



mineral resources

Department:

Mineral Resources

REPUBLIC OF SOUTH AFRICA

BASIC 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:	Blou Berg Eiendomme (Pty) Ltd
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FILE REFERENCE NUMBER SAMRAD:	WC 30/5/1/3/2/10223 MP

1. 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 therefore 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.

2. OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic 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) identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) describe the need and desirability of the proposed alternatives;
- (d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:-
 - (i) the nature, significance, consequence, extent, duration and probability of the impacts occurring to; and
 - (ii) the degree to which these impacts—
 - (aa) can be reserved;
 - (bb) may cause irreplaceable loss of resources; and
 - (cc) can be managed, avoided, or mitigated.
- (e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
 - (i) identify and motivate a preferred site, activity and technology alternative;
 - (ii) identify suitable measures to manage, avoid or mitigate identified impacts; and
 - (iii) identify residual risks that need to be managed and monitored.

PART A**SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT****Contact Person and Correspondence Address****a) Details of****i) Details of the EAP**

Name of the Practitioner: Roelien Oosthuizen
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ii) Expertise of the EAP**(1) The qualifications of the EAP**

(with evidence)

B-Comm in Human and Industrial Psychology (NWU)
 MEM Environmental Management (UFS)
 (with evidence attached as **Appendix 1**)

(2) Summary of the EAP's past experience

(In carrying out the Environmental Impact Assessment Procedure)

Relevant past experiences in carrying out the Environmental Impact Assessment Procedures include Environmental Impact Assessments, Environmental Management Plans/Programmes/ Reports, Performance assessments, Rehabilitation progress assessments, Environmental Liability assessments, Environmental compliance monitoring, Scoping Reports, etc.
 See attached CV. (with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	A PORTION OF PORTION 5 (A PORTION OF PORTION 2 - WATERVAL) OF THE FARM BEZEM FONTEIN 213
Application area (Ha)	4.99 ha (Four comma nine nine hectares.)
Magisterial district:	LAINGSBURG
Distance and direction from nearest town	The farm is located ± 23 km north east of Ladysmith, Western Cape, South Africa.
21 digit Surveyor General Code for each farm portion	C0430000000021300005 Total Extent of application area: 4.99ha

c) **Locality map**
(show nearest town, scale not smaller than 1:250000)

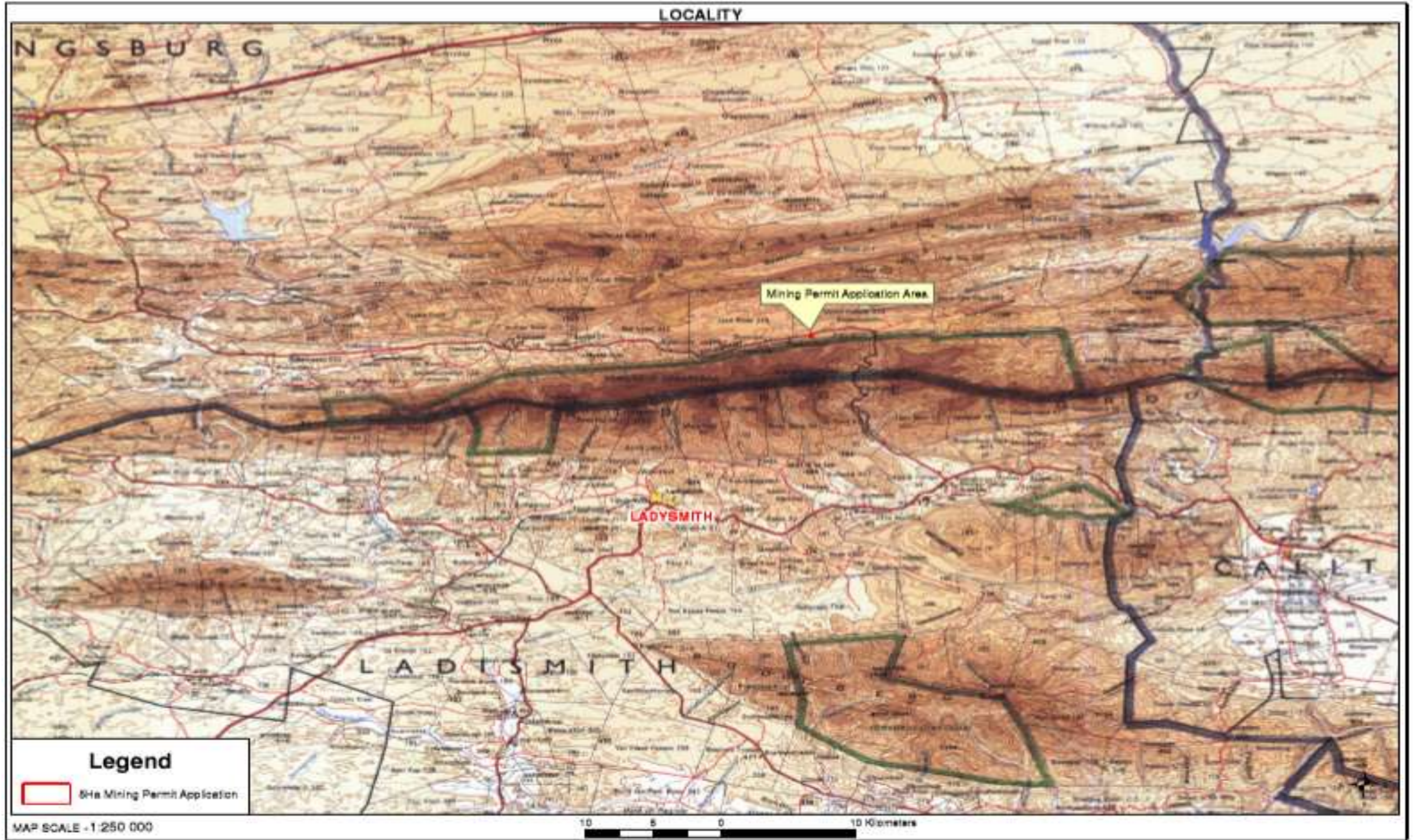


Figure 1: The locality of the proposed mining permit area indicated in red.

d) **Description of the scope of the proposed overall activity**

(provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site)

