from blasting when wind is blowing strongly in the direction of an outside receptor. Do not blast with low overcast clouds. These 'do not's' stem from the influence that weather has on air blast. The energy of air blast cannot be increased but it is distributed differently and therefore is difficult to mitigate.</p> <p>It is recommended that a standard blasting time is fixed and blasting notice boards setup at various routes around the project area that will inform the community of blasting dates and times.</p> <p>Third party monitoring</p> <p>Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. Audit functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.</p> <p>Video monitoring of each blast</p> <p>Video of each blast will help to define if fly rock occurred and from where. Immediate mitigation measure can then be applied if necessary. The video will also be a record of blast conditions.</p>		
Biodiversity Assessment	<ul style="list-style-type: none"> ▪ it is recommended that once the layout/development plans have been finalised, that a walk down of the infrastructure areas is conducted, in order to ascertain the exact presence and numbers of possible protected faunal and floral species. All locations of individuals must be marked by GPS and logged (notably floral species) and then the necessary permits must be applied for from the relevant authorities. Furthermore, during development activities, all mitigation measures are to be strictly enforced so as to ensure that the surrounding environment is not impacted upon through edge effects or careless veld clearing and dumping activities. ▪ Should the mining activities be approved by the relevant authorities, it is recommended that a thorough walkdown of the proposed mining footprint areas be conducted at the relevant stages of mining activities by a specialist in order to locate and remove any faunal SCC species that are unable self-relocate, to suitable similar habitat within the region. This is particularly pertinent to the smaller more reclusive species of the Genus Ceratogyrus, Harpactira and Pterinochilus. It is recommended that walkdowns of the various areas, in line with the planned mining phases, be conducted in the months of January – February. Where necessary the relevant permits will also need to be applied for from the relevant authorities. ▪ Develop and implement an Alien and Invasive Plant Control Plan. ▪ Should the proposed mining activities receive approval from the relevant authorities, it is recommended that the proposed drainage line diversion and post 10 year mining plan only be implemented as and when needed 	X	7.5
Groundwater study	A Water Management Plan is required to ensure that the new proposed facilities do not impact negatively on groundwater levels and quality to unacceptable levels. It will also serve as early warning systems to implement mitigation measures at early stages to reduce	X	7.5



LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORT	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	<p>cumulative impacts. To ensure that the groundwater environment is protected, monitoring of water quality and levels are required on an on-going basis.</p> <p>Monitoring is required for the following purposes:</p> <ul style="list-style-type: none"> ▪ To detect the actual impact on groundwater quantity and quality timeously. ▪ To assess whether the mitigation measures given in Section 8 are effective, supporting the update of mitigation measures where necessary. ▪ To support adaptive management in which the numerical model can be updated based on new information thereby increasing its confidence level. This can be used to predict groundwater impacts and also assist with closure planning. With updated high confidence predictions, the mine can act in a pre-emptive manner, thus reducing risks, rather than acting retrospectively when monitoring data reveals a problem. ▪ To interrogate unknowns identified in this report, in which various field investigations can be carried out to test and improve the conceptual understanding of the aquifer system. <p>The recommended monitoring includes the following:</p> <ul style="list-style-type: none"> ▪ Groundwater levels. ▪ Groundwater quality. ▪ Wetland and freshwater resource monitoring. ▪ All water uses and/or discharges – including make-up water, dust suppression and dewatering volumes. ▪ Surface subsidence monitoring 		
Heritage Impact Assessment	<ul style="list-style-type: none"> ▪ A full-scale second phase heritage impact assessment to document the well, the reservoir, the milking shed and the position and character of all early flood irrigation systems. ▪ Application for demolishing permits for the above-mentioned. ▪ The relocation of all the graves to an appropriate site. 	X	7.5
Palaeontological Impact Assessment: Desktop Study	<ul style="list-style-type: none"> ▪ Mitigation may be needed (Appendix 2) if fossils are found. Great care is needed during mining due to the presence of Taung to the north. ▪ No consultation with parties was necessary. The Environmental Control Officer must familiarise him- or - herself with the formation present and its fossils and obtain training pre-construction (one day). ▪ The development may go ahead. ▪ The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities. For a chance fossil find, the protocol is to immediately cease construction activities, construct a 30 m barrier, and contact SAHRA for further investigation. It is recommended that the EMPr be updated to include the involvement of a palaeontologist for pre-construction training of the ECO and the ECO together with the quarry manager must visit and survey site after blasting, excavating and during drilling during construction of infrastructure. 	X	7.5
Stormwater Management plan	<ul style="list-style-type: none"> ▪ It is recommended to construct clean water diversion berms around the proposed opencast mining pit to prevent clean surface water runoff from the upstream catchment to drain into the pit. To ensure that the pit is always surrounded by the clean water diversion berms, the berms should be extended or 	X	7.5



LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORT	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	<p>moved as mining progresses. A berm height of 1.5 m is recommended.</p> <ul style="list-style-type: none"> ▪ It is recommended to design and construct the road crossing and final drainage line diversion as per the Jones and Wagner report (Jones and Wagner, 2019) as and when mining starts encroaching into the river line area. The initial drainage line will pass underneath the haul road and through a concrete chute and precast culvert system. The point where the clean water from the drainage line diversion will be released to the downstream environment should be fitted with adequate erosion protection measures. ▪ Finally, it is recommended to construct a culvert along the haul road to allow clean runoff water to report to the downstream clean water environment. 		
Traffic Impact Assessment	<ul style="list-style-type: none"> ▪ A detour (deviation) is proposed by EDL Engineers (Pty) Ltd on the north eastern side of the R31 in order to promote better sight distance as well as possible damage to the existing pipeline next to the road reserve. ▪ The detour is proposed to be approximately 410m long, 7.5m wide, and have a gravel surface with a dust suppression treatment and a crossfall of 2% along the length of the detour. ▪ With the detour being proposed at 7.5m wide and having both direction of flow (one travel way of approx. 3.4m in each direction), a LOS of A will be maintained. ▪ If a Stop / Go system, or flagmen as an option to temporarily control traffic is implemented during peak hours for any Equipment or Trucks to cross over the detour, the Level of Service will deteriorate to LOS F with an average delay of more than 2 minutes. ▪ For drainage purposes, concrete pipe culverts are proposed. The number and position of these culverts needs to be determined by the site engineer. ▪ For safety purposes, concrete “New Jersey” Barriers are proposed to protect the construction workers, road users as well as any construction equipment close to the detour. ▪ It is also proposed that Yellow Plastic MKII barriers filled with sand or water and are placed with a “Road-Closed” sign to close the existing section of the road for road users, where the detour starts. ▪ The speed limit on the R31 will have to be lowered from 120km/h to 60km/h in 200m increments to promote safety for the road users and the construction area, as shown on Drawing No. 19020/SL/01. ▪ Temporary road signage will be erected as per the specifications of the South African Road Traffic Signs Manual Vol 2. Roadworks, and as shown on Drawing No. 19020/SL/01. ▪ It is therefore recommended that the proposed detour at Ulco AfriSam, on the R31 as described in this report, is supported from a safety and traffic engineering perspective, provided that the detour is implemented as shown on Drawing No. 19020/CL/01 and 19020/SL/01 and in accordance with the relevant standards of the SARTSM Vol 2. 	X	7.5
Wetland study for the Bergville project	Diversion of the ephemeral drainage line:	X	7.5



LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORT	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
	<ul style="list-style-type: none"> ▪ The diversion channel must be sloped at a maximum of a 1:3 slope, as this would prevent erosion of the channel (primarily due to the high erosive nature of the soils in the area) but also allow for animals to enter into and out of the diverted channel, thus retaining ecological connectivity and migratory properties; ▪ After the construction of the berm diversion, it should immediately be revegetated with indigenous vegetation species such as the species that are associated with the natural upstream reach of the drainage line. This will allow that the riparian habitat lost by the original drainage line be replaced to some degree, to provide refuge and migratory corridors for fauna and avifauna; and ▪ It should be ensured that the diverted drainage line has the same hydrological regime as that of the drainage line prior to it being diverted. This will ensure that habitat conditions provided by the diverted drainage line offer the same habitat requirements as the original drainage line and that the pattern flow and timing of water reaching downstream areas is not affected. <p>Mining of limestone:</p> <ul style="list-style-type: none"> ▪ As the mining plan entails a 1 Year, 5 Year and a 10 Year mining plan, the site clearing associated with each of the footprint areas for the allocated years, should be limited to the proposed layout for each phase. This would limit disturbance to the buffer zone surrounding the pan wetland during these years, and in turn prevent alteration to the natural drainage patterns of the local catchment and prevent the sedimentation of the pan wetland during the construction of each phase; ▪ All alien and invasive species must be eradicated from the construction footprint area. The eradicated alien and invasive species may not be stockpiled within close proximity to any watercourses during the LOM and must be disposed of at a registered disposal facility (it is not recommended for these to be burned or buried, as the seeds may disperse and/or the plants may re-establish). ▪ The localised dewatering of the aquifer driving the hydrological functioning of the pan wetland cannot be prevented (Scholtz, 2019). Since the water table is expected to be shallow, mining will occur below the static groundwater levels. Thus, continuous monitoring of groundwater depth quality through purpose drilled groundwater monitoring boreholes should occur to ensure early detection of negative impacts so that the impacts can be managed as best possible; ▪ All other watercourses within the larger mining right area (MRA) as identified in the SAS 2018 study must be maintained in their current PES in order to prevent any degradation to any other watercourses within the surrounding area of the pan wetland and depression. These watercourses will provide refuge for species which were dependant on the pan wetland and depression (although only on a seasonal basis). 		



11. Environmental Impact Statement

11.1. Summary of the key findings of the environmental impact assessment

This EIAR has served to identify the potential impacts associated with the activities of the associated project. In accordance with the relevant environmental legislation, reasonable measures to mitigate the potential impacts arising from the proposed activities have been assessed and the significance of each of these impacts under both the pre- and post-mitigation scenarios identified and detailed.

The methodology utilised to undertake the impact assessment has incorporated, amongst other skills, professional experience, relevant literature and local knowledge of the site and surrounding area.

Mining of the groundwater driven pan is not necessarily considered a fatal flaw as none of the pans are considered particularly unique and/or irreplaceable. Furthermore, the extent of impact will be limited since any impact is naturally contained due to the endorheic nature of pans in the area.

It is the EAP's opinion that based on the process that has been followed and the findings of the impact assessment, in conjunction with the proposed mitigation measures, that no unmanageable adverse impacts are expected to occur, and some positive impacts are expected.'

11.2. Final Site Map

Figure 63 below illustrates the final site map of the project.