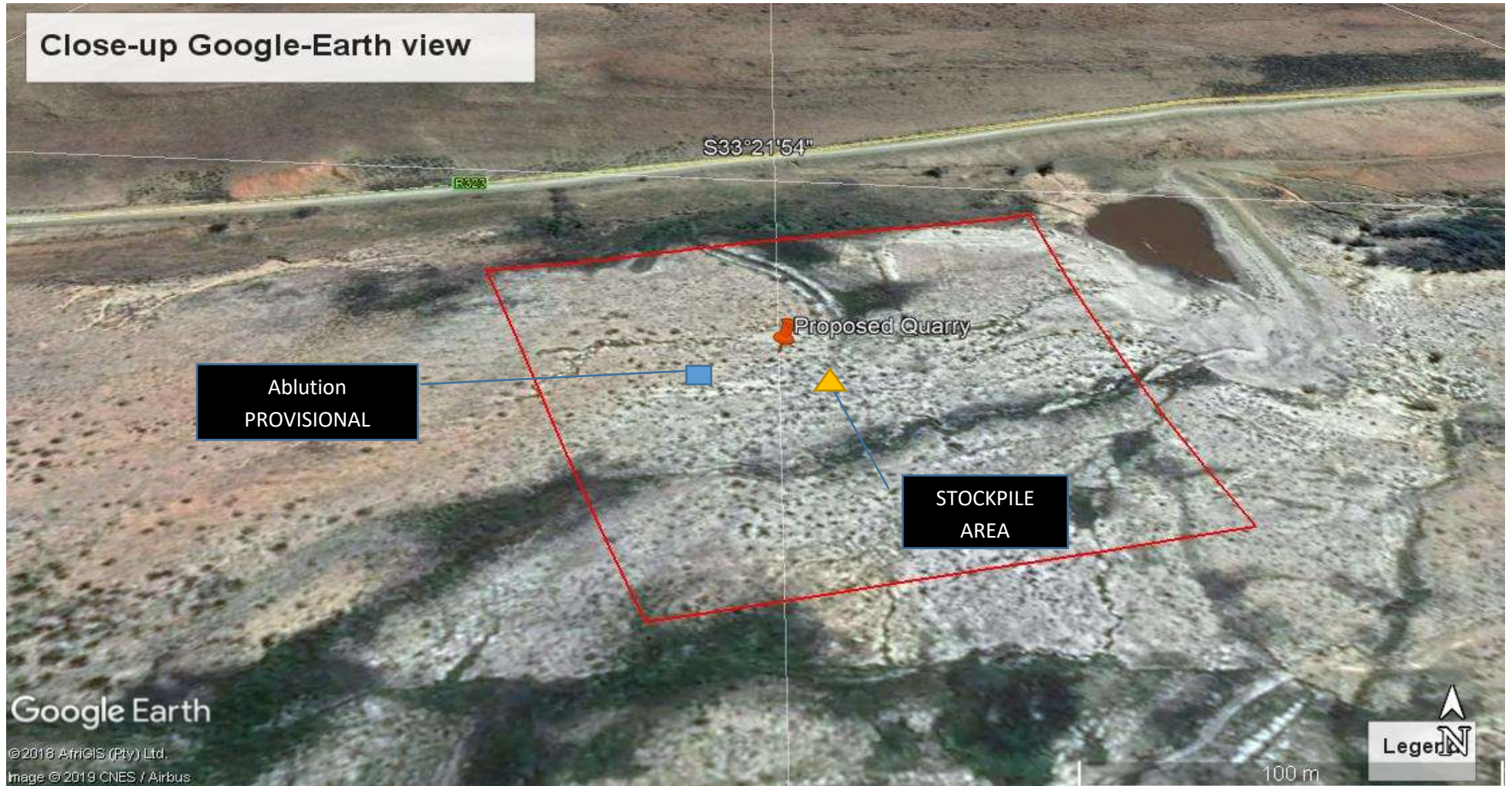


Figure 2. Map showing the aforesaid main and listed activities, and infrastructure to be placed on site

i) Listed and specified activities

Table 1: Listed and Specified Activities

NAME OF ACTIVITY (E.g. for prospecting – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route, etc. ... etc. ... etc. E.g. for mining – excavations, blasing, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc. ... etc. ... etc.)	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY (Mark with an X where applicable or affected).	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)	WASTE MANAGEMENT AUTHORISATION (Indicate whether an authorisation is required in terms of the Waste Management Act). (Mark with an X)
Activity 21 of NEMA Listing Notice 1 Any activity including the operation of that activity which requires a mining permit in terms of section 27 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; or, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). (b) the primary processing of a mineral resource including winning extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies.	4.99ha	X	GNR 327	
Activity 27 of NEMA Listing Notice 1 The clearance of an area of 1 hectare or more, but less than 20 ha of indigenous vegetation, except 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.	A total of 4.99 hectares will be physically disturbed were the Sand material will be removed.	X	GNR 327	

<p>Activity 15 of Category A under the National Environmental Management: Waste Act 59 of 2008 The continuous establishment and reclamation of temporary stockpiles resulting from activities which require a mining permit.</p>	<p>1225m² (35m X 35m block)</p>		<p>GNR 633</p>	<p>X</p>
<p>OTHER ACTIVITIES (Associated infrastructure not considered to be listed activities)</p> <p>Temporary Workshop Facilities (Not anticipated)</p> <p>Storage Facilities (Not anticipated)</p> <p>Concrete Bund walls and diesel Depots (Not anticipated farm infrastructure will be used)</p> <p>Ablution Facilities</p>	<p>±400m²</p> <p>±400m²</p> <p>±250m²</p> <p>±25m²</p>		<p>NOT LISTED</p>	

ii) Description of the activities to be undertaken

(Describe methodology or technology to be employed, including the type of commodity to be prospected/mined and for a linear activity, a description of the route of the activity)

The proposed development will include excavation of sand from the alluvial floodplain and construction of an access road to remove the product from the site.

(ii) Road construction

The excavated sand will have to be transported from the site by trucks and heavy vehicles and will require an adequate access road which may affect the two stream systems. Crossing of these streams by such a road will have a significant impact on them and should be avoided. This can be achieved by utilising an **existing small dirt track which can be upgraded and accessing the site via the dam shore** which is already an artificial and degraded area and will prevent impacting on the stream systems. Should this route be used the risk should remain low. It is however also subject to the upgrading of the existing track minimising erosion and its design allowing for adequate drainage of surface runoff without exacerbating erosion (van Rensburg, 2019:28).

e) Policy and Legislative Context

Table 2: Policy and Legislative Context

Applicable Legislation and Guidelines used to compile the report <small>(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.)</small>	Reference where applied	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT <small>(E.g In terms of the National Water Act:-Water Use License has/has not been applied for).</small>
Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations (CARA)	<ul style="list-style-type: none"> - Section 5: Implementation of control measures for alien and invasive plant species; - Section 6: Control measures. - Regulation GN R1048, published on 25 May 1984, in terms of CARA 	- Control measures are to be implemented upon the approval of the EMPR.
Constitution of South Africa (Act 108 of 1996)	<ul style="list-style-type: none"> - Section 24: Environmental right - Section 25: Rights in Property - Section 27: Water and sanitation right 	- To be implemented upon the approval of the EMPR.
Environment Conservation Act (Act 73 of 1989) and Regulations (ECA)	<ul style="list-style-type: none"> - Sections 21, 22, 25, 26 and 28: EIA Regulations, including listed activities that still relate to the existing section of ECA. - Section 28A: Exemptions. 	- To be implemented upon the approval of the EMPR.
Fencing Act (Act 31 of 1963)	- Section 17: States that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5m on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.	- Control measures are to be implemented upon the approval of the EMPR.
Hazardous Substances Act (Act 15 of 1973) and Regulations read together with NEMA and NEMWA	- Definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	- Noted and Considered measures are to be implemented upon the approval of the EMPR.

Intergovernmental Relations Act (Act 13 of 2005)	- This Act establishes a framework for the National, Provincial and Local Governments to promote and facilitate intergovernmental relations.	
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended	- Entire Act. - Regulations GN R527	- A Mining Permit has been applied for (WC) 30/5/1/3/2/10223 MP. - Rights and obligations to be adhered to.
National Environmental Management Act (Act 107 of 1998) and Regulations as amended	- Section 2: Strategic environmental management principles, goals and objectives. - Section 24: Foundation for Environmental Management frameworks. - Section 24N: - Section 24O: - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care. - Regulations GN R547, more specifically Chapters 5 and 7, where applicable (the remainder was repealed) published on 18 June 2010 in terms of NEMA (Environmental Management Framework Regulations) - Regulations GN R982 to R985, published on 4 December 2014 in terms of NEMA (Listed Activities) - Regulations GN R993, published on 8 December 2014 in terms of NEMA (Appeal) - Regulations GN R994, published on 8 December 2014 in terms of NEMA (exemption)	- None of the plant species recorded are however rare or endangered and they are all relatively widespread. However, the proposed mining area is of small extent and seeing as none of these species are rare, endangered or localised their loss is not anticipated to be high. Permits will however have to be acquired to remove these plants. - Control measures are to be implemented upon the approval of the EMPR.

	<ul style="list-style-type: none"> - Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations) - Regulations GN R1147, published on 20 November 2015 in terms of NEMA (Financial Provision) 	
National Environmental Management: Air Quality Act (Act 39 of 2004)	<ul style="list-style-type: none"> - Section 32: Control of dust - Section 34: Control of noise - Section 35: Control of offensive odours - Regulation GN R551, published on 12 June 2015 (amended Categories 1 to 5 of GN 983) in terms of NEM:AQA (Atmospheric emission which have a significant detrimental effect on the environment) - Regulation GN R283, published on 2 April 2015 in terms of NEM:AQA (National Atmospheric Emissions Reporting Regulations) (Group C-Mines) 	<ul style="list-style-type: none"> - Control measures are to be implemented upon the approval of the EMPR. - This is also legislated by Mine Health and Safety from DMR and is to be adhered to.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	<ul style="list-style-type: none"> - Section 52 of The National Environmental Management Act: Biodiversity Act (NEMBA) (Act 10 of 2004) states that the MEC/Minister is to list ecosystems that are threatened and in need of protection. - Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process. - A list of threatened and protected species has been published in terms of Section 56(1) GG 29657 GNR 151 and GNR 152, Threatened or Protected Species Regulations. <p>Commencement of Threatened or Protected Species Regulations 2007 : 1 June 2007 GNR 150/GG 29657/23-02-2007</p>	<ul style="list-style-type: none"> - According to Mucina & Rutherford (2006) the area consists of Matjiesfontein Shale Renosterveld (FRs 6). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004). It is not currently subjected to any pronounced transformation pressures and the conservation value of this vegetation type is therefore relatively low.