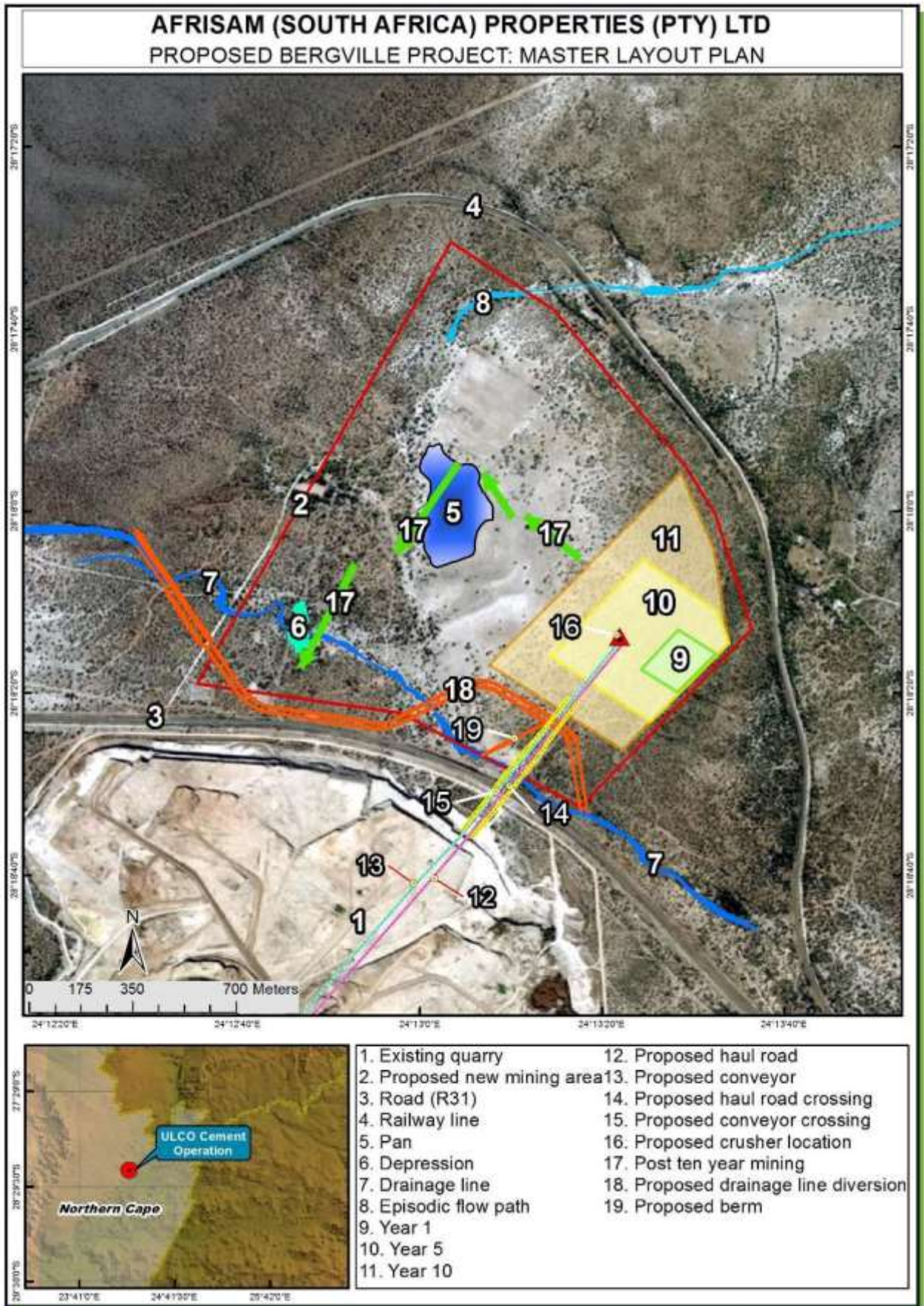


Figure 63: Final site map



11.3. Summary of the positive and negative implications and risks of the proposed activity

11.3.1 Summary of the positive and negative implications and risks associated with the proposed Bergville project

A summary of the negative (Table 34) and positive (Table 35) implications and risks of the Bergville project have been summarised below.

Table 34: Summary of the negative environmental impacts, after mitigation

NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
1a	Geology	Opencast Mining	The limestone will be removed by opencast mining methods, permanently altering the geological sequence.	Operational, Decommissioning	Low
2a	Topography, Soils Land use and land capability	Opencast Mining	Removing of limestone will impact on overlying geological strata, alter topography and/or reduce land capability, as well as cause an increased risk of erosion within wetlands.	Operational, Decommissioning and Closure.	Low
2b	Topography, Soils Land use and land capability	Surface infrastructure	Temporary stockpiling of topsoil, construction and operation of the surface infrastructure will cause a temporary minor change in topography until the closure of the mine when the infrastructure will be demolished.	Construction, Operational, Decommissioning and Closure.	Low
3a	Fauna and Flora: Ephemeral Drainage line diversion (preferred and alternative)	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> • Clearing of vegetation as part of the drainage line diversion leading to a loss of faunal and floral habitat; • Loss of faunal and floral species diversity due to vegetation loss; • Loss of downstream recharge of the existing drainage line due to the diversion leading to loss of niche habitat and species diversity associated with areas of increased moisture; and • Vegetation clearing and desiccation of the downstream drainage line feature within the study area leading to the loss of floral and faunal SCC associated with areas of increased moisture. 	Construction	High



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
3b	Fauna and Flora: Preferred Haul road, crusher plant and conveyor construction	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> • Clearing of vegetation along the proposed haul road and conveyor belt routes will lead to the loss of faunal and floral habitat; • Decreased habitat will lead to the loss of faunal and floral species diversity as well as the loss of faunal and floral SCC; and • Construction of the haul road and conveyor will lead to the fragmentation of faunal habitat within the study area. 	Construction	Medium
3c	Fauna and Flora: Vegetation clearing of mining footprints (preferred and alternative)	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> • Clearing of vegetation within the mining footprints leading to significant habitat loss for faunal and floral species; • Loss of faunal and floral species diversity due to habitat loss and increased mining activities; and • Loss and or displacement of faunal and floral SCC. 	Construction	High



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
3d	Fauna and Flora: Original Haul road, crusher plant and conveyor construction	Clearing of vegetation as part of the construction of the drainage line diversion, preferred and alternative conveyor and crusher plant, haul road and the systematic clearing of the proposed mining areas in accordance with the mine schedule.	<ul style="list-style-type: none"> • Clearing of vegetation along the proposed haul road and conveyor belt routes will lead to the loss of faunal and floral habitat; • Decreased habitat will lead to the loss of faunal and floral species diversity as well as the loss of faunal and floral SCC; and • Construction of the haul road and conveyor will lead to the fragmentation of faunal habitat within the study area. 	Construction	High
3e	Fauna and Flora: Mining and expansion of opencast pits	Mining within the proposed mining footprints (preferred and alternative) as per the mine schedule (Year 1, Year 5, Year 10 and Post 10 years); and Operation of the crusher, conveyor belt and haul road;	<ul style="list-style-type: none"> • Loss of floral and faunal habitat, diversity and SCC due to mining operations and the expansion of the opencast pits in line with the current proposed mining schedule; • Loss of habitat connectivity as a result of the construction of the haul road as well as the conveyor belt; • Noise and dust pollution to the receiving environment from blasting and vehicle movement will lead to the displacement of faunal species whilst dust fallout on plants may reduce the photosynthetic rate leading to slower plant growth and vegetation recovery. 	Operational	High



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
3f	Fauna and Flora: Crusher plant, haul road and conveyor operation (preferred layout)	Mining within the proposed mining footprints (preferred and alternative) as per the mine schedule (Year 1, Year 5, Year 10 and Post 10 years); and Operation of the crusher, conveyor belt and haul road;	<ul style="list-style-type: none"> • Operation of the crusher plant; • Vehicle related faunal mortalities may occur as a result of mining vehicles moving along haul and mine roads; • Night glow from operational lights will lead to altered nocturnal species movement patterns, notably to species that are light sensitive and/or attracted to light sources; and • Increased levels of dust and noise pollution as a result of the operations of the crusher and conveyor leading to the displacement of faunal species whilst dust fallout on plants may reduce the photosynthetic rate leading to slower plant growth and vegetation recovery. 	Operational	Medium
3g	Fauna and Flora: Crusher plant, haul road and conveyor operation (original layout)	Mining within the proposed mining footprints (preferred and alternative) as per the mine schedule (Year 1, Year 5, Year 10 and Post 10 years); and operation of the crusher, conveyor belt and haul road;	<ul style="list-style-type: none"> • Operation of the crusher plant. • Vehicle related faunal mortalities may occur as a result of mining vehicles moving along haul and mine roads; • Night glow from operational lights will lead to altered nocturnal species movement patterns, notably to species that are light sensitive and/or attracted to light sources; and • Increased levels of dust and noise pollution as a result of the operations of the crusher and conveyor leading to the displacement of faunal species whilst dust fallout on plants may reduce the photosynthetic rate leading to slower plant growth and vegetation recovery. 	Operational	High
3h	Fauna and Flora: Removal of mining related infrastructure and site rehabilitation	Demolishing of all surface infrastructure (Crusher and conveyor); and Rehabilitation of opencast pits, haul road and conveyor route.	<ul style="list-style-type: none"> • Loss of remaining faunal habitat, diversity and SCC in the surrounding natural areas. Removal of infrastructure and rehabilitation may result in a loss of faunal habitat, diversity and faunal SCC, if not performed according to a detailed closure and rehabilitation plan. 	Decommissioning	Medium



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
3i	Fauna and Flora: Alien plant proliferation in disturbed areas	Demolishing of all surface infrastructure (Crusher and conveyor); and Rehabilitation of opencast pits, haul road and conveyor route.	<ul style="list-style-type: none"> Increase in alien species proliferation; and Ineffective rehabilitation of disturbed areas may result in alien and invasive plant proliferation, which might spread to surrounding undisturbed areas and will result in further habitat and terrestrial species diversity loss. 	Decommissioning	Medium
4a1	Surface water	<u>Opencast Mining:</u> Grading, vegetation clearing and soil stripping.	There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, carbonaceous materials or other pollutants generated during the construction phase of the proposed Bergville Project. The sediment load within surface water runoff may increase if not prevented or mitigated, or the chemistry of surface water may be altered. <u>Surface water quality:</u> Siltation of water resources causes deterioration of water quality, affecting the use of surface water as a natural resource.	Construction	Low
4a2	Surface water	Opencast Mining: Operation of an opencast mining pit.	The opencast mining pit will reduce clean water runoff, with subsequent impacts on the catchment reserve. Additionally, clean water that drains into the opencast pit will come in contact with the mine floor and side walls, which could pollute the clean water. <u>Surface water quantity:</u> There will be a decrease in clean water runoff reporting to the catchment and potential impact on the availability of water to downstream users. <u>Surface water quality:</u> Deterioration of water quality is expected, affecting the use of surface water as a natural resource.	Operational, Decommissioning and Closure	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
4b1	Surface water	Surface infrastructure: Use of hazardous materials	Spillages of hazardous materials used during the construction of the proposed Bergville Project may impact on the surrounding clean water environment. <u>Surface water quality</u> Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource.	Construction	Low
4b2	Surface water	Surface infrastructure: Maintenance of vehicles and equipment during construction	Maintenance activities resulting in spillage of oil, fuel and / or grease at construction sites. <u>Surface Water quality:</u> Spillages of substances that contains hydrocarbons may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Construction	Low
4b3	Surface water	Surface infrastructure: Cement and concrete mixing	Washing of concrete delivering trucks and cement equipment on site as well as cement / concrete mixing outside of demarcated areas and the incorrect disposal of excess cement and concrete may impact on the surrounding clean water environment. <u>Surface water quality:</u> Incorrect cement / concrete handling practises during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource.	Construction	Low
4b4	Surface water	Surface infrastructure: Storage of fuel and refuelling construction vehicles	Accidental spillages of fuel on site and incorrect storage practises may impact on the surrounding clean surface water environment. <u>Surface water quality:</u> Incorrect fuel storage, handling and accidental spillages during construction may lead to a deterioration of water quality affecting the use of surface water as a natural resource and the degradation of aquatic biodiversity and ecosystems.	Construction	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
4b5	Surface water	Surface infrastructure: Operation of a haul road	<p>Clean water transported within the drainage line could enter the existing opencast mining pit at the haul road crossing (due to the haul road passing through a slot in the limestone wall of the existing pit). Clean water that drains into the existing opencast pit will decrease the volume of water available for the catchment yield. Clean water that comes in contact with the mine floor and side walls, could become polluted.</p> <p><u>Surface water quantity:</u> There will be a decrease in clean water runoff reporting to the catchment and potential impact on the availability of water to downstream users.</p> <p><u>Surface water quantity:</u> Deterioration of water quality is expected, affecting the use of surface water as a natural resource.</p>	Operational	Low
5a	Groundwater	Opencast Mining: and Surface infrastructure:	<p>Site clearing and removal of topsoil, may lead to ponding of surface water in the cleared areas during the wet season and could potentially lead to increased infiltration to aquifers. Groundwater quality impacts during the construction phase are expected to be insignificant if the proposed management measures are implemented. The stripping and stockpiling of topsoil and subsoil from the pit and infrastructure surface areas is considered negligible since no chemical interaction is envisaged that could have an adverse impact on groundwater quality. The stripping of topsoil may result in a very slight increase in groundwater recharge, which is a slight positive effect on the groundwater environment. The duration of the activity is however so limited that the effect will not be measurable.</p> <p>The construction of the above-mentioned infrastructure will cause a very small reduction in recharge to the aquifer due to the compaction of the surface area. This impact is countered by the fact that vegetation clearing may result in ponding and slight increases in recharge. Runoff water will contribute to the catchment yield.</p>	Construction	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
5b	Groundwater	Opencast Mining: and Surface infrastructure.	<p>The localised dewatering of the aquifer on cannot be prevented. Since the water table is expected to be shallow, mining will occur below the static groundwater levels. Farmers' boreholes will have to be monitored to verify whether the dewatering will impact on their boreholes.</p> <p>Given the nature of the limestone/dolomitic aquifer, aquifer hydraulic properties may vary considerably. Where the aquifer and preferential flow paths (fractures) are well developed, the cone of depression may impact a large area.</p>	Operational	Medium
5c	Groundwater	Opencast Mining: and Surface infrastructure.	<p>If pollutants have reached groundwater it is very difficult and costly to remediate. However, because of the highly alkaline nature of the limestones, this material will not have an acid leachate impact on the local or regional water quality. No sulphidic minerals are known to be present in the ore to be mined that could result in acidity of drainage or mine water. However, salinity and possibly nitrogen contamination may result from the mining activities and stockpiling of ore and overburden. Good housekeeping practices and effective blasting and stormwater management should keep quality impacts to the minimum.</p>	Operational, Decommissioning and Closure	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
6a	Sensitive landscapes (including wetlands): Ephemeral Drainage (EDL) Line	Diversion of the ephemeral drainage line by means of a berm-and-trench channel from where it enters the western boundary of the new mining area and will be released back into the natural drainage line on the eastern portion of the new mining area. The drainage line will be crossed by the new access haul road via a culvert crossing or by means of an aqueduct supported by concrete columns over the access road. For the duration of the diversion channel, the riparian habitat provided by the original reach of the drainage line will be lost.	<ul style="list-style-type: none"> • Clearing of riparian vegetation for the placement of the berm; • Altered drainage patterns, leading to the change in the pattern flow and timing of water in the landscape, potentially impacting on the riparian vegetation composition; • Loss of riparian habitat due to the diversion of the drainage line, and failure of riparian habitat to establish in the new diversion channel to offset the loss of the original drainage line habitat; • Potential inadequate design of the diversion channel and aqueduct, leading to alteration of the pattern flow and timing of water in the drainage line as well as erosion and sedimentation of the downstream freshwater environment. 	Construction	Medium
6b	Sensitive landscapes (including wetlands): watercourses All	The construction of clean and dirty water management systems around the open cast pit footprint areas during the LOM	<ul style="list-style-type: none"> • Loss of catchment yield that would otherwise have entered the watercourses within the new mining area; • This could lead to alteration of the wetting pattern of the pan wetland and flow in the ephemeral drainage line (EDL), leading to changes in the habitat it provides. 	Construction	Medium