	<p>Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG 29657/23-02-2007 *</p> <p>Threatened or Protected Species Regulations GNR 152/GG 296547/23-02-2007 *</p> <ul style="list-style-type: none"> - Sections 65 – 69: These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species. - Sections 71 and 73: These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species. - Regulation GN R151, published on 23 February 2007 (List of Critically Endangered, Vulnerable and Protected Species, 2007) in terms of NEM: BA - Regulation GN R152, published on 23 February 2007 (TOPS) in terms of NEM:BA - Regulations GN R507 to 509 of 2013 and GN 599 of 2014 in terms of NEM:BA (Alien Species) 	<ul style="list-style-type: none"> - The Western Cape Biodiversity Spatial Plan (2017) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site in question is listed as being largely an Other Natural Area (ONA) although the southern stream system is also listed as being an Ecological Support Area 1 and 2. However, although this is not a Critical Biodiversity Area it still functions in ecological support of such surrounding areas and supports surrounding watercourses and wetlands. This functioning and support should therefore be retained as far as possible (Taken out of the ecological and wetland assessment by DPR Darius van Rensburg).
<p>The National Environmental Management Act: Protected Areas Act (NEMPAA) (Act 57 of 2003) provides for the protection of ecologically viable areas that are representative of South Africa’s natural biodiversity and its landscapes and seascapes.</p>	<ul style="list-style-type: none"> - Chapter 2 lists all protected areas. 	<ul style="list-style-type: none"> - According to Mucina & Rutherford (2006) the area consists of Matjiesfontein Shale Renosterveld (FRs 6). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004). It is not currently subjected to any

		<p>pronounced transformation pressures and the conservation value of this vegetation type is therefore relatively low.</p> <ul style="list-style-type: none"> - The Western Cape Biodiversity Spatial Plan (2017) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site in question is listed as being largely an Other Natural Area (ONA) although the southern stream system is also listed as being an Ecological Support Area 1 and 2. However, although this is not a Critical Biodiversity Area it still functions in ecological support of such surrounding areas and supports surrounding watercourses and wetlands. This functioning and support should therefore be retained as far as possible (Taken out of the ecological and wetland assessment by DPR Darius van Rensburg).
<p>National Environmental Management: Waste Management Act (Act 59 of 2008)</p>	<ul style="list-style-type: none"> - Chapter 4: Waste management activities - Regulations GN R634 published on 23 August 2013 in terms of NEM:WA (Waste Classification and Management Regulations) 	<ul style="list-style-type: none"> - Activity 15 of Category A under the National Environmental Management: Waste Act 59 of 2008 - The continuous establishment and reclamation of temporary stockpiles

<p>Activity 15 of Category A under the National Environmental Management: Waste Act 59 of 2008 The continuous establishment and reclamation of temporary stockpiles resulting from activities which require a mining permit.</p>	<ul style="list-style-type: none"> - Regulations GN R921 published on 29 November 2013 in terms of NEM:WA (Categories A to C – Listed activities) - National Norms and Standards for the Remediation of contaminated Land and Soil Quality published on 2 May 2014 in terms of NEM:WA (Contaminated land regulations) - Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and Management Regulations) - Regulations GN R632 published on 24 July 2015 in terms of NEM: WA (Planning and Management of Mineral Residue Deposits and Mineral Residue Stockpiles) - Regulations GN R633 published on 24 July 2015 in terms of NEM: WA (Amendments to the waste management activities list published under GN921) 	<p>resulting from activities which require a mining permit.</p> <ul style="list-style-type: none"> - To be implemented upon the approval of the EMPR.
<p>National Forest Act (Act 84 of 1998) and Regulations</p>	<ul style="list-style-type: none"> - Section 15: No person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. 	<ul style="list-style-type: none"> - A permit application regarding protected tree species need to be lodged with DAFF if necessary. - Control measures are to be implemented upon the approval of the EMPR.
<p>National Heritage Resources Act (Act 25 of 1999) and Regulations</p>	<ul style="list-style-type: none"> - Section 34: No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. - Section 35: No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site. 	<ul style="list-style-type: none"> - Control measures are to be implemented upon the approval of the EMPR. Fossil finds procedure are attached to the PIA.

	<ul style="list-style-type: none"> - Section 36: No person may, without a permit issued by SAHRA or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a forma cemetery administered by a local authority. - Section 38: This section provides for HIA which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during HIA process. - Regulation GN R548 published on 2 June 2000 in terms of NHRA 	
<p>National Water Act (Act 36 of 1998) and regulations as amended, <i>inter alia</i> Government Notice No. 704 of 1999</p>	<ul style="list-style-type: none"> - Section 4: Use of water and licensing. - Section 19: Prevention and remedying the effects of pollution. - Section 20: Control of emergency incidents. - Section 21: Water uses In terms of Section 21 a licence is required for: <ul style="list-style-type: none"> (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a watercourse; (f) Waste discharge related water use; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (i) altering the bed, banks, course or characteristics of a watercourse; (j) removing, discharging or disposing of water found underground if it is necessary for the 	<ul style="list-style-type: none"> - A water use application for a Section c and i will be a requirement for this application. - Control measures are to be implemented upon the approval of the EMPR.

	<p>efficient continuation of an activity or for the safety of people; and;</p> <ul style="list-style-type: none"> - Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities) - Regulation GN R1352, published on 12 November 1999 in terms of the National Water Act (Water use to be registered) - Regulation GN R139, published on 24 February 2012 in terms of the National Water Act (Safety of Dams) - Regulation GN R398, published on 26 March 2004 in terms of the National Water Act (Section 21 (j)) - Regulation GN R399, published on 26 March 2004 in terms of the National Water Act (Section 21 (a) and (b)) - Regulation GN R1198, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i) – rehabilitation of wetlands) - Regulations GN R1199, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i)) - Regulations GN R665, published on 6 September 2013 in terms of the National Water Act (Amended GN 398 and 399 – Section 21 (e), (f), (h), (g), (j)) 	
<p>Nature Conservation Ordinance (Ord 19 of 1974)</p>	<ul style="list-style-type: none"> - Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora. 	<ul style="list-style-type: none"> - Control measures are to be implemented upon the approval of the EMPR.
<p>Occupational Health and Safety Act (Act 85 of 1993) and Regulations</p>	<ul style="list-style-type: none"> - Section 8: General duties of employers to their employees. - Section 9: General duties of employers and self-employed persons to persons other than their employees. 	<ul style="list-style-type: none"> - Control measures are to be implemented upon the approval of the EMPR.

Road Traffic Act (Act 93 of 1997) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Water Services Amendment Act (Act 30 of 2007)	- It serves to provide the right to basic water and sanitation to the citizens of South Africa (giving effect to section 27 of the Constitution).	- Control measures are to be implemented upon the approval of the EMPR.
National Land Transport Act, (Act 5 of 1998)		- To take note.
Spatial Planning and Land Use Management (Act 16 of 2013 (SPLUMA) and regulations	- To provide a framework for spatial planning and land use management in the Republic; - To specify the relationship between the spatial planning and the land use management, amongst others - Regulations GN R239 published on 23 March 2015 in terms of SPLUMA	- To be implemented upon the approval of the EMPR.
Subdivision of Agricultural Land Act, 70 of 1970 and regulations	- Regulations GN R373 published on 9 March 1979 in terms of Subdivision of Agricultural Land	- To take note.
Basic Conditions of Employment Act (Act 3 of 1997)) as amended	- To regulate employment aspects	- To be implemented upon the approval of the EMPR
Community Development (Act 3 of 1966)	- To promote community development	- To be implemented upon the approval of the EMPR
Development Facilitation (Act 67 of 1995) and regulations	- To provide for planning and development	- To take note.
Development Facilitation (GN24, PG329, 24/07/1998)	- Regulations re Northern Cape LDO's	- To take note.
Development Facilitation (GNR1, GG20775, 07/01/2000)	- Regulations re application rules S26, S46, S59	- To take note.
Development Facilitation (GN732, GG14765, 30/04/2004)	- Determines amount, see S7(b)(ii)	- To take note.