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
6c	Sensitive landscapes (including wetlands): wetland depression	Pan and Site clearing, removal of vegetation and topsoil stripping within the GN509 Zone of Regulation of the pan wetland (year 1 to 10) and the entire extent of the pan wetland and depression (post year 10). This mix of topsoil and vegetation will be moved to the topsoil stockpile. Since there is little to no overburden over the limestone, when it is encountered it will be stripped separately to the topsoil and used soon after as fill material for concurrent rehabilitation requirements on the mine.	<ul style="list-style-type: none"> • Removal of vegetation (primarily terrestrial vegetation) and associated disturbances (vehicle movement) within the pan wetland and depression; • Earthworks, leading to the exposure of soils, and potentially to increased runoff, erosion and incision of the pan wetland and depression; • Potential for increased sedimentation of the pan wetland can lead to altered freshwater habitat and potentially altering surface water quality (if present); • Soil stockpiling; • Decreased ecoservice provision by the pan wetland and depression; and • Proliferation of alien vegetation due to disturbances. 	Construction	High



<p>6d</p>	<p>Sensitive landscapes (including wetlands): Diverted ephemeral drainage line, pan wetland and depression</p>	<p>Construction of the preferred layout crusher within the Year 5 open cast pit footprint area (outside all zones of regulation associated with all of the watercourses within the new mining area) or construction of the alternative layout crusher within approximately 160m of the pan wetland (within its GN509 zone of regulation). The conveyor belt will however be constructed across the diverted ephemeral drainage line. Once the crusher has been constructed, a conveyor belt will be constructed along the haul road route to transport the product to the existing mining operations. Since the crusher complex (of the preferred layout or the alternative layout) will be located outside of all GN704 zones of regulation associated with all of the watercourses within the new mining area, the construction thereof is not envisioned to impact on the key drivers and</p>	<ul style="list-style-type: none"> • Clearing of riparian and/or terrestrial vegetation surrounding the diverted drainage line; • The construction of overland conveyor entails the excavation of pits for the supporting structures, which may potentially generate dust and increase the sediment load of the drainage line; and • Potential contamination of surface water (if present) due to the use of concrete (mixing and casting of concrete for the foundations of the supporting structure of the conveyor) within close vicinity thereof. 	<p>Construction</p>	<p>Low</p>
-----------	--	--	--	---------------------	------------



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
		receptors (hydrology, water quality, geomorphology, habitat and biota) of the watercourses located within the new mining area.			
6e	Sensitive landscapes (including wetlands): Ephemeral Drainage Line	Operation of the diverted ephemeral drainage line.	<ul style="list-style-type: none"> Potential for riparian vegetation not to establish within the diversion channel causing a loss of riparian habitat and ecological services; and Erosion of the diversion channel or failure of the berm can cause sedimentation of the downstream reach of the drainage line. 	Operational	Medium
6f	Sensitive landscapes (including wetlands): wetland depression	Pan and Mining of limestone will be on a blast, load and haul back under the R31 road basis to the existing crusher south of the new mining area.	<ul style="list-style-type: none"> Blasting activities associated with the mining of limestone may contaminate surface water runoff into the watercourses. The mining of the limestone will encroach on the entire extent of the pan wetland and depression. Localised dewatering of the shallow aquifer within the open cast pit area (Schultz, 2019); This will result in a cone of depression and a decline in water levels with a subsequent loss of the hydrological head which drives the hydrological functioning of the pan wetland (year 1 to 10). The extent of the cone of depression will depend on aquifer characteristics such as abstraction rates (by the local surrounding farmers), transmissivity and the effective porosity of the subsurface. Previous studies have indicated that these properties may be substantial (Schultz, 2019). Due to the shallow groundwater table expected, the presence of water in the pan wetland may be partly due to a fluctuating water table. Seasonally, this pan wetland does provide habitat for a variety of species which rely on the presence of surface water. The associated dewatering activities and cone of depression could therefore also impact on its habitat, albeit only seasonally. 	Operational	High



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
6g	Sensitive landscapes (including wetlands): Diverted ephemeral drainage line (Note: the pan wetland and depression has been removed at this point due to the open cast mining activities)	Rehabilitation of mining footprint areas, including the backfilling of the open cast pit area, removal of stormwater management infrastructure, including the diversion of the EDL and contouring and revegetation of the new mining area to conform to the natural topography	<ul style="list-style-type: none"> • Compaction of soils due to vehicular movement as part of backfilling of the open cast pit; • Latent impacts of vegetation losses, where vegetation is failing to establish as part of the rehabilitation the new mining area and in part to allow the establishment of a new wetland in the same locality as that of the previous pan wetland; • Increased runoff volumes and formation of preferential surface flow paths as a result of compacted soils, leading to increased sedimentation and erosion. 	Decommissioning and Closure	Medium
7a	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> • Health impacts on susceptible groups⁴¹ within the town of Ulco, considering the cumulative impact of the existing mining and processing operation. 	Construction	Medium
7b	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> • Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco. 	Construction	Low

⁴¹ Susceptible groups include the elderly, infants, persons with chronic cardiopulmonary disease, -pneumonia, -influenza and -asthma.



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
7c	Air Quality	The generation of dust by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> Nuisance impact of dust on residences in Ulco, considering the cumulative impact of the existing mining and processing operation. 	Construction	Low
7d	Air Quality	The generation of dust by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities	<ul style="list-style-type: none"> Nuisance impact of dust on residences within a 10 km radius of the proposed project, outside the town of Ulco. 	Construction	Low
7e	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	<ul style="list-style-type: none"> Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation. 	Construction	Low
7f	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	<ul style="list-style-type: none"> Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco. 	Construction	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
7g	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by vegetation clearing, soil stripping, excavation, wind erosion and other construction activities.	<p>The impact on the ambient air quality, considering:</p> <ul style="list-style-type: none"> • The proposed site falls outside declared airshed priority areas, however, the Northern Cape province is concerned about particulates air pollution in the area and the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; • The Ulco cement operation is near the proposed Bergville project; • Ulco’s current mining, crushing and milling activities are major sources of dust and fine particulates (PM10 and PM2.5) and present a risk of a cumulative impact on the area; • Ulco fugitive dust management plan specifies dust suppression using water for the emissions from its unpaved roads and its crushing and milling operations are fitted with bagfilters; and • A survey conducted by Health & Occupational Hygiene Laboratory CC, found PM10 and PM2.5 to fall below their respective NAAQS. 	Construction	Medium
7h	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	<p>The impact on the ambient air quality, considering:</p> <ul style="list-style-type: none"> • The proposed site falls outside declared airshed priority areas, however, the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; • The Ulco cement operation is near the proposed Bergville project; • Ulco’s kiln is a major source of combustion gases and presents a risk of a cumulative impact on the area; and • Ulco’s kiln is fitted with an electrostatic precipitator and a bagfilter. 	Construction	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
7i	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Operational	Medium
7j	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Operational	Low
7k	Air Quality	The generation of dust by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Nuisance impact of dust on residences in Ulco, considering the cumulative impact of the existing mining and processing operation.	Operational	Medium



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
7l	Air Quality	The generation of dust by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	Nuisance impact of dust on residences within a 10 km radius of the proposed project, outside the town of Ulco.	Operational	Low
7m	Air Quality	The generation of combustion gases from blasting activities, vehicle/ equipment exhaust emissions.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Operational	Medium
7n	Air Quality	The generation of combustion gases from blasting activities, vehicle/ equipment exhaust emissions.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Operational	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
7o	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by overburden removal, blasting, drilling, material handling, material transfer, crushing, hauling, conveying and wind erosion.	<p>The impact on the ambient air quality, considering:</p> <ul style="list-style-type: none"> • The proposed site falls outside declared airshed priority areas, however the Northern Cape province is concerned about particulates air pollution in the area and the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; • The Ulco cement operation is near the proposed Bergville project; • Ulco's current mining, crushing and milling activities are major sources of dust and fine particulates (PM10 and PM2.5) and present a risk of a cumulative impact on the area; • Ulco fugitive dust management plan specifies dust suppression using water for the emissions from its unpaved roads and its crushing and milling operations are fitted with bagfilters; and • A survey conducted by Health & Occupational Hygiene Laboratory CC, found PM10 and PM2.5 to fall below their respective NAAQS. 	Operational	Medium
7p	Air Quality	The generation of combustion gases from blasting activities, vehicle/ equipment exhaust emissions.	<p>The impact on the ambient air quality, considering:</p> <ul style="list-style-type: none"> • The proposed site falls outside declared airshed priority areas, however, the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; • The Ulco cement operation is near the proposed Bergville project; • Ulco's kiln is a major source of combustion gases and presents a risk of a cumulative impact on the area; and • Ulco's kiln is fitted with an electrostatic precipitator and a bagfilter. 	Operational	Low
7q	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by wind erosion and rehabilitation activities.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Decommissioning and Closure	Medium