Land Survey Act (Act 8 of 1997)) and regulations, more specifically GN R1130	- To control land surveying, beacons etc. and the like; - Agriculture, land survey S10	- To take note.
National Veld and Forest Fire Act (Act 101 of 1998)) and regulations, more specifically GN R1775	- To regulate law on veld and forest fires - (Draft regulations s21)	- To be implemented upon approval of the EMPR
Municipal Ordinance, 20/1974	- To control pollution, sewers etc.	- To be implemented upon approval of the EMPR
Municipal Ordinance, PN955, 29/08/1975	- Nature conservation Regulations	- To be implemented upon approval of the EMPR
Cape Land Use Planning Ordinance, 15/85	- To control land use planning	- To take note.
Cape Land Use Planning Ordinance, PN1050, 05/12/1988	- Land use planning Regulations	- To take note.
Roads Ordinance 19 of 1976	- Roads	- To take note.

f) Need and desirability of the proposed activities

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location)

The site is situated at the foot of the Klein Swartberge on a Portion of Portion 5 of the Farm Bezemfontein 213. The site is situated approximately 50 km to the north east of Ladismith and approximately 70 km to the south east of Laingsburg and has an extent of 4.99 hectares. The site is situated at the foot of the north facing slopes of the Klein Swartberg where sands eroding from the slopes are continuously deposited. The site does contain some transformation in the form of a large artificial impoundment and embankment but is still largely natural. Two prominent and largely natural stream system are also present on the site. The proposed mining development will excavate sand from a low mound between the streams. The mining activities are not anticipated to utilise any processing plant and will remain at a very small scale.

The proposed development will include excavation of sand from the alluvial floodplain and construction of an access road to remove the product from the site. The streams will be excluded from mining operations but may still be affected by it.

Firstly, the excavation of sand should be restricted to the central embankment of alluvial sand, excluding the adjacent stream systems, treating these as no-go areas. Sediments from the site should be prevented from entering the adjacent stream systems and it is recommended that berms be erected between the site and these streams. Secondly, the depth of sand excavation should not exceed the level of the banks of these streams. This should be feasible since adequate material is not present beyond this depth. In addition, the border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion. Thirdly, the site will remain highly susceptible to erosion and comprehensive rehabilitation, including adequate management of topsoil, will be crucial. Extended monitoring and implementation of erosion measures will also be necessary.

No exploration is carried out. The quantity and quality of sand available in the area can be easily confirmed by visual survey.

It is being loose sedimentary topsoil and soft in nature, the sand is removed by a system of a temporary Excavator and tipper combination. The sand will be loaded directly to the trucks/tippers/lorries for transportation to mainly the new PV solar Plant. Also other projects can benefit by the site like road/construction projects, for filling and levelling of low-lying areas and for other infrastructure development work in and around the district.

No trucks will be allowed to use the Seven Weeks Poort road (R323) until a traffic impact statement had been concluded (Western Cape Transport and public Works comments).

g) Motivation for the overall preferred site, activities and technology alternative

In order to ensure that the proposed development enables sustainable development, a number of feasible options must be explored. Motivation for the footprint of the actual mining

operation (i.e. excavations) will not be provided here, as the location of the mine is determined by the geological location of the mineral resource (Sand).

Mine Site Location

The site is situated at the foot of the Klein Swartberge on a Portion of Portion 5 of the Farm Bezemfontein 213. The site is situated approximately 50 km to the north east of Ladismith and approximately 70 km to the south east of Laingsburg and has an extent of 4.99 hectares. The site is situated at the foot of the north facing slopes of the Klein Swartberg where sands eroding from the slopes are continuously deposited. The site does contain some transformation in the form of a large artificial impoundment and embankment but is still largely natural. Two prominent and largely natural stream system are also present on the site. The proposed mining development will excavate sand from a low mound between the streams. The mining activities are not anticipated to utilise any processing plant and will remain at a very small scale.

On this site there will be no processing plant although any infrastructure (chemical toilet) will be strategically placed by incorporating mining project demands, environmental sensitivities and IAP concerns, as identified during the EIA process. Thus, the mining site location is primarily based on proximity to the access roads, proximity to the areas earmarked for mining and limited additional impact on the environment and heritage resource. This renders the consideration of further alternative locations in terms of the mine site location, unnecessary.

The excavated sand will have to be transported from the site by trucks and heavy vehicles and will require an adequate access road which may affect the two stream systems. Crossing of these streams by such a road will have a significant impact on them and should be avoided.

This can be achieved by utilising an existing small dirt track which can be upgraded and accessing the site via the dam shore which is already an artificial and degraded area and will prevent impacting on the stream systems. Should this route be used the risk should remain low. It is however also subject to the upgrading of the existing track minimising erosion and its design allowing for adequate drainage of surface runoff without exacerbating erosion (Taken out of the Ecological and wetland study by DPR Darius van Rensburg).

h) Full description of the process followed to reach the proposed preferred alternatives within the site

NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

The consideration of alternatives is a critical component of the EIA process, where an appropriate range of alternatives require consideration whilst achieving the desired objective of the proposed project. In order to ensure that the proposed development enables sustainable development, a number of feasible options must be explored. The various alternatives were assessed in terms of logistical practicality, environmental acceptability and economic feasibility. Alternatives for the locality of the mining operation do not form part of the discussion as the location of the mine is determined by the geological location of the mineral resources.

Land Use

No specialist comparative land use assessments were conducted, but the mining area has a low agricultural potential for grazing. Therefore mining has been determined as the most feasible alternative.

Project Infrastructure

The mining operations are anticipated to remain at a very small scale, consisting only of a temporary excavator as the need dictates and without storage of any hazardous materials or wastes. Firstly, the excavation of sand should be restricted to the central embankment of alluvial sand. Secondly, the depth of sand excavation should not exceed the level of the banks of these streams. This should be feasible since adequate material is not present beyond this depth. In addition, the border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion. Thirdly, the site will remain highly susceptible to erosion and comprehensive rehabilitation, including adequate management of topsoil, will be crucial. Extended monitoring and implementation of erosion measures will also be necessary (Taken out of the ecological and wetland study by Darius van Rensburg).

No trucks will be allowed to use the Seven Weeks poort road (R323) until a traffic impact statement had been concluded (Western Cape Transport and public Works comments).

Alternatives and considerations pertaining to the project infrastructure were discussed in section g.

Mining Method

The mining operations are anticipated to remain at a very small scale, consisting only of a temporary excavator as the need dictates and without storage of any hazardous materials or wastes. No exploration is carried out. The quantity and quality of the Sand available in the area can be easily confirmed by visual survey.

It is being loose sedimentary topsoil and soft in nature, the sand is removed by a system of temporary Excavator and tipper combination. The sand will be loaded directly to the trucks/ tippers/lorries for transportation to the needy customers' (The PV solar plant site).

The depth of sand excavation should not exceed the level of the banks of these streams. This should be feasible since adequate material is not present beyond this depth. In addition, the border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion (Taken out of the ecological and wetland study by DPR Darius van Rensburg).

Proceed without the Mine (No Go)

Land Use

The current land use is grazing, with a low stocking rate for the farm. If the mining operation does not continue, the farming will persist. Cumulative aspects associated with grazing include overgrazing, with potential of desertification.

Socio-Economy

Blou Berg Eiendomme mining project plan is to employ 7 people. The non-approval of this mining operation would impact negatively on the employment rate for the region and the families who are likely to benefit from the positive employment opportunities. Substantial tax benefits to the State and Local Government will also be lost.

Biodiversity

According to Mucina & Rutherford (2006) the area consists of Matjiesfontein Shale Renosterveld (FRs 6). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004). It is not currently subjected to any pronounced transformation pressures and the conservation value of this vegetation type is therefore relatively low.

The Western Cape Biodiversity Spatial Plan (2017) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site in question is listed as being largely an Other Natural Area (ONA) although the southern stream system is also listed as being an Ecological Support Area 1 and 2. However, although this is not a Critical Biodiversity Area it still functions in ecological support of such surrounding areas and supports surrounding watercourses and wetlands. This functioning and support should therefore be retained as far as possible (Taken out of the ecological and wetland assessment by DPR Darius van Rensburg).

Heritage and Cultural Resources

1. A ground survey was conducted on 8 November 2019 by Dr. Edward Matenga for the identification and documentation of any archaeological and historical material that might occur on the property.
2. The following is a summary of the findings of the survey:
3. *The Stone Age*
A lithic was found representing a Middle Stone Age Scraper (BZK06). The paucity of evidence for the Stone Age is likely due to the fact that the size of the area under investigation is relatively small at 4.99 ha.
4. *The Iron Age*
No material dating to the Iron Age was found.
5. *Historic buildings and structures*
One building was observed located outside the area of the proposed sand mining. It is a small isolated gabled farmhouse with roof of corrugated iron sheets. It has a gabled veranda set against it in the midsection facing north. This building may be significant as it exemplifies rural buildings of the modern commercial farming period. But it will not be affected as it lies outside the limits of the proposed development.

6. Early commercial farmers used dolerite monoliths as posts to erect fences around their properties and to divide them into paddocks. It is reported that barbed wire fencing was first used in South Africa at the end of the 19th century. Monoliths were observed in 6 places. Five of these (BZF01-BZF05) stand or lie in a line to suggest that they formed a section of early fencing. These lie outside the limits of the proposed sand mining and will therefore not be affected. One of the standing monoliths (BZF09) stand within the footprint of the proposed mining. The relic is however considered of to be of low cultural significance to warrant protection *in situ*.
7. *Burials and burial grounds*
There were no graves or burial ground found.
8. *Aspects of cultural landscapes*
Cultural Landscapes are “cultural properties that represent the combined works of nature and of man” They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.”¹
9. Elsewhere on the farm Bezemfontein there are characteristic elements of a Karoo commercial farming landscape such as the long boundary and partition stonewalls, farmsteads, orchards and irrigated fields. None of these elements will be affected by the proposed development.

Palaeontology

A palaeontological Impact Assessment desktop study was done by Prof. Marion Bamford on 29 November 2019 for the Mining Permit Application for sand on portion Waterfal of farm Bezemfontein 213, Laings District.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the right age to contain fossils but in the finer-grained material that has not weathered to form loose sand. Furthermore, the material to be mined is loose sand and this does not preserve fossils. Since there is an extremely small chance that fossils from the Waboomberg Formation may be disturbed, although none has been reported from this site, a Fossil Chance find protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low and the mining for sand and rehabilitation of the land may proceed.

In the event that the mining operation does not proceed, the heritage resources will remain as is. The protection and preservation of these resources are therefore not guaranteed. However, if the mining operation is approved, the heritage resources will be protected through the demarcation of no-go zones and fencing off of any possible resources.

¹ Paragraph 47 of the Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO 2016).

i) Details of the development footprint alternatives considered

With reference to the site plan provided as Appendix 3 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

The property on which or location where it is proposed to undertake the activity

The site is situated at the foot of the Klein Swartberge on a Portion of Portion 5 of the Farm Bezemfontein 213. The site is situated approximately 50 km to the north east of Ladismith and approximately 70 km to the south east of Laingsburg and has an extent of 4.99 hectares. The site is situated at the foot of the north facing slopes of the Klein Swartberg where sands eroding from the slopes are continuously deposited.

The type of activity, technology and operational aspects

The proposed development will include excavation of sand from the alluvial floodplain and construction of an access road to remove the product from the site. The streams will be excluded from mining operations but may still be affected by it.

The aim of the mining activities will be to excavate and remove the accumulated sands between these two streams. The mining activities are not anticipated to utilise any processing plant and will remain at a very small scale.

The planned mining activities, as discussed in section d) ii), the mining method of the activity is based on opencast mining by semi mechanized system of removing loose soils using a temporary Excavator and tippers/lorries. The quantity and quality of sand available in the area can be easily confirmed by visual survey.

It is being loose sedimentary topsoil and soft in nature, the sand is removed by a system of a temporary Excavator and tipper combination. The sand will be loaded directly to the trucks/ tippers/lorries for transportation to the needy customers' site likethe solar PV plant, road/construction projects, for filling and levelling of low-lying areas and for other infrastructure development work in and around the district.

It is being soft in nature and accumulated as loose soil. The sand will be excavated from the surface up to a depth of 0.6m – 1.2m and hence there is no need to form a bench. However the slope will be maintained at 18°.

The design or layout of the activity

The site infrastructure will need to be strategically placed by incorporating mining project demands and environmental sensitivities identified during the Environmental Impact Assessment process. Thus, the site layout will primarily be based on proximity

to the access roads, proximity to the areas earmarked for mining as well as limited additional impact on the environmental and heritage resources.

The excavated sand will have to be transported from the site by trucks and heavy vehicles and will require an adequate access road which may affect the two stream systems. Crossing of these streams by such a road will have a significant impact on them and should be avoided. This can be achieved by utilising an existing small dirt track which can be upgraded and accessing the site via the dam shore which is already an artificial and degraded area and will prevent impacting on the stream systems. Should this route be used the risk should remain low. It is however also subject to the upgrading of the existing track minimising erosion and its design allowing for adequate drainage of surface runoff without exacerbating erosion (Taken out of the Ecological and wetland study by Darius van Rensburg).

The option of not implementing the activity

Potential land use includes grazing and sand mining. The majority of the area is classified to have low to moderate potential for grazing land and low suitability for crop yield. Therefore, mining activities are believed to be the most economically beneficial option for the area. The farming of livestock will only be able to continue in areas not affected by mining operations. Cumulative impacts associated to grazing include overgrazing and destruction of natural vegetation, but the cumulative effect of mining activities on the property are expected to outweigh any potential negative effects that agriculture might have.

ii) Details of the Public Participation Process Followed

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

The initial consultation process with interested and affected parties was completed. The process as described by NEMA for Environmental Authorisation was followed. See table 3 below for the identification of Interested and Affected Parties to be consulted with. The landowner is also the applicant.

- Registered letters were sent to all Government Departments and the Municipality on 30 September 2019.
- An Advert (Notice) was placed in the Burger on 9 October 2019 to notify all other interested and affected parties.
- Notices were placed at the Koop Produsente Cooperation and the Municipal offices as well on the fence of the farm.
- The Basic Assessment Document was also sent per registered post to all registered parties.

iii) Summary of issues raised by I&APs

(Complete the table summarising comments and issues raised, and reaction to those responses)

Table 3: Summary of issues raised by I&APs

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted		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 response were incorporated
AFFECTED PARTIES					
Landowner/s	X				
Aztomate (Pty) Ltd Mr. JG Hunlun PO Box 224 Laingsburg 6655	X Registered Letter				
Lawful occupier/s of the land					
Mr. Ben Jewaskawitz PO Box 318 Ladysmith 3370 Mr. Fritz Hunlun PO Box 477 Oudshoorn 6620	X Registered Letter	11 November 2019	Letters returned as unclaimed		
Landowners or lawful occupiers on adjacent properties	X				
Transnet P.O. Box 72501 Parkview South Africa 2122 Email: enquiries@transnet.net	X Registered letter				
Municipal Councillor	X				
Municipality	X				
Laingsburg Municipality Private Bag X4, Laingsburg, 6900	X Registered letter				

2 Van Riebeeck Street, Laingsburg, 6900 T: 023 551 1019 F: 086 694 3816 Tel 023 551 1019 Fax 023 551 1019 Webwww.laingsburg.gov.za					
Central Karoo District Municipality Private Bag X560, Beaufort West, 6970, Physical: 63 Donkin Street, Beaufort West, Tel: 023 449 1000	X Registered letter				
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS					
SANRAL P.O. Box 415 Pretoria 0001	X Registered letter				
National Department of Public Works Private Bag X9078, Cape Town, 8000 9 Dorp Street, Cape Town, 8001 Tel : 021 483 5549 Fax: 021 483 5353	X Registered letter				
Department of Transport and Public Works Private Bag X9185, Cape Town, 8000 9 Dorp Street, Cape Town, 8001	X Registered letter	14 October 2019 e-mail	Good day 1. Receipt is hereby acknowledged for your letter / email WC 30/5/1/3/2/10223 MP dated 8 October 2019 2. Kindly note that the matter is receiving attention and that a further communication will be addressed to you as soon as circumstances permit.		