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
7r	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by wind erosion and rehabilitation activities.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Decommissioning and Closure	Low
7s	Air Quality	The generation of dust by wind erosion and rehabilitation activities.	Nuisance impact of dust on residences in Ulco, considering the cumulative impact of the existing mining and processing operation.	Decommissioning and Closure	Low
7t	Air Quality	The generation of dust by wind erosion and rehabilitation activities.	Nuisance impact of dust on residences within a 10 km radius of the proposed project, outside the town of Ulco.	Decommissioning and Closure	Low
7u	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	Health impacts on susceptible groups within the town of Ulco, considering the cumulative impact of the existing mining and processing operation.	Decommissioning and Closure	Low
7v	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions.	Health impacts on susceptible groups within a 10 km radius of the proposed project, outside the town of Ulco.	Decommissioning and Closure	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
7w	Air Quality	The generation of small particulates (e.g. PM10 & PM2.5) by wind erosion and rehabilitation activities.	<p>The impact on the ambient air quality, considering:</p> <ul style="list-style-type: none"> • The proposed site falls outside declared airshed priority areas, however, the Northern Cape province is concerned about particulates air pollution in the area and the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; • The Ulco cement operation is near the proposed Bergville project; • Ulco’s current mining, crushing and milling activities are major sources of dust and fine particulates (PM10 and PM2.5) and present a risk of a cumulative impact on the area; • Ulco fugitive dust management plan specifies dust suppression using water for the emissions from its unpaved roads and its crushing and milling operations are fitted with bagfilters; and • A survey conducted by Health & Occupational Hygiene Laboratory CC, found PM10 and PM2.5 to fall below their respective NAAQS. 	Decommissioning and Closure	Medium
7x	Air Quality	The generation of combustion gases from vehicle/equipment exhaust emissions during decommissioning and rehabilitation.	<p>The impact on the ambient air quality, considering:</p> <ul style="list-style-type: none"> • The proposed site falls outside declared airshed priority areas, however, the FBDM, due to the lack in monitoring data, considers the air quality in the Dikgatlong Local Municipality as poor; • The Ulco cement operation is near the proposed Bergville project; • Ulco’s kiln is a major source of combustion gases and presents a risk of a cumulative impact on the area; and • Ulco’s kiln is fitted with an electrostatic precipitator and a bagfilter. 	Decommissioning and Closure	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
8a	Noise, Blasting and Vibration	Mining operations	Noise generated by the Ulco operation emanates primarily from the fans, with intermittent noise as a result of blasting activities at the adjacent limestone quarry. Noise levels at the plant are within the limits, as specified in the SABS code, at the boundary of the plant. The Ulco Village is the closest residential area to the plant. Noise from the plant and mine is audible at night, and can be considered to be a disturbance at times, mainly as a result of the mine and train shunting. Ambient noise levels in the area surrounding the Ulco operation are generally typical of those associated with rural agricultural activities.	Construction, Operational, Decommissioning and Closure	Low
8b	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on houses	Operational	Low
8c	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on windmill	Operational	Low
8d	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on roads	Operational	Low
8e	Noise, Blasting and Vibration	Blasting operations	Ground vibration Impact on railway	Operational	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
8f	Noise, Blasting and Vibration	Blasting operations	Air blast Impact on houses	Operational	Low
8g	Noise, Blasting and Vibration	Blasting operations	Fly Rock Impact on houses	Operational	L
8h	Noise, Blasting and Vibration	Blasting operations	Fly Rock Impact on roads	Operational	Low
8i	Noise, Blasting and Vibration	Blasting operations	Fly Rock Impact on railway	Operational	Medium
8j	Noise, Blasting and Vibration	Blasting operations	Impact of Fumes - Houses	Operational	Low
9	Visual	Surface infrastructure	Due to the nature of the topography and the distance from the existing provincial road, the proposed crusher and mining activities will be visible from the provincial road.	Construction, Operational, Decommissioning and Closure	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
10a	Sites of Archaeological and Cultural Importance	Opencast mining and surface infrastructure	The general area is known to contain both Early as well as Later Stone Age sites as well as engraving sites. On the study area, no Stone Age (either Early, Middle or Later) artefacts were observed. Neither were there any engravings or other rock art observed. Furthermore, the area investigated revealed no indication of Iron Age settlement. On and around the farmyard of the property under investigation there remain some buildings and structures related to farming activities that fall under the protection of the heritage law under the 60 year rule. These include a reservoir, a well, a milking shed and several canals related to flood irrigation. The graves observed are those of two white pioneer farmers, as well as approximately 20 other graves that could not be linked to any family as they bear no engraved head stones. These are most probably the graves of labourers on the farm as well as their families. In 10 years' time as the mining progresses, these heritage remains will become an impediment and second phase studies may be undertaken and demolition applications could be made at the provincial Heritage Authorities in Kimberley. In the same way, the white pioneer graves and the other 20 labourers' graves may be treated similarly. If they do not impede the mining process they may be left in place. On the other hand, depending on the proposed mining plans, these graves may be relocated to the most suitable position.	Construction, Operational, Decommissioning and Closure	Low
10b	Sites of Archaeological and Cultural Importance (Palaeontological)	Opencast mining and surface infrastructure	The potential impact of the development on fossil heritage in the quaternary age rocks due to earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by development, vehicle traffic, mining, prospecting, and human disturbance.	Construction, Operational, Decommissioning and Closure	Low
10c	Sites of Archaeological and Cultural Importance (Palaeontological)	Opencast mining and surface infrastructure	The potential impact of the development on fossil heritage in the Ulco Formation due to earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in or destruction of the fossils by development, vehicle traffic, mining, prospecting, and human disturbance.	Construction, Operational, Decommissioning and Closure	Low



NO.	ASPECTS AFFECTED	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE IF MITIGATED
11a	Socio-economic	Temporary diversion of the R31	The Level of Service (LOS) currently experienced on the R31 is a Level of Service A, which according to the Highway Capacity Manual (HCM), produced by the Transportation Research Board, represents free-flow conditions and freedom to manoeuvre within the traffic stream. By constructing a detour as per Drawing No. 19020/CL/01 of the traffic impact study the Level of Service will not deteriorate to a lower Level of Service, ultimately ensuring road user satisfaction and efficient free-flowing traffic on the R31 past the site.	Construction	Low



Table 35: Summary of the positive environmental impacts, after mitigation

NO.	ACTIVITY	POTENTIAL IMPACT	PHASE in which impact is anticipated	SIGNIFICANCE If mitigated
Socio-Economic				
11b	Proposed project	Bergville Jobs will be retained, providing income and, therefore, having a further impact on the regional socio-economy aspects of the area, along with other benefits arising from the Social and Labour Plan.	Operational.	Positive

12. Proposed impact management objectives and the impact management outcomes for inclusion into the EMPr

Based on the assessment and where applicable the recommendations from specialist reports, the table below summarises the impact management objectives and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.

Table 36: Impact management objectives and the impact management outcomes

ENVIRONMENTAL ASPECT	OBJECTIVE	SUMMARY OF IMPACT MANAGEMENT OUTCOME
Geology	None.	Not applicable.
Topography	None.	Not applicable.
Soil	To prevent soil contamination and to conserve surface and ground water resources as well as to prevent impact on downstream water users.	Groundwater monitoring (Quarterly). Surface water monitoring (monthly).
Flora and Fauna	To prevent the proliferation and a further increase of alien and invasive grass species within disturbed areas.	Implementation of the control of Alien Invasive Vegetation Procedure.
Sensitive Landscapes (including wetlands)	To prevent deterioration of the wetlands	Wetland Monitoring every 3 years
Ground Water	To minimise the extent of disturbance of the aquifer and to limit degeneration of groundwater quality and quantity.	Water and hydrocarbon monitoring (quarterly)
Surface Water	To conserve the surface water resource and prevent impact on downstream water users.	Surface water quality monitoring (monthly).



ENVIRONMENTAL ASPECT	OBJECTIVE	SUMMARY OF IMPACT MANAGEMENT OUTCOME
Air Quality	To reduce air quality impacts from the decommissioning, construction and operational activities.	Dust fallout monitoring (monthly)
Noise	To reduce noise levels during the decommissioning activities.	Noise monitoring (annually)
Visual	To minimise the visual impact.	Rehabilitation on closure.
Sites of cultural and archaeological importance	To protect artefacts, fossil heritage or sites of cultural heritage (archaeological and historical) significance.	Comply to the NHRA (Act 25 of 1999)
Socio-Economic	Prevent socio economic impacts by employment opportunities.	Implementation of approved Social and Labour Plan.

13. Final proposed alternatives

13.1. Mining layout alternative

Both the mining layouts will have a similar environmental impact however, from a mining perspective, the preferred layout is ideal. Refer to Figure 27 indicating the preferred mine layout.

13.2. Site alternatives for the crusher

The crusher location, closer to the existing Ulco operation was considered as the preferred option.

13.3. Site alternatives for the road and conveyor crossing point

Alternative 2, located closer to the crusher location is considered the preferred location due to less climb (and associated fuel consumption and lower CO₂ emission).

13.4. Layout alternatives for the stream diversion

Stream diversion option 2 is preferred, as it avoids the topographical high point, while at the same time allowing for gentler direction changes in the diverted watercourse. In addition, this option would shorten the length of the proposed river diversion.

13.5. Design alternatives for the R31 crossing

An underpass beneath the road, created by jacking a preconstructed culvert beneath the road is the preferred option as it will avoid disruption of the R31 road during the construction phase.

13.6. Design alternatives for the proposed haul/access road stream crossing

At present, options 2 (stream crossing under the access road by means of an aqueduct structure) is preferred.



13.7. No-go option

If the project area reserves are not mined, the status quo environmental conditions within the mining right area will continue for the next few years and then the Ulco operation would potentially close due to lack of suitable raw material.

Physical and biophysical environment – Although the proposed project is expected to create significant negative environmental impacts, the proposed project, from all the specialists’ opinions, is not considered a fatal flaw to the environment should the alternatives be considered, and the mitigation measures implemented.

Socio-economic –A number of positive socio-economic impacts will arise and continue as a result of the proposed project, such as skills development, local economic development and job opportunities. As per the Social and Labour Plan, the operation (at full production) employs 232 permanent staff.

14. Aspects for inclusion as conditions of the authorisation

Should the Department of Mineral Resources grant authorisation for this project, it should be subject to the following conditions:

- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements;
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EIA and the EMPr. Such persons must be issued with a written mandate by mine management to provide guidance and instructions to employees and contractors; and
- Stakeholder engagement must be maintained during all phases of the proposed project.

15. Description of any assumptions, uncertainties and gaps in knowledge

In terms of the EIA Regulations GN R982 Appendix 1(3)(o), the Environmental Impact Assessment Practitioner (“EAP”) must provide a description of any assumptions, uncertainties and gaps in knowledge upon which the impact assessment has been based. The table below provides the assumptions and limitations applicable to the various specialist assessments.

Table 37:Specialist assumptions and limitations

SPECIALIST	ASSUMPTIONS AND LIMITATIONS
Air Quality Impact Assessment	<ul style="list-style-type: none"> ▪ Where available, design specifications and operating conditions were provided by Ulco; ▪ The air quality impact assessment focused on the emissions of dust and particulates (particularly PM10) and considered the combustion emissions (from blasting, vehicles and heavy equipment), qualitatively;



SPECIALIST	ASSUMPTIONS AND LIMITATIONS
	<ul style="list-style-type: none"> ▪ Due to its temporary nature, the construction phase was assessed qualitatively; ▪ Due to the closure phase not being anticipated in the near future and the limited information on this phase, it was assessed qualitatively; ▪ The quantification of emissions was limited to the scope of the project, which was to assess the emissions from the proposed Bergville project; ▪ The emission inventory and dispersion models were set up to reflect a routine operational day for two scenarios: ▪ Scenario A, simulates the dust and PM10 where limestone is hauled to the crusher at Ulco’s existing cement operation; and ▪ Scenario B, simulates the dust and PM10 where limestone is crushed at the proposed Bergville project and conveyed to the Ulco’s existing cement operation for further processing. ▪ Both scenarios simulate the dispersion of uncontrolled dust and PM10 emissions; ▪ The dispersion models for the two scenarios were run from the planned starting point of the proposed project. It is expected that the risks discussed in section 3.5 will remain the same as the mine progresses from east to west; ▪ The overburden and limestone in-situ moisture and silt contents were not available during the time of this assessment; ▪ The emission inventory was developed using default emission factors for TSP and PM10, taken from the Australian Government’s National Pollutant Inventory Emission Estimation Technique Manual for Mining and Processing of Non-Metallic 1999. The emission factors used may exaggerate and overestimate emissions under assumed worst case scenarios. The emission estimates together with their model output results should, therefore, only be used as guides in determining high risk areas. ▪ Due to its relatively small contribution and the modelling complexity it poses, wind erosion and blasting were excluded from the dispersion models. These sources are, however, included in the emission inventory and considered in the risk assessment; ▪ The existing Ulco mining operation was identified as a significant background source; and ▪ The tonnes mined and cement produced at Ulco cement operation and factory will remain the same regardless of the addition of the proposed Bergville project.
Blasting and Vibration study	<ul style="list-style-type: none"> ▪ The project is evaluated as a new operation with no blasting activities currently being done in the section for application. ▪ Blasting is conducted in the existing pit areas (not part of the application). The existing and planned new areas are 200 m apart and information measured in the existing operation is considered applicable to the new section. ▪ The anticipated levels of influence estimated in this report are calculated using standard accepted methodology according to international and local regulations. ▪ The assumption is made that the predictions are a good estimate with significant safety factors to ensure that expected levels are based on