<p>Tel: 0860 212 414 Fax : 021 483 7216</p>		<p>25 October 2019 Letter</p>	<p>Lyle Martin (Administrative Clerk : Road Planning)</p> <p>Your letter WC30/5/1/3/2/10223 MP dated 30 September 2019 to this Branch.</p> <p>Main Road 309, a Proclaimed Provincial Road for which this Branch is the Road Authority, is affected by this application, which is why this Branch wishes to register as an interested and affected party.</p> <p>This Branch requests that copies of all relevant transport correspondence be forwarded for perusal and comments. Initially you are informed that obtaining an approval for access in terms of Roads Ordinance 19 of 1976 is a requirement; and this Branch will only consider issuing such an approval upon receipt of a Land Use application, via the Local Authority, that include a professional registered civil engineer's Traffic Impact Statement and the determination of the additional impact on this Branch's road infrastructure.</p>	<p>Dear Mr. Martin The letter dated 25 October 2019 with the above reference refers.</p> <p>Thank you for your response in the matter. I have tried to contact Mr. Evan Burger on 021 483 2180 and the phone number does not take messages anymore.</p> <p>I hope you can maybe assist in the matter. According to your letter you requested a traffic Impact Statement on the additional impact on the Branch's road infrastructure and I just need to discuss the matter and provide background on the application of Mr. Jaco Hunlun. He is the farm owner of the property on which this 5 ha permit will be situated once approved by DMR. It is a small operation and according to the application a maximum of 7260 tonnes will be mined per quarter which translates to 110 tonnes per day or 3 road tipper trucks of 36 tonnes per day. Existing farm roads and entrances will be used as is currently used by the farmer himself for his farming operations.</p>	
<p>Department of Agriculture, Forestry & Fisheries Directorate: Forestry Management Private Bag X 9037 Cape Town 7525</p>	<p>X Registered letter</p>	<p>20 December 2019</p>	<p>Letter returned as unclaimed.</p>		

<p>Customs House Building Fifth Floor Lower Heerenagt Street Cape Town 8000 Tel : +27 21 431 7400 Fax: +27 21 934 2023</p>					
<p>ESKOM Holdings SOC Limited DISTRIBUTION DIVISION – WESTERN CAPE OPERATING UNIT Land Development and Environmental Management Department Eskom Distribution Office, Eskom Road, Brackenfell P.O. Box 222, Brackenfell 7560 Tel +27 21 980 3911 Fax +27 21 980 3053 www.eskom.co.za</p>	<p>X Registered letter</p>				
<p>Department of Agriculture Western Cape The Head of Department Private Bag X1 Elsenburg 7607</p>					
<p>Department of Water & Sanitation Private Bag X16 SANLAMHOF 7532</p> <p>52 Voortreker Road Spectrum Building BELLVILLE 7530</p> <p>And</p> <p>3 Blackenberg Street Sigma Building Bellville 7530 Tel: (021) 941 6000</p>	<p>X Registered letter</p>				

Fax: (021) 941 6100					
SAHRA P.O. Box 4637 Cape Town 8000	X				
Communities					
Dept. Land Affairs					
Department of Rural Development and Land Reform Private Bag X9133 Cape Town 8000 Room 133 First Floor 120 Plein Street Cape Town 8000 General Contacts Switch-board: 012 312 8911					
Traditional Leaders					
No Traditional Leaders					
Dept. Environmental Affairs					
Department of Environmental Affairs and Development Planning Private Bag X9086 Cape Town 8000	X Registered letter	18 November 2019 Letter	<ol style="list-style-type: none"> 1. The above document (Ref: WC30/5/2/3/10233MP received by this Department on 15 October 2019 refers. 2. This letter serves as acknowledgement of receipt of the above-mentioned document by this Department. 3. Please register this Department as an Interested and Affected Party (I&AP). All future correspondence must be sent to the person referred to under enquiries. 4. It is understood from the submission that the proposal entails the mining of sand on the above-mentioned property, however, there is no mention made of the extent of the mining area ad where exactly on the property these activities are proposed. Please ensure such detail (including maps and site plans) are included in all future submissions. 5. It is also understood that the proposal requires a Water Use License, a Waste Management License and an Environmental Authorisation. In light of the one environmental system, it is now a requirement to 		

			<p>synchronise these processes in order to ensure that both processes are duly by one another. It is therefore the duty of Environmental Assessment Practitioner (“EAP”) to take note of timeframes and synchronise the three processes.</p> <ol style="list-style-type: none"> 6. Furthermore, please note that this Department requires 1 hard copy and one electronic copy (CD) with the request for comment. Please ensure that this requirement is fulfilled moving forward in the process. 7. Please ensure that sufficient information is provided in the draft BAR in order to assist this Department to provide more informed comment. 8. Please note that the Basic Assessment Report must contain all the relevant information as stipulated in Appendix 1 of the NEMA EIA Regulations, (as amended). 9. Provision for rehabilitation costs must be provided for and secured PRIOR to the approval of the proposed development. 10. The Environmental Management Programme (EMPr) must contain all the relevant information stipulated in Appendix 4 of the NEMA EIA Regulations, 2014 (as amended). 11. Also note that all specialist reports must comply with Appendix 6 of the NEMA EIA Regulations, 2014 (as amended). 12. Based on the limited information provided at this stage, this Department has no substantial comment and awaits the draft Basic Assessment Report (one CD and one hard copy) in order to provide information comment. 13. Kindly quote the abovementioned reference number in any future correspondence in respect of the application. 14. This Department reserves the right to revise its initial comments and request further information from you based on any new or revised information received. 		
Other Competent Authorities affected					
OTHER AFFECTED PARTIES					
INTERESTED PARTIES					

iv) The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

(1) Baseline Environment

(a) Type of environment affected by the proposed activity

(its current geographical, physical, biological, socio-economic, and cultural character)

1) Geology:

Geologically the site is still dominated by the Table Mountain Sandstone Formation though shales of the Witteberg Group becomes evident along the northern border of the site. As a result, the site can also be regarded as forming an ecotone between the fynbos vegetation associated with the sandy soils derived from the sandstone and the renosterveld vegetation associated with the clayey soils derived from the adjacent shales. This is also reflected in the species composition on the site which contains elements of both the adjacent North Swartberg Sandstone Fynbos (FFs 23) as well as the Matjiesfontein Shale Rensoterveld (FRs 6).

The applicant targets sandy to loamy soils 0.6 to 1.2m deep.

Table 4: Explanation of symbols for the geological map and approximate ages (Thamm and Johnson, 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project. (Bamford, 2019:8)

Symbol	Group/Formation	Lithology	Approximate Age
Da	Adolphspoort Fm, Traka Subgroup, Bokkeveld Group, Cape SG	Siltstone, shale, argillaceous sandstone	Devonian
Dw	Waboomberg Fm, Bidouw Subgroup, Bokkeveld Group, Cape SG	Mudrock, siltstone, sandstone	Devonian
Dh	Hex River Fm, Ceres Subgroup, Bokkeveld Group, Cape SG	Protosandstone, siltstone	Devonian
Db	Baviaanskloof Fm, Nardouw Subgroup, Table Mountain Group, Cape SG	Micaceous sandstone	Devonian
Ss	Skurweberg Fm, Nardouw Subgroup, Table Mountain Group, Cape SG	sandstone	Silurian
Sg	Goudini Fm, Nardouw Subgroup, Table Mountain Group, Cape SG	Sandstone	Silurian
Os	Skiereiland Peninsular Fm, Table Mountain Group, Cape SG	Quartzitic sandstone, shale and conglomerate	Ordovician

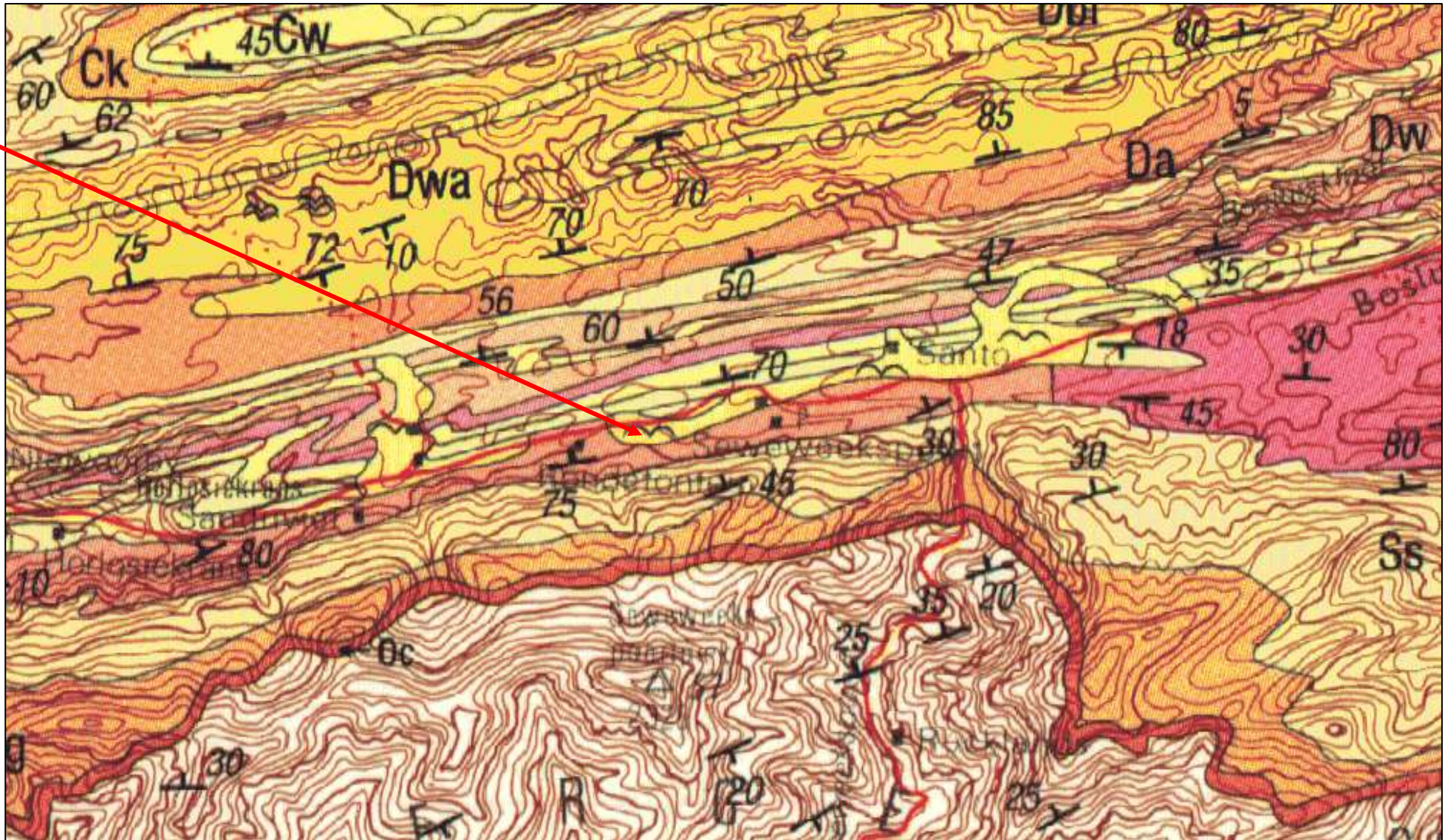


Figure 3: The distribution of geological features in the study area.

2) Climate:

Regional Climate:-

The weather data for Laingsburg Municipality is obtained from weather stations in Laingsburg town and Vleiland and shows that Laingsburg Municipality has a typical Karoo climate.

2.1 **Temperature**

The average monthly temperature and precipitation for Laingsburg town and Vleiland indicates that the maximum temperatures are experienced between December and March with the highest being in the January and February months with Vleiland appears to be approximately 6°C higher than Laingsburg town that records Vleiland at 16°C. The lowest temperatures are experienced between June and July at about 4°C. The mean annual minimum and maximum temperature are 9°C and 23°C for Laingsburg and 10°C and 22°C for Vleiland respectively.

2.2 **Rainfall**

The highest rainfall months are recorded between March and June with the highest rainfall in March for Laingsburg town and between February and November for Vleiland. It appears that Vleiland has generally consistent rainfall throughout the year. The total annual mean rainfall for Laingsburg town is 110mm pa and for Vleiland is 230mm pa. Laingsburg Municipality receives an average annual rainfall of about 175mm. However, only 9mm of rainfall was recorded in 2006, one of the driest rainfall seasons in years. Frost occurs during the winter months June to August.

The mean annual rainfall for the region is 300 mm. However, as a result of the proximity to the Klein Swartberg which receives a considerably higher rainfall of up 580 mm, it is considered highly likely that the site will also receive a higher rainfall than the regional norm (van Rensburg, 2019:16).

2.3 **Wind**

The predominant wind direction is easterly. This is followed by south-south-westerly, westerly and west-north-westerly directions.

3) **Topography:**

The map below shows the topography of the study area. The Municipal area is generally undulating with mountain ranges rising above the general level of the Karoo plains to the north and south. The general altitude of the Municipality is approximately 206m (676ft) above sea level and the highest mountains the Seweweekspoort Peak raises

approximately 2320m (7628ft) (IDP, 2007-2012). The difference in altitude in the study area ranges from about 500m in the river valleys, to over 2320m on the mountain peaks. The mountain ranges create a significant change in the relief of the area from north to south. The Skaapberg, Karookop and Kromberge form the northern most boundary of the study area. The area south of the N1 is dominated by east-west mountain ranges including the Klein Swartberge, containing the highest mountains in the municipality, and the Anysberg which form the southern boundary. The Elandsberge, De Witteberge, De Waaihoekberg, Anysberg, Klein Swartberge and the Matjiesgoetberge are found in a band south of the N1 and their valleys along the Bobbejaans and Buffels Rivers contain the settlements of the Municipality.

The site is situated at the foot of the north facing slopes of the Klein Swartberg where sands eroding from the slopes are continuously deposited (van Rensburg, 2019:3). The site does contain some transformation in the form of a large artificial impoundment and embankment but is still largely natural. Rainfall along the peaks and steep slopes create runoff with a high velocity, which therefore cause erosion of the sandy soils down the slope to the foot of the mountain. Here the slope drastically and suddenly decreases to a flat plain with low ridges to the north. This essentially halts water flow which allows for the deposition of the sands and forms an alluvial plain. The low ridge to the north functions as a barrier and water flow therefore takes place in parallel to the mountain slope, i.e. west to east (van Rensburg, 2019:16).

4) **Soils:**

The geology of this mountain range consists of the Table Mountain Sandstone Group which easily erodes into a fine sand. Soils on the site is dominated by deep sands, although soils with a higher loam and clay content become more prominent along the northern border of the site as well as along the two streams which are deeply incised into the surrounding sands (van Rensburg, 2019:16).

5. **Land Capability and Land Use:**

The map shows the land capability based on the soil classification. The majority of the land is classified as Group B with classifications of 5, 6 and 9 which are most suitable for grazing. The application area is suitable for grazing.

There are small pockets suitable for arable agriculture:

- west of the R323;
- north-west and west of Matjiesfontein; and,
- around Vleiland and Rouxpos. However, it is only around Vleiland and Rouxpos where there is sufficient water for crop farming. The portion around the Floriskraal dam on the Buffels River, south-east of Laingsburg, is identified for wildlife (game farming).



Figure 4. Agricultural Land Use

Enterprise contribution to agricultural production

The majority of the income is obtained from sheep farming 68%, 55% from meat, i.e. dorper sheep, and wool contributes to 12% from merino sheep. 71% comes from livestock production, with 29% from crop production. Of the R130 million production income the sheep farming contributes R77 million and production of vegetable seeds R16 million. Olives and essential oils are the highest producing long term crops at R8 000 and R40 000 per unit. Lucerne and peaches have produced the greatest gross margins under the short term crops. Under the livestock the boer goat and cattle are priced at R1 000 to R4 500 per unit. (OABS, 2011) It should be noted that lucerne and peaches are the biggest contributor to the short term crop sector and sheep dominate the

livestock sector, by contributing almost R51 million towards the gross margin. (OABS, 2011) Agricultural Statistics 2010 estimates the agricultural debt for Laingsburg Municipality as calculated at R211 651 451 million which is about 17% of its asset value. The table below shows an average contribution obtainable from a typical farm.