SPECIALIST	ASSUMPTIONS AND LIMITATIONS
	<p>worst case scenarios. These will have to be confirmed with actual measurements once the operation is active.</p> <ul style="list-style-type: none"> ▪ Blast Management & Consulting was not involved in the blast design. The information on blast design applied was provided by the client. ▪ The work done is based on the author’s knowledge and information provided by the project applicant. ▪ The following needs to be considered during the evaluation of the application. This report covers the full extent of the mining area. There are however areas identified within this area that will be mined first and will be done so for a long period of time prior to mining the full extent. Figure 2 above shows a 1 year, 5 year and 10 mine plans. These areas are significantly smaller than the application area and further away from any structure and installation considered in this report. The extent of this report is considered a worst-case scenario for the full extent of the application area.
<p>Biodiversity Assessment</p>	<ul style="list-style-type: none"> ▪ The ecological assessment is confined to the study area and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment. In addition, through the use of satellite imagery and brief visual assessments the neighbouring properties appeared to be in similar condition to that of the study area. As such the data obtained from the assessment of the study area can be used to infer the ecological conditions of the adjacent properties; ▪ With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral and faunal communities have been accurately assessed and considered; ▪ Due to the nature and habits of most faunal taxa, the high level of surrounding anthropogenic activities and the time (season) of the assessment, it is unlikely that all species would have been observed during a field assessment of limited duration. Therefore, site observations were compared with literature studies where necessary; ▪ Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the study area may have been missed during the assessment; ▪ The project experienced mapping constraints since the final extent of the open pit for the post 10-year mine plan is uncertain. All maps have been developed indicating the mine plan up to the 10-year plan. Thus, all maps must be considered with caution since the extent of the post 10 year mine plan must be inferred by the reader; and ▪ The data presented in this report are based on a two-day site visit, undertaken in the end of November 2017 (early summer). A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was significantly augmented with all available desktop data and previous experience in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the study area.
<p>Stormwater Management plan</p>	<ul style="list-style-type: none"> ▪ Whilst every endeavour has been made by Shangoni to ensure that information provided is correct and relevant, this technical report is, of necessity, based on information that could reasonably have been



SPECIALIST	ASSUMPTIONS AND LIMITATIONS
	<p>sourced within the time period allocated to the assessment, and is, furthermore, of necessity, dependent on information provided by management and/or its representatives during the course of the project.</p> <ul style="list-style-type: none"> ▪ It is assumed that the Client provided all information to Shangoni that is relevant to the scope of work included in this technical report and that no important information has been withheld. ▪ The relevant information received from the Client during the course of this project will be deemed true and correct. If such information reflected in any documentation relevant to this project is discovered to be misleading, Shangoni does not take any responsibility for the implications of such misrepresentations made by the Client. ▪ Flood peak calculations assume rainfall intensity is uniform throughout the duration of the storm. Analysis does not account for runoff retention or artificial acceleration within the catchment. ▪ Calculations are done for complete catchment areas and should be distributed where there is more than one drainage point within the same built up catchment. ▪ Storm water control recommendations are based on industry experience and best practice. Final designs for construction should be authorised by an approved engineer. ▪ Contour and elevation data as provided during the analysis are assumed to be accurate and representative of the site and catchment areas. ▪ Upstream catchment activities are interpreted according to common practices and no detailed insight is available on possible storm water measures beyond the site. The assessment does not guarantee the integrity of downstream infrastructure in the event of release or discharge from site. ▪ The measures proposed as part of the storm water management section of the report do not impose preference as this is an operational document to assist in the complete management of clean and dirty surface water in the vicinity of the operation. ▪ The measures proposed in the storm water management plan section of the report do not specifically cover considerations relevant to storm water management for the purpose of safety, like mine flooding and loss of life, the primary focus being environmental management and the identification of potential environmental concerns. ▪ Recommendations represented in this report apply to the site conditions and features as they existed at the time of Shangoni's investigations, and those reasonable foreseeable. The recommendations do not necessarily apply to conditions and features that may arise after the date of this storm water management plan, for which Shangoni had no prior knowledge nor had the opportunity to evaluate
<p>Wetland study for the Bergville project</p>	<ul style="list-style-type: none"> ▪ The determination of the watercourse boundary and the assessment thereof for this study, is confined to the new mining area. However, a broader freshwater ecological study was undertaken by SAS in 2018 as part of the assessment of the entire mining right area to establish baseline assessments for the identified watercourses. As such, all watercourses identified within 500m of the new mining area (i.e. the investigation area) were delineated in fulfilment of GN509 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) using desktop



SPECIALIST	ASSUMPTIONS AND LIMITATIONS
	<p>methods, however these resources were not assessed individually in this report, but an assessment thereof is provided in the freshwater assessment report by SAS (2018);</p> <ul style="list-style-type: none"> ▪ The watercourse delineation as presented in this report is regarded as a best estimate of the temporary zone boundary, based on the site conditions present at the time of assessment. Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required the wetland will need to be surveyed and pegged according to surveying principles and with surveying equipment; ▪ Wetland, riparian and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the watercourse boundary may occur. However, if the DWAF (2008) method is followed, all assessors should obtain largely similar results; ▪ The project experienced mapping constraints since the final extent of the open pit for the post 10-year mine plan is uncertain. All maps have been developed indicating the mine plan up to the 10-year plan. Thus all maps must be considered with caution since the extent of the post Year 10 mine plan must be inferred by the reader; and ▪ With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. However, it is expected that the proposed development activities have been accurately assessed and considered, based on the field observations and the consideration of existing studies and monitoring data in terms of riparian and wetland ecology.

16. Reasoned opinion as to whether the proposed activity should or should not be authorised

16.1. Reasons why the activity should be authorised or not

In accordance with the EIA Regulations GN R982, the Environmental Impact Assessment Practitioner (“EAP”) must provide an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation must be stated.

The impact assessment undertaken for the proposed activities considered both the biophysical and socio-economic environments. The assessment of the biophysical environment revealed that there are significant negative impacts, but no environmental fatal flaws associated with the project should mitigation and management measures be implemented. The proposed activities will have positive impacts on the socio-economic environment in the form of additional job opportunities and skills development.



In terms of collectively considering ecological, social and economic impacts it is important to remember that while there might be some trade-offs between the considerations, in South Africa all development must in terms of Section 24 of the Constitution be ecologically sustainable, while economic and social development must be justifiable. There are, therefore, specific "trade-off" rules that apply. Environmental integrity may never be compromised, and the social and economic development must take a certain form and meet certain specific objectives in order for it to be considered justifiable.⁴²

Although the proposed project is expected to create significant negative environmental impacts, the proposed project, from all the specialists' opinions, is not considered a fatal flaw to the environment should the alternatives be considered, and the mitigation measures implemented. In terms of collectively considering ecological, social and economic impacts, approving the proposed project can be justified from a mine operational perspective also considering the economic and social benefit, and the EAP is of opinion that this project should be authorised.

16.2. Conditions that must be included in the authorisation

16.2.1 Specific conditions to be included into the compilation and approval of the EMPr

Should the Department of Mineral Resources grant authorisation for this project, it should be subject to the following conditions:

- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements;
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EIA and the EMPr. Such persons must be issued with a written mandate by mine management to provide guidance and instructions to employees and contractors; and
- Stakeholder engagement must be maintained during all phases of the proposed project.

17. Period for which Environmental Authorisation is required

The Ulco operation has a life of mine of approximately 5 years within its current mining area and the current Mining Right has ±20 years left. Therefore, the period for which environmental authorisation is required is at least 20 years (from the date of approval provided by the DMR), to include for construction and decommissioning activities.

⁴² Guideline on need and desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (GN 891 of 20 October 2014)



18. Undertaking

The undertaking by the EAP is provided in Section 2 of Part B (Environmental Management Programme) below. This undertaking confirms: the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&APs, the inclusion of inputs and recommendations from the specialist reports where relevant and the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

19. Financial Provisions

19.1. Explain how the aforesaid amount was derived.

The financial provision calculation was calculated making use of the Department of Minerals and Resources (“DMR”) guideline document for financial provision. The guideline document dated January 2005 was utilised. The 2018 financial provision was updated to include for the proposed Bergville Project. Making use of the DMR guideline document for calculating a financial provision, the 2019 financial provision requirements for Ulco Cement Plant was calculated at R 71 371 797.25. The process of evaluating the financial provision requirements must be reassessed in 2020.

19.2. Confirm that this amount can be provided for from operating expenditure

Financial provision will be provided by means of both an allocation within the AfriSam Trust Fund and through provision of a bank guarantee.

20. Deviations from the approved scoping report and plan of study

No deviations from the approved scoping report and plan of study have been undertaken.

21. Other information required by the competent authority

On the acceptance of the final Scoping Report the competent authority requested for specific information. Refer to Annexure C3 for a copy of the letter and response.



21.1. Compliance with the provisions of section 24(4)(a) and (b) read with section 24(3)(a) and (7) of the National Environmental Management Act 107 of 1998. The EIA report must include the

21.1.1 Impact on the socio-economic conditions of any directly affected person

Results of investigation, assessment and evaluation of impact on any directly affected person	Reference to where mitigation is reflected
<p>As per the Social and Labour Plan, during the Life of Mine, Ulco Operation aims:</p> <ul style="list-style-type: none"> ▪ To promote employment and advance the social and economic welfare of all employees and uplift all stakeholders within the communities in which we operate; ▪ To contribute to the transformation of our industry; and ▪ To ensure that the holders of mining rights contribute to the socio-economic development of the communities in which they operate, including major labour sending areas. 	<p>Refer to Part A Section 7.5</p>

22.1.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act 25 of 1999

Results of investigation, assessment and evaluation of impact on any directly affected person	Reference to where mitigation is reflected
<p>No impact on national estate in terms of the Heritage Resources Act (Act 25 of 1999), are identified as part of the project..</p>	<p>Refer to Part A Section 7.5</p>

22. Other matters required in terms of section 24(4) (a) and (b) of the Act

An impact assessment for the proposed project has been undertaken and include consultation with and participation of interested and affected parties. Applying the hierarchical approach to impact management was firstly considered to avoid negative impacts, but where avoidance was not possible, to better mitigate and manage negative impacts. Where impacts were found to be potentially significant, various mitigation measures to manage and monitor the impacts of the project have been proposed. Furthermore, the environmental impact statement (Part A Section 11) summarises the key findings of the environmental impact assessment and negative implications of the project.



PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1. Draft environmental management programme

1.1. Details of the EAP

The requirements for the provision of the detail and expertise of the EAP are included in Part A, Section 1.2.

1.2. Description of the aspects of the activity

The requirement to describe the aspects of the activity that are covered by the draft environmental management programme is included in Part A, Section 7.5

1.3. Composite map

Refer to Figure 63 above as well as Annexure A for a map that superimposes the proposed activity, its associated structures and infrastructures on the environmental sensitivities of the preferred sites.

1.4. Description of impact management objectives including management statements

1.4.1 Determination of closure objectives

The Ulco operation has a life of mine of approximately 5 years within its current mining environment. This life of mine can be extended through the implementation of mining activities to the north of the R31. Hence there could potentially be limestone reserves to sustain Ulco for over 100 years. Due to the long life of mine remaining, no detailed closure planning has been completed. Before mining took place, the land was suitable for low intensity grazing. Due to the rural location of the site, much of the surrounding land is undisturbed and represents what Ulco would have looked like if it were not for the mining operation.

Ulco will close the mine whereby all infrastructure and basic services that have been developed by the mine, which will continue to be of benefit to the local / provincial community after the mine has closed, will be left. All buildings / infrastructures that have been determined as having no socio-economic benefit after the life of the mine will be demolished and the rubble buried in old excavations within the mining area.

The aim for all disturbed land created as a result of the Ulco operations will be to rehabilitate the land back to a state to where it blends in with the surrounding land (grazing land) and is acceptable to all relevant interested and affected parties.



1.4.2 The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity.

The potential impacts that may result from the proposed Bergville Project have been presented in Part A Section 7.5. The impacts were identified through the input from various specialists and their resultant specialist report (attached hereto in Annexure D). The impacts were identified, described, assessed and their significance ranked. Mitigation measures were then put forward to prevent these impacts from occurring, and where they could not be prevented, mitigation measures were put forward to minimise, remedy and / or avoid the impacts.

1.4.3 Potential risk of Acid Mine Drainage

Because of the highly alkaline nature of the limestones, this material does not possess any acid potential and will not have an acidic impact on ambient water quality.

1.4.4 Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Refer to Section 1.4.3 above.

1.4.5 Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Refer to Section 1.4.3 above.

1.4.6 Measures that will be put in place to remedy any residual or cumulative impacts that may result from acid mine drainage

Refer to Section 1.4.3 above.

1.4.7 Volumes and rate of water use required for the mining, trenching or bulk sampling operation

At their present quarry, Ulco abstracts groundwater from a shallow (19 m) dewatering borehole to lower the groundwater table to allow mining to continue. This borehole is located on the north-western perimeter of the quarry and during the 2014 and 2015 mining periods, dewatering volumes recorded were 67 169 m³/a (2.16 l/s) and 144 760 m³/a (3.69 l/s) but decreased drastically to 771 m³/a (0.25 l/s) and 2551 m³/a (0.08 l/s) during 2016 and 2017. This decrease is possibly related to cavity dewatering as a result of drought conditions. A series of dewatering boreholes of between 20 and 30 m are proposed to be drilled on the northern boundary of the proposed pit. Whether these cavities are currently filled given the drought conditions are unknown, but abstraction volumes could range between 2 and 10 l/s.



1.4.8 Has a water use licence been applied for

A Water Use Licence Application (“WULA”) for water use activities associated with the proposed Bergville Project has been applied for by Shangoni as part of the project. The WULA includes the following:

Table 38: Water Use activities applied for as part of the proposed Bergville project

Water Use	Activity/Facility	Farm Name	Commencement Date of Water Activity	Comments
Section 21(a): taking water from a water resource				
Section 21(a): taking water from a water resource	Dewatering of the proposed quarry	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop	Proposed 2020	Registration required License required
	Abstraction boreholes	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop		
Section 21 (b): Storing water				
Section 21 (b): Storing water	Potable water storage tank	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop	Proposed 2020	Registration required License required
Section 21 (c): impeding or diverting the flow of water in a watercourse; and Section 21 (i): altering the bed, banks, course or characteristics of a watercourse.				
Section 21 (c): impeding or diverting the flow of water in a watercourse; and Section 21 (i): altering the bed, banks, course or characteristics	Opencast mining of a pan and associated episodic drainage lines	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop	Proposed 2020	Registration required License required
	Topsoil, product and mine residue stockpiles within 500 m of a watercourse	Portion 3 (Bergville) of the Farm Hondefontein 216		



Water Use	Activity/Facility	Farm Name	Commencement Date of Water Activity	Comments
of a watercourse.		Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop		
	Diversion of a drainage line	Portion 3 (Bergville) of the Farm Hondefontein 216 a Portion of Erven 4 Delportshoop		
	Conveyor	Portion 3 (Bergville) of the Farm Hondefontein 216		
	Crusher complex	Portion 3 (Bergville) of the Farm Hondefontein 216		
	Roads and Tunnel	Portion 3 (Bergville) of the Farm Hondefontein 216		
	Septic tank/Conservancy tank	Portion 3 (Bergville) of the Farm Hondefontein 216		
	Dewatering pipeline	Portion 3 (Bergville) of the Farm Hondefontein 216		
	Rolling sump	Portion 3 (Bergville) of the Farm Hondefontein 216 a Portion of Erven 4 Delportshoop		
	Storm water management (including berms and trenches).	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop		
	Abstraction pipeline	Portion 3 (Bergville) of the Farm Hondefontein 216 a Portion of Erven 4 Delportshoop		

Section 21(f) – Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit



Water Use	Activity/Facility	Farm Name	Commencement Date of Water Activity	Comments
Section 21(f) – Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit	Dewatering of the proposed quarry (groundwater abstraction) and discharge into river diversion or existing artificial wetlands.	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop	Proposed 2020	Registration required License required
Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource				
Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource	Product stockpile	Portion 3 (Bergville) of the Farm Hondefontein 216 Portion 2 of the Farm Vogelfontein 176 a Portion of Erven 4 Delportshoop	Proposed 2020	Registration required License required
	Dust suppression			
	Mine Residue stockpile			
	Backfilling/rehabilitation			
	Septic tank/Conservancy tank			
Rolling sump				



1.4.9 Impacts to be mitigated in their respective phases

Table 39: Measures to rehabilitate the environment affected by the undertaking of any listed activity

NO	ENVIRONMENTAL COMPONENT	ACTIVITY	PHASE IN WHICH IMPACT IS ANTICIPATED	SIZE AND SCALE OF DISTURBANCE	MITIGATION MEASURES	COMPLIANCE STANDARDS	WITH	TIME PERIOD FOR IMPLEMENTATION
----	-------------------------	----------	--------------------------------------	-------------------------------	---------------------	----------------------	------	--------------------------------

Refer to the consolidated tables in Part A, Section 7.5

1.5. Impact management outcomes

Table 40: Impact management outcomes, identifying the stand of impact management required for the identified aspects

NO	ASPECTS AFFECTED	ACTIVITY	IMPACT DESCRIPTION	PHASE	MITIGATION TYPE	STANDARDS TO BE ACHIEVED
----	------------------	----------	--------------------	-------	-----------------	--------------------------

Refer to the consolidated tables in Part A, Section 7.5

1.6. Impact management actions

Table 41: Impact management actions, identifying the manner in which the impact management objectives and outcomes will be achieved.

NO	ASPECTS AFFECTED	ACTIVITY	IMPACT DESCRIPTION	MITIGATION TYPE	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
----	------------------	----------	--------------------	-----------------	---------------------------	--------------------------------

Refer to the consolidated tables in Part A, Section 7.5



1.7. Closure Objectives

This overall closure of Ulco mining operation will be achieved by implementing the following general closure objectives:

- Removing all buildings that have no socio-economic use after the life of the mine. During the life of the mine, all decommissioned mine buildings will be removed. Until they are removed, the cost of such removal will be catered for within the financial provisions, for the mine. Buildings will be stripped of salvageable material then demolished, and the rubble will be buried within depressions within the mining area, such as the old quarry and the subsided area. All concrete foundations will be broken up and buried under at least 500mm of overburden / topsoil.
- All buildings that have been identified as having socio-economic benefit will be left in accordance to Section 44 of the Minerals and Petroleum Resources Development Act. This includes all the buildings and infrastructure which constitutes the Ulco village and all staff houses. The services which support the village will also be retained. This includes a sewage works, potable water purifying plant and reticulation system, roads, shops, schools, clinics, sports facilities, airstrip and electrical sub stations.
- Sloping of final benches within the quarries will firstly consider safety risks. After satisfying the safety risk, consideration will be given to a number of other factors that include:
 - Aesthetics & creating habitats for fauna and flora.
 - Resembling the natural topography of the greater area giving specific consideration the Ghaap fault.
 - Indigenous grass and trees will be planted in all disturbed areas. A limiting factor for encouraging grass to grow over the disturbed area is the lack of topsoil. Recent experiments at the Harrison area have proved it possible to grow grass by contouring with foliage without any additional topsoil.
 - Erosion will be managed by establishing drainage channels.
 - All alien vegetation will be removed on site and a management plan will be implemented to ensure the continued eradication of alien vegetation.
- The socio-economic impacts of mine closure will be dealt with in the social and labour plan for the mine. As the mine draws closer to closure, emphasis will be placed on the following socio-economic initiatives:
 - Training and multi-skilling workforce.
 - Where possible, relocating employees to other AfriSam operations.
 - Working with local authorities to promote alternative job creation schemes.
 - Providing advice on alternative professions.
 - Setting up financial assistance for sustainable projects.



1.8. Mechanisms for monitoring compliance with and performance assessments against the environmental management programme

The aim of environmental monitoring and auditing is to develop a cost-effective approach to monitoring the operations' environmental performance. Certain parameters (e.g. water quality) can be monitored through measurements, others can only be monitored through observation (e.g. maintenance effectiveness). However, in all cases anticipation of environmental problems through assessment of the environmental impact of the operations' working methods, followed by forward planning to prevent problems or at least limit their effects, is seen as the key to successful environmental management.

1.8.1 Monitoring Protocols and Minimum Requirements

Each monitoring network will be structured to identify problems and measure the success or effectiveness of management measures. In order to achieve this, monitoring protocols must be developed, for all monitoring networks (by the service provider undertaking the monitoring). These monitoring protocols must provide the following information:

- Objectives of the monitoring programme.
- Reference to the legislation which governs the need for the specific monitoring campaign.
- Specific location of monitoring points (GPS co-ordinates), a map illustrating the location of the sampling points relative to mine infrastructure and pollution sources. This must be accompanied by the motivation for the site selections.
- Method of monitoring.
- Frequency of monitoring – supported to reference to SANS where possible.
- List of parameters to monitor for and the reason why these parameters have been selected. I.e. linked to pollution sources at the mine.
- What guidelines and / or standards will be used as performance indicators. The reason(s) for using these standards or guidelines. This is particularly important for water sample analysis as the guidelines used as indicators will vary depending on a number of site-specific factors.
- Details concerning how the results will be presented. The presentation of the results must be in a manner that easily indicates when guidelines have been exceeded. The results must be presented in such a way that trends can be established and monitored. Historic results should be presented at the same time as presenting new results
- How the results will be used to provide guidance to the mine. An explanation as to how exceedance of standards or guidelines will be highlighted and how the probable cause for the exceedance will be identified. A commitment to presenting guidance regarding what action to be taken in the event of the appropriate standards or guidelines being exceeded.
- Where the results will be stored.
- In the event of a major breach of environmental legislation and permit conditions as determined by the monitoring results, a report will be submitted to the relevant authorities in writing within the required days as per the relevant legislation or permit, informing them of:



- Details of the incident.
- Corrective action plan.
- Time frame/schedule for implementation of corrective action.

Guidance for some of the monitoring protocols is provided below.

Table 42: Guidance on some of the monitoring requirements at Ulco

DUST FALLOUT MONITORING	
Applicable Legislation:	<ul style="list-style-type: none"> ▪ National Environmental Management: Air Quality Act, Act No. 39 of 2004 (NEM:AQA), particularly Section 12. ▪ South African National Standard – SANS 1929.
Parameters:	<ul style="list-style-type: none"> • Dust Fallout
Monitoring Method:	<p>Single or directional fallout monitors, following the American Society for Testing and Materials standard method for collection and analysis of dust fall (ASTM D1739). An open topped cylinder (bucket) not less than 150mm in diameter with a height not less than twice the diameter and suspended 2m above the ground (<i>fixed point monitoring</i>). The bucket must be half-filled with de-ionised water and treated with an inorganic biocide to prevent algal growth, and exposed for a <i>continuous</i> period of 30 days (± 2 days). The water is returned to the laboratory, filtered and the residue dried before the insoluble dust is weighed. Results are expressed as mg/m²/day.</p>
Site Selection Parameters:	<p>Monitoring sites should be located within 2km of the mining area (background sites can be further away) and must consider:</p> <ul style="list-style-type: none"> ▪ <i>Wind direction</i>: Monitoring stations should be located downwind of the mining site. (Ensure monitoring point recording dust fallout downwind of all prominent wind directions.) ▪ <i>Receptors</i>: Monitoring points must be located at all sensitive receptors (residential area, schools, ecologically sensitive habitats, etc.) within 2km of the mine. ▪ <i>Other sources of pollution in the vicinity</i>: If the mining site is located downwind of another dust source, locate a directional unit between the mining site and the off-site source.
Monitoring Interval:	<ul style="list-style-type: none"> ▪ <i>Monthly (ongoing)</i>: Sampler should be exposed for a continuous period of 30 days (± 2 days), results expressed as mg/m²/day.
Performance Indicators:	<ul style="list-style-type: none"> ▪ SANS 1929 and the dust control regulations. ▪ Previous monitoring results.
Reporting:	<p>It is advisable to store all results in a spreadsheet and project the results graphically in order to determine:</p> <ul style="list-style-type: none"> ▪ Exceedances of the SANS, which should be presented on the graphs. ▪ Trends with previously monitored results.
Environmental Management:	<p>When exceedances of performance indicators are recorded, the following steps must be taken and documented:</p> <ul style="list-style-type: none"> ▪ Determine the source of the pollution and prevailing winds.



	<ul style="list-style-type: none"> ▪ If pollution is from the mine, determine if it is as a result of a once off incident or a routine event. ▪ Determine how the incident / event can be prevented, or how it can be managed in future. Implement appropriate mitigation measures. ▪ The success of mitigation must be confirmed through continued routine monthly sampling. ▪ If pollution continues after two months of monitoring, alternative preventative / mitigation measures must be implemented. The success must once again be confirmed through the routine monthly monitoring.
NOISE MONITORING	
Applicable Legislation:	<ul style="list-style-type: none"> ▪ Regulation 154 (Regulations regarding Noise Control) of the Environment and Conservation Act, Act No. 73 of 1989 (ECA). ▪ South African National Standard – SANS 10103 (Previously SABS 0103.).
Parameters:	Noise must be measured in “ <i>dBA</i> ”.
Monitoring Method:	<p>Outdoor monitoring must be undertaken by placing the microphone of an integrating impulse sound level meter</p> <ul style="list-style-type: none"> ▪ At least 1.2m, but not more than 1.4m, above the ground and ▪ At least 3.5m away from walls, buildings or other sound reflecting surfaces. <p>The person taking the measurements must ensure:</p> <ul style="list-style-type: none"> ▪ The microphone of an integrating impulse sound level meter is at all times provided with a windshield; ▪ The measuring instruments are operated strictly in accordance with the manufacturer’s instructions; and ▪ Sound measuring instruments are checked annually by the SABS or a calibration laboratory approved by the Minister in order to ensure accuracy.
Monitoring Interval:	Every 2 years, unless there is a complaint. If there is a complaint a survey must be commissioned to qualify the complaint.
Performance Indicators:	<ul style="list-style-type: none"> ▪ SANS 10103. ▪ Previously monitoring results.
Reporting:	<p>It is advisable to store all results in a spreadsheet and project the results graphically in order to determine:</p> <ul style="list-style-type: none"> ▪ Exceedances of the SANS, which should be presented on the graphs. ▪ Trends with previously monitored results.



<p>Environmental Management:</p>	<p>When exceedances of performance indicators are recorded, the following steps must be taken and documented:</p> <p>Determine the source of elevated noise levels.</p> <p>If increased noise levels are from the mine, determine if this is as a result of a once off incident or a routine event.</p> <ul style="list-style-type: none"> ▪ Determine how the incident / event can be prevented, or how it can be managed in future. Implement appropriate mitigation measures. ▪ The success of mitigation measures must be confirmed through continued routine monthly sampling. ▪ If elevated noise continues after two months of monitoring, alternative preventative / mitigation measures must be implemented. The success must once again be confirmed through the routine monthly monitoring.
<p>WATER QUALITY MONITORING</p>	
<p>Applicable Legislation:</p>	<ul style="list-style-type: none"> ▪ National Water Act, Act No. 36 of 1998. ▪ GN704
<p>Parameters (guideline):</p>	<p>The monitoring parameters will be selected based on the following factors:</p> <ul style="list-style-type: none"> ▪ <i>Pollution sources on-site:</i> i.e. coal stockpile or waste sites ▪ <i>Type of mineral being mined:</i> Exposing sub-surface rock may result in chemical reactions that will change the water quality of run-off. ▪ <i>Authority requirements:</i> i.e. The DWA regional office and / or the catchment management agency (CMA). ▪ <i>Downstream receptors / users:</i> Use quality requirements of downstream receptors / users in order to determine compliance.
<p>Monitoring Method:</p>	<p>The following must be ensured when undertaking sample collection:</p> <ul style="list-style-type: none"> ▪ <i>Containers:</i> Samples for chemical analysis must be collected in clean bottles, preferably provided by the laboratory. Samples for biological analysis must be collected in sterile bottles. ▪ <i>Location of sampling point:</i> Always collect from the same point. ▪ <i>Sampler:</i> Sampling should be undertaken by the same two people to minimise variation in collection points and collection methods. ▪ <i>Location of sample collection:</i> Water courses samples must be taken from the centre of the water course. Water body samples must be taken from at least 2m away from the edge of the water body. ▪ <i>Collection:</i> Rinse bottles and lids three times with water being collected. Ensure sufficient volume (for analysis) is collected. ▪ <i>Time of sample collection:</i> Collect samples on the same day of the week and at approximately the same time of day. ▪ <i>Storage:</i> Samples must not be stored for longer than 24 hours and must be stored in a cool dark place.



Site Selection (guideline):	<p>The following must be considered when making the site selections:</p> <ul style="list-style-type: none"> ▪ <i>Point of entry.</i> Samples must be taken from the watercourse as it enters the mining site to obtain baseline data. ▪ <i>Pollution / Discharge points.</i> Samples must be taken downstream of the point where water and / or effluents are discharged into the watercourse to determine if the mine is polluting the water course. ▪ <i>Point of exit.</i> Samples from the watercourse where it exits the mining site will determine if the mine has cause pollution of the water. ▪ <i>“Standing” water.</i> Samples from standing water within the mining area.
Monitoring Interval:	<ul style="list-style-type: none"> ▪ <i>Various</i>
Performance Indicators:	<ul style="list-style-type: none"> ▪ South African Water Quality Guidelines published by DWA. ▪ Previous monitoring results.
Reporting:	<p>It is advisable to store all results in a spreadsheet and project the results graphically in order to determine:</p> <ul style="list-style-type: none"> ▪ Exceedances of the DWA guidelines (presented on the graphs). ▪ Trends with previously monitored results.
Environmental Management:	<p>When exceedances of performance indicators are recorded, the following steps must be taken and documented:</p> <ul style="list-style-type: none"> ▪ Determine if the source of the pollution is as a result of mining activities. ▪ Determine if this is a once off incident or as a result of routine events. ▪ Through consultation with DWA, determine how the incident can be prevented / managed in future and appropriate mitigation measures (BATNEEC) must be implemented. ▪ The success of mitigation measures must be confirmed through monthly sampling or an interval stipulated by DWA. ▪ If it is observed that pollution continues after two months of monitoring, alternative preventative / mitigation measures must be implemented after consultation with DWA. Confirm success of management measures through the routine monitoring.

WATER CONSUMPTION

Applicable Legislation:	<ul style="list-style-type: none"> ▪ National Water Act, Act No. 36 of 1998.
Parameters:	<p>The mine must record the volume of water (potable and process water) being used throughout the operation.</p>
Monitoring Method:	<ul style="list-style-type: none"> ▪ <i>Flow meters.</i> A series of flow meters across the operation that must be calibrated annually.
Site Selection:	<p>Site selection based on:</p> <ul style="list-style-type: none"> ▪ <i>Source / Holding tank.</i> It is necessary to know the total volume of water from which all extraction is undertaken. ▪ <i>Extraction points.</i> Points throughout the water reticulation system where water is taken off / used.



Monitoring Interval:	<ul style="list-style-type: none"> At a minimum, monitoring must be undertaken <i>monthly</i>, however, it is advisable to record consumption <i>weekly</i>.
Performance Indicators:	<ul style="list-style-type: none"> Permit allocations. Previous consumption figures. Internal consumption targets.
Reporting:	It is advisable to store water consumption monitoring results in a spreadsheet and project the results graphically in order to determine exceedances of permit conditions, areas of “excessive use” and variations compared with previous results. As variations, can also be linked to changes in the operation / changes in production, it is important to compare consumption figures with production rates - ℓ per ton produced.
Environmental Management:	When extreme variations in consumption figures are identified, these figures must be compared with operational activities that took place during that period in order to determine if this is the reason for the increase, or if there is a problem.

BLASTING VIBRATION AND BLAST NOISE MONITORING

Applicable Legislation:	<ul style="list-style-type: none"> International Standards Organisation – ISO/CD 1996-1. South African National Standard – SANS 10103.
Parameters:	<ul style="list-style-type: none"> Noise Air blast Ground vibrations.
Monitoring Method:	<ul style="list-style-type: none"> <i>Noise and Airblast.</i> Measures with a microphone and analysed with equipment recording the entire frequency range of infra- and audible sound. <i>Ground vibration.</i> Measured and analysed with seismographic transducers and equipment.
Site Selection:	<p>Site selection based on:</p> <ul style="list-style-type: none"> <i>Receptors.</i> Monitoring will be required where more sensitive receptors are located on neighbouring land. <i>Distance from blast.</i> As the impact of blasting varies with distance (due to the type of material being blasted, the size of the blast, the blasting technique), the contractors undertaking the blasting and / or monitoring must advise when selecting monitoring points.
Monitoring Interval:	<p>Intervals for monitoring will vary from site to site, depending on the frequency of blasting and variations in each blast. On average, monitoring should be undertaken as follows:</p> <ul style="list-style-type: none"> Monitoring must be undertaken during <i>every blast</i>. If consistent results are recorded over a 6 month period, monitoring can be reduced to <i>annually</i>.
Performance Indicators:	<p>South Africa does not have industry standards and norms, therefore, use is made of:</p> <ul style="list-style-type: none"> The United States Bureau of Mines (USBM).



	<ul style="list-style-type: none"> Where the mine is located adjacent informal housing, reference must also be made to the DIN standards.
Reporting:	<p>It is advisable to store all results in a spreadsheet and project the results graphically in order to determine</p> <ul style="list-style-type: none"> Exceedances of the industry standards and norms, which should be presented on the graphs. Variations from previous results.
Environmental Management:	<p>If exceedances of the performance indicators are recorded, the following steps must be taken and documented:</p> <ul style="list-style-type: none"> Determine the reason for the unacceptable levels and ensure that this does not happen in subsequent blasts. Inspect the houses on inspection list. If there is structural damage to these houses, an inventory must be made of all houses affected by the blast. Proposed corrective action must be discussed with those impacted.

ELECTRICITY CONSUMPTION

Applicable Legislation:	<ul style="list-style-type: none"> None.
Parameters:	The mine must record the units of electricity used.
Monitoring Method:	<ul style="list-style-type: none"> <i>Meter readings.</i>
Site Selection:	<p>Site selection based on:</p> <ul style="list-style-type: none"> <i>Source.</i> It is necessary to know the total electricity consumption in order to evaluate operational consumption. <i>Extraction points.</i> Used to determine the percentage consumption.
Monitoring Interval:	<ul style="list-style-type: none"> At a minimum, monitoring must be undertaken <i>monthly</i>, however, it is advisable to record consumption <i>weekly</i>.
Performance Indicators:	<ul style="list-style-type: none"> Previous consumption figures. Internal consumption targets.
Reporting:	It is advisable to store electricity consumption monitoring results in a spreadsheet and project the results graphically in order to determine areas of
	“excessive use” and variations compared with previous results. As variations, can also be linked to changes in the operation / changes in production, it is important to compare consumption figures with production rates – kW used per ton produced.
Environmental Management:	When extreme variations in consumption figures are identified, these figures must be compared with operational activities that took place during that period in order to determine if this is the reason for the increase, or if there is a problem.

FUEL CONSUMPTION



Applicable Legislation:	<ul style="list-style-type: none"> None.
Parameters:	<ul style="list-style-type: none"> The volume of fuel still remaining in the tank. The volume of fuel that has been dispensed to vehicles.
Monitoring Method:	<ul style="list-style-type: none"> <i>Dip stick</i>. Record the volume in the tank. <i>Pump records</i>. Record the fuel that has been pumped.
Site Selection:	<ul style="list-style-type: none"> <i>Tank</i>. Readings taken directly from the tank. <i>Pump</i>. Readings taken directly from the pump.
Monitoring Interval:	<ul style="list-style-type: none"> At a minimum, monitoring must be undertaken <i>weekly</i>, however, it is advisable to record consumption <i>daily</i>.
Performance Indicators:	<ul style="list-style-type: none"> Previous consumption figures. Internal consumption targets.
Reporting:	<p>It is advisable to store fuel consumption monitoring results in a spreadsheet and project the results graphically in order to determine areas of “excessive use” and variations compared with previous results. As variations, can also be linked to changes in the operation / changes in production, it is important to compare consumption figures with production rates – ℓ used per ton produced.</p>
Environmental Management:	<p>When extreme variations in consumption figures are identified, these figures must be compared with operational activities that took place during that period in order to determine if this is the reason for the increase, or if there is a problem.</p>

WASTE GENERATION

Applicable Legislation:	<ul style="list-style-type: none"> National Environmental Management: Waste Act, Act No. 59 of 2008
Parameters:	<ul style="list-style-type: none"> The volumes of each waste stream that is generated by the mine.
Monitoring Method:	<p>The following steps will be undertaken in order to initiate a waste monitoring programme:</p> <ul style="list-style-type: none"> <i>Waste inventory</i>. Identify all waste materials generated by the mine. <i>Units of measure</i>. Selected based on the type of waste generated, i.e. liquids will be recorded as volume and solids as weight.
Site Selection:	<p>All personnel involved in waste monitoring must be aware of the stage at which a product becomes “waste” and must be recorded.</p>
Monitoring Interval:	<p>Determined based on the speed at which waste is generated.</p>
Performance Indicators:	<ul style="list-style-type: none"> Previous figures. Internal targets.
Reporting:	<p>It is advisable to store waste generation monitoring results in a spreadsheet and project the results graphically in order to determine variations in volumes produced and to compared with previous figures and production rates.</p>



	Environmental Management:	When extreme variations in volumes are identified, these must be compared with operational activities undertaken during that period.
--	---------------------------	--

1.8.2 General Performance Monitoring and Reporting Requirements

The following general monitoring requirements will be implemented at Ulco:

Table 43: General monitoring requirements to be implemented at Ulco

MONITORING AND REPORTING REQUIREMENTS	FREQUENCY
Emissions Reports	
Emissions Reports to be submitted to the Chief Air Pollution Control Officer on request (as per permit specifications).	Quarterly
<ul style="list-style-type: none"> ▪ Quarterly which include: <ul style="list-style-type: none"> - Production rates. - Down time of dust reduction equipment. - Emissions inventory. ▪ Annual reports which include: <ul style="list-style-type: none"> - A compliance assessment, which provides a summary of emitted pollutants for the year. 	Annually
ISO 14001:2004 Management Review	
<ul style="list-style-type: none"> ▪ As part of the commitments required for the continued implementation of the ISO 14001:2004 environmental management system, Ulco will undertake an annual review of its systems to identify where continually improvements in environmental management can be made. 	Annual Management Review
<ul style="list-style-type: none"> ▪ Bi-annual internal audits will be undertaken to ensure successful implementation of ISO 14001:2004. The frequency of auditing for various departments will be based on the significant impacts associated with the department. 	Internal audits every 6 months
Legal Audit	
<ul style="list-style-type: none"> ▪ As part of the commitment to, at minimum, ensure compliance with all applicable environmental legislation, Ulco will employ an external consultant to undertake environmental legal assessments of the site. 	Every 2 years
<ul style="list-style-type: none"> • Plans will be drawn up and implemented and rectify any legal non-conformances discovered. 	As and when required.
Financial Provision Review Calculations	
<ul style="list-style-type: none"> ▪ Ulco will assess their financial provision requirement and submit the revised amount the DMR. 	Annually
<ul style="list-style-type: none"> ▪ Ulco will undertake a full review and evaluation of the financial provision requirements. 	Every 2 years
Social and Labour Plan Reporting	



MONITORING AND REPORTING REQUIREMENTS	FREQUENCY
<ul style="list-style-type: none"> ▪ Ulco will report back on its commitments and the implementation of the SLP as legally required. 	Annually
Reporting on the integrated water use license (IWULA)	
<ul style="list-style-type: none"> ▪ Ulco will report back to DHWS on its commitments contained within its IWULA as and when required. This includes but not limited to; <ul style="list-style-type: none"> - Water balance. - Water quality monitoring results. 	Every 2 years
Environmental Performance Assessment Reports	
<ul style="list-style-type: none"> ▪ Ulco will undertake an environmental performance assessment of the approved EMPr in terms of Regulation 55 of the MPRDA. 	Every 2 years
Environmental Compliance Audits	
<ul style="list-style-type: none"> ▪ Unless otherwise instructed by the Competent Authority (in this case, the DMR) or as a condition to the authorisation / EMPr approval, environmental compliance audits on the EMPr will be undertaken on a biennial basis (every second year), and the resultant audit reports will be submitted to the DMR. The auditing process, as well as report format will comply with the requirements as contained in the EIA Regulations, GN R982, dated December 2014, as amended. 	Every 2 years

1.9. Indicate the frequency of the submission of the performance assessment report

Unless otherwise instructed by the Competent Authority (in this case, the DMR) or as a condition to the authorisation / EMPr approval, environmental compliance audits on the EMPr will be undertaken on a biennial basis (every second year), and the resultant audit reports will be submitted to the DMR. The auditing process, as well as report format will comply with the requirements as contained in the EIA Regulations, GN R982, dated December 2014, as amended.

1.10. Environmental Awareness Plan

In accordance with Regulation 51(b)(vi) MPRDR (2004), an Environmental Awareness Plan is needed which states that an EMPr contemplated in Section 39(1) of the MPRDA (2002) must include an Environmental Awareness Plan as contemplated in Section 39(3)(c) of the Act. According to Section 39(3)(c) of the MPRDA (2002) *“an applicant who prepares an environmental management programme or an environmental management plan must develop an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment”*.

AfriSam (South Africa) (Pty) Ltd is committed to promoting and implement sustainability throughout the group of employees. By making this commitment, Ulco acknowledges the importance of making all



employees aware of the potential environmental impacts that could result from conducting their jobs and how this potential can be minimised through mitigation measures and effective training. Environmental awareness of the employees at Ulco will be provided by implementing the environmental awareness training through the following five methods:

- Green area meeting (*monthly*)
- Environmental Management Programme Training (*annually*)
- Induction courses (*annually*)
- External environmental courses (*as and when available*)

It is important to note that the environmental awareness programme is a living document and should be reviewed regularly to ensure that relevant environmental concerns are discussed and the potential impacts of such concerns are minimised. The environmental awareness programme will be incorporated into existing structures and procedures that already take place at Ulco. An outline of how this will be achieved in each forum is presented below.

Green Area Meetings

As green area meetings take place on a weekly basis they are ideal to i) facilitate awareness of job specific environmental dangers and ii) educate employees as to how they can live a more sustainable lifestyle outside work. The method and medium of communication during the environmental green area meetings will be determined by the team leader facilitating the meeting. The topics discussed in each of these dedicated safety, health and environmental green area meetings will be recorded in a log book, with all employees being present signing an attendance register.

As potential environmental impacts differ in each area / unit of the mine, the focus of the environmental issues discussed with employees may differ in each area / unit. The environmental topics selected for discussion can either be:

- General topics applicable to the entire operation.
- Area / unit specific topics as identified in the impact assessment of the EMP
- Topics that can be “taken home” and implemented off-site.

General Topics to be discussed

The following topics are applicable to all employees and will therefore be discussed in all departments:

- Dust and how to prevent it!
- Good housekeeping requirements.
- Waste minimisation, separation of waste and recycling
- The importance of preserving water.
- Cleaning up hydrocarbon spillages
- What to do in the case of an emergency incident such as a fire.
- Reporting environmental incidents (non-conformances)
- Environmental management systems (ISO 14001:2004) and the AfriSam Environmental Policy



- Alien vegetation identification and removal, and the importance of indigenous vegetation – reduce the demand on ground water.

Each general topic can be discussed once per annum.

Area specific topics to be discussed:

Mining Department; Each topic listed below can be discussed once a year:

- The importance of topsoil and indigenous vegetation and control of bush encroachment.
- Practical training on cleaning up an oil spill and the procedure in the case of a major oil spill.
- How dust is generated, the environmental impacts of dust and what you can do to reduce dust generation.
- The implications of speeding and higher fuel consumption and the correct procedure for refuelling of vehicles.

Processing Department; Each topic listed below can be discussed once a year:

- Carbon dioxide and other emissions and the problems of global warming
- How dust is generated, the environmental impacts of dust and what you can do to reduce dust generation.
- Handling Alternative Raw Materials.

Packaging and Dispatch Department; Each topic listed below can be discussed once a year:

- How dust is generated, the environmental impacts of dust and what you can do to reduce dust generation.
- Practical training on cleaning up oil spills
- Reducing waste generation / recycling (plastic, paper bags & wood)

Quality Assurance Department; Each topic listed below can be discussed once a year:

- Disposal of chemical wastes
- Storage of chemical wastes
- Use of chemicals
- The importance Material Safety Data Sheets.

Engineering Department; Each topic listed below can be discussed once a year:

- Reasons for storing hydrocarbon fluids in bunded areas
- Practical implications on identifying and cleaning up oil spills
- Training on the storage, use and clean-up of spills for all chemicals stored. Priority must be given to those chemicals which are regarded as the biggest risk. Good housekeeping

Administration / Stores Department; Each topic listed below can be discussed once a year:

- Training buyers on the purchasing of hazardous chemicals and the importance of Material Safety Data Sheets.
- Training on the correct storage and handling of hazardous chemicals.



- Training on the responsibilities on the receiving of hazardous goods.

Security Department; Each topic listed below can be discussed once a year:

- Identifying engines which are leaking oil or have excessive emissions
- Measures to clean up oil spills.
- Identifying poor waste management practices.

Human Resources & Safety Health and Environment Department; Each topic listed below can be discussed once a year:

- Waste minimisation and recycling
- Importance of documentation control
- Importance of environmental compliance of contractors
- Reporting an environmental incident

Take home topics to be discussed

Environmental awareness should not stop at the work place. Many of the concepts learned at work can be applied to employees' life styles at home. Topics that can be covered under "take home topics" include, but are not limited to:

- **Water** consumption and conservation – South Africa is a "water scares" country.
- **Energy** consumption and conservation – Considering our current energy crisis.
- Waste minimisation and recycling.

Type and Frequency of Meetings

Monthly Dedicated Environmental Green Area Meeting

Ulco will dedicate *one green area meeting every month* to discussing environmental concerns and ways of minimising the potential for pollution generation. The topics of discussion and the medium of presentation will be determined by the team leader (as described above).

The following management measures are applicable to the green area meeting:

- Develop training sheets for each topic to be discussed which can be used by the team leaders. These must be signed and kept as records.
- The topics discussed in each environmental dedicated green area meeting will be noted in a log book (During every meeting).
- The method and medium of discussion will be determined by the team leader facilitating the meeting. The intention is to be informal and practical.

Environmental Incident Green Area Meeting

In addition, the once a month dedicated environmental green area meetings, environmental topics will be discussed at a *green area meeting* if an *environmental incident occurred within an area /unit* during the previous week. During the meeting, the following topics will be discussed (this is not an exhaustive list):



- How and why the incident occurred.
- How the incidents were cleaned up (if applicable).
- Evaluation of the clean-up or response by staff.
- Can the clean-up or response be improved.
- What preventative measures should be implemented / what can be done to reduce the likelihood of the incident recurring.

Environmental Management Programme Training

Annually, aspects of the EMP will be selected to form part of a training workshop. Ulco employees will be selected to attend the training workshop based on the topics selected and environmental incidents that may have occurred during the previous year. Examples of topics to be included are:

- Dust management.
- Noise minimisation.
- Water conservation.
- Waste management practices.
- Clean-up of hydrocarbon spills.
- Benefits of concurrent rehabilitation.

In presenting this information it is important to make the employees aware of the site-specific environmental goals and objectives and the benefits of achieving such goals. As these goals change the induction course must be updated accordingly. Where possible, the goals and objectives covered should be selected based on topics that personnel can relate to. The training session should start with examples of where these have been achieved and the benefits of this achievement to mine personnel. Examples of information to present include, but are not limited to the following:

Dust Emissions:

- *Objective:* Control dust emissions from the activities of the operation through the implementation of management measures.
- *Goal:* Compliance with the SANS 1929.
- *Benefits:* Cleaner air to breath which has health benefits. Houses and cars will not have to be cleaned as frequently.

Waste Minimisation:

- *Objective:* Minimise the volume of waste that has to be disposed.
- *Goal:* To be set annually.
- *Benefits:* Reduces the economic and environmental costs of dealing with waste. Reduces the need to use non-renewable resources, ensuring that these will be available to future generations (sustainability).

Induction Training



All new employees undergo an induction course when they are employed by the mine and all employees undergo a refresher induction course once a year. Environmental awareness forms part of this induction course. The outcome of the environmental component is to inform / remind employees of the environmental management measures that must be implemented. The following topics are examples of what is to be included within the induction course:

- What **dust** and **noise** suppression measures are available throughout the mine and why they must be implemented.
- The basic outline of the storm water management plan (**water pollution** minimisation plan) and what concerns must be reported; i.e. erosion, or broken berms.
- The reasons and benefits of **good housekeeping** – *ease of identification of concerns and pollution minimisation*.
- Basic steps to clean **hydrocarbon spills**.
- Basic steps to implementing effective **waste management**.
- What actions must be taken by employees if environmental concerns are noted.
- Biodiversity.
- Basic Environmental legal requirements.
- Protected disclosures.
- Environmental incidents and emergencies.

External Environmental Awareness Courses

As the environmental awareness of employees is often carried out by Ulco staff members, it is important to ensure that these staff members are able to provide employees with the necessary information and understanding. Therefore, on an adhoc basic, nominated staff member(s) will attend an environmental training session hosted by AfriSam (South Africa) (Pty) Ltd head office and / or external environmental awareness courses. The selection of potential courses will be determined by the head of environmental management for AfriSam (South Africa) (Pty) Ltd.

1.11. Specific information required by the Competent Authority

On the acceptance of the final Scoping Report the competent authority requested for specific information. Refer to Annexure C3 for a copy of the letter and response.

2. 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) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed;




Signature of EAP

20 January 2020

Date

3. Declaration of independence

Shangoni hereby declares that it is an independent environmental specialist in that it has no business, financial, personal or other interest in this project in respect of which Shangoni is appointed. Furthermore, no circumstances exist that may compromise the objectivity of Shangoni, excluding fair remuneration for work performed in connection with this project.

Report compiled

by:

Minnette Le Roux
(Pr.Sci.Nat)

Report reviewed by:

Brian Hayes (Pr Eng)