Total district	Average farm	
Number of farms	268	1
Total agricultural (ha)	878,100	3,276
Total arable (ha)	2,110	8
Jobs	1000	4
GDP contribution	R131,307,025	R489,952
Export	R11,495,715	R42,894

Table 5: Average farm contribution (source: OABS, 2011)

In terms of farm sizes it should be noted that that modern agriculture dictates that sustainable farming units become bigger due to decreasing margins on produce. The table shows the distribution of the frequency of farm sizes. The greatest number of cadastrals are between 3 000 – 5 000ha.

DISTRICT	Number of Farm Enterprises per size category							
	<100ha	100-500ha	500-1000ha	1000-2000ha	2000-3000ha	3000-5000ha	5000-10000ha	>10000ha
BW	53	12	16	35	45	71	101	26
LB	24	20	16	45	31	58	34	13
MB	2	10	3	7	17	30	30	8
PA	48	18	20	30	28	35	46	8

Table 6 Size distribution of farming enterprises (source: Agri Informatics, 2011)

The table below shows that 3 650ha is the minimum farm size for 500 SSU's in Laingsburg at a grazing capacity of 7.3ha/SSU.

DISTRICT	Grazing Capacity (ha/SSU)	Farm size 500 SSU's (ha)
Beaufort-West	4.3	2150
Laingsburg	7.3	3650
Murraysburg	2.9	1450
Prince Albert	6.0	3000

Table 7: Minimum farm size for a 500 SSU enterprise (source: Agri Informatics, 2011)

The table below shows that a number of farm enterprises are significantly smaller than the minimum size of small sheep farms.

DISTRICT	Grazing Capacity (ha/SSU)	Farm size 500 SSU's (ha)
Beaufort-West	120	32.6%
Laingsburg	161	65.7%
Murraysburg	17	15.7%
Prince Albert	141	61.3%

Table 8: Number of farms smaller than the minimum required size (source: Agri Informatics, 2011)

Agricultural Land Composition

Veld and mountain land uses approximately 97% of the land in the municipality

ITEM	%	Hectares (ha)
Irrigation	0.13%	1,110
Irrigation – Orchards & LT Crops	0.13%	1,100
Irrigation – Short term crops	0.00%	10
Dryland	0.11%	1,000
Veld	85%	743,275
Mountain land	15%	131,715
Odd land	0.11%	1,000
TOTAL	100%	878,100

Table 9: Agricultural land composition – Laingsburg district (source: OABS, 2011)

Land use before mining

The historical agricultural use of the land is for sheep, cattle or game farming.

Evidence of disturbance

In general, the site is considered to be largely natural, but as indicated above is subjected to significant disturbance, both natural and artificially induced. In addition, another large impact on the site and especially affecting the two small stream systems is a large artificial impoundment with an earthen embankment. This inundates and transforms a significant portion of the natural vegetation but also modifies the flow and flooding regime of the two small stream systems significantly. (van Rensburg, 2019:15).

Secondly, the site is also affected by relatively high levels of trampling and overgrazing by domestic stock which also decreases the vegetation cover and increases erosion of the sandy soils. Other smaller impacts such as the culverts and drainage from the adjacent gravel road will also contribute to erosion. (van Rensburg, 2019:15).

Existing structures

The site does contain some transformation in the form of a large artificial impoundment and embankment but is still largely natural. There is also a small dirt track on the dam shore. Other smaller impacts such as the culverts and drainage from the adjacent gravel road will also contribute to erosion.

6. **Surface Water:**

An Ecological and Wetland Assessment for the proposed sand mining operations on Bezemfontein was done by Daruis van Rensburg.

Two prominent and largely natural stream system are present on the site. The proposed mining development will excavate sand from a low mound between the streams. Although water is slowed drastically at the foot of the mountain, large flow events or flooding has caused the formation of two prominent channels, incised into the sandy alluvial plain. These channels form two prominent streams, also associated with wetland conditions.

Wetland Assessment

The site consists of the sand mining area with extent of approximately 5 hectares and contains two small stream system bordering the site to the north and south. The streams will be excluded from mining operations but may still be affected by it.

Obligate wetland vegetation was utilized to determine the presence and border of wetlands. Soil samples were used to determine the border and also to confirm the presence of wetland soils along the small streams on the site. Soil samples were investigated for the presence of anaerobic evidence which characterizes wetland soils. Soil samples taken along the main channel of these streams contain clear signs of wetland conditions and is also indicative of a perennial zone of wetness.

Obligate wetland species are only able to inhabit wetland areas and as a result where they occur wetland conditions can be assumed to occur. The obligate wetland cape reed (*Elegia capensis*), riparian grass (*Pennisetum macrourum*) and geophyte (*Watsonia angusta*) was utilised to provide a quite accurate boundary of wetland conditions and the floodplain of these streams.

Along the northern stream system there is also an artificial crescent shaped channel and berm. This furrow or channel diverts a portion of the flow in the stream although its intended function is unclear. It has however also manifested some wetland conditions due to continued inundation and saturated soil conditions. These wetland conditions are however artificial and do not perform any function which is important to the continued natural functioning of the stream. This channel and berm can therefore be included in the sand excavation operations without having a large impact on the functioning of the stream.

Wetland conditions are mostly confined to the main channel and decreases from the edge of the main channel. However, the northern stream contains a portion with a lower gradient, a more diffuse flow regime and consequently also contains elements of an unchanneled valley-bottom wetland (SANBI 2009).

In addition, where runoff from the steep mountain slopes to the south reaches the alluvial plain it is also likely that seepage areas may be present. These will however be located upstream of the mining area and not in close proximity and should therefore not be affected by mining operations and has therefore not been included in this assessment.

Description of the stream systems:

The main channel of these streams are quite narrow and dominated by low sedges and semi-aquatic vegetation adapted to almost permanently saturated soils. The border between the marginal and lower zone can also be differentiated as a sudden increase in the slope which are quite steep along the banks of the streams. The marginal zone can also be regarded as mostly natural although trampling by cattle is evident in some areas.

The lower zone along the banks of the streams are clearly defined and consists of a definite and steep slope. Obligate wetland vegetation is present and are dominated by cape reed (*Elegia capensis*), geophytes (*Watsonia angusta*) and riparian grass (*Pennistenum macrourum*). The vegetation may however also be much lower in density as a result of the steep slopes of the banks and significant erosion. Wetland conditions should therefore still be regarded as present, though only on a seasonal basis. The lower zone can be regarded as largely natural although significant erosion is present, this however also considered part of the natural cycle of these systems. The upper zone at the site is clearly visible as a decrease in slope and consists exclusively of terrestrial vegetation with wetland species absent. The zone is considered as the edge of these streams and indicate the absence of wetland conditions. It is also considered to be largely intact and unmodified.

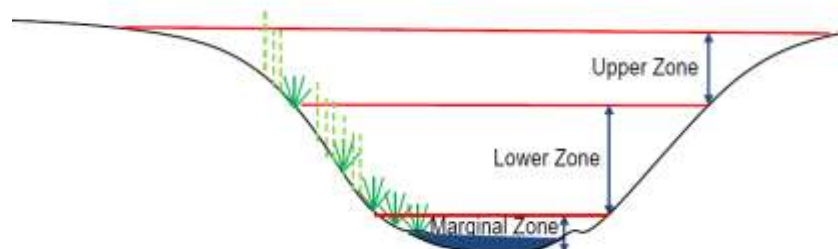


Figure 5. Illustration showing the different riparian zones along the two streams on the site (van Rensburg, 2019:24).

An Index of Habitat Integrity (IHI) was conducted for the two affected streams. The results of the IHI indicated that the study area has an Instream IHI of Category C: Moderately Modified and Riparian IHI of Category C: Moderately Modified. This can be mostly attributed to the modification of the streams brought about by the artificial impoundment.

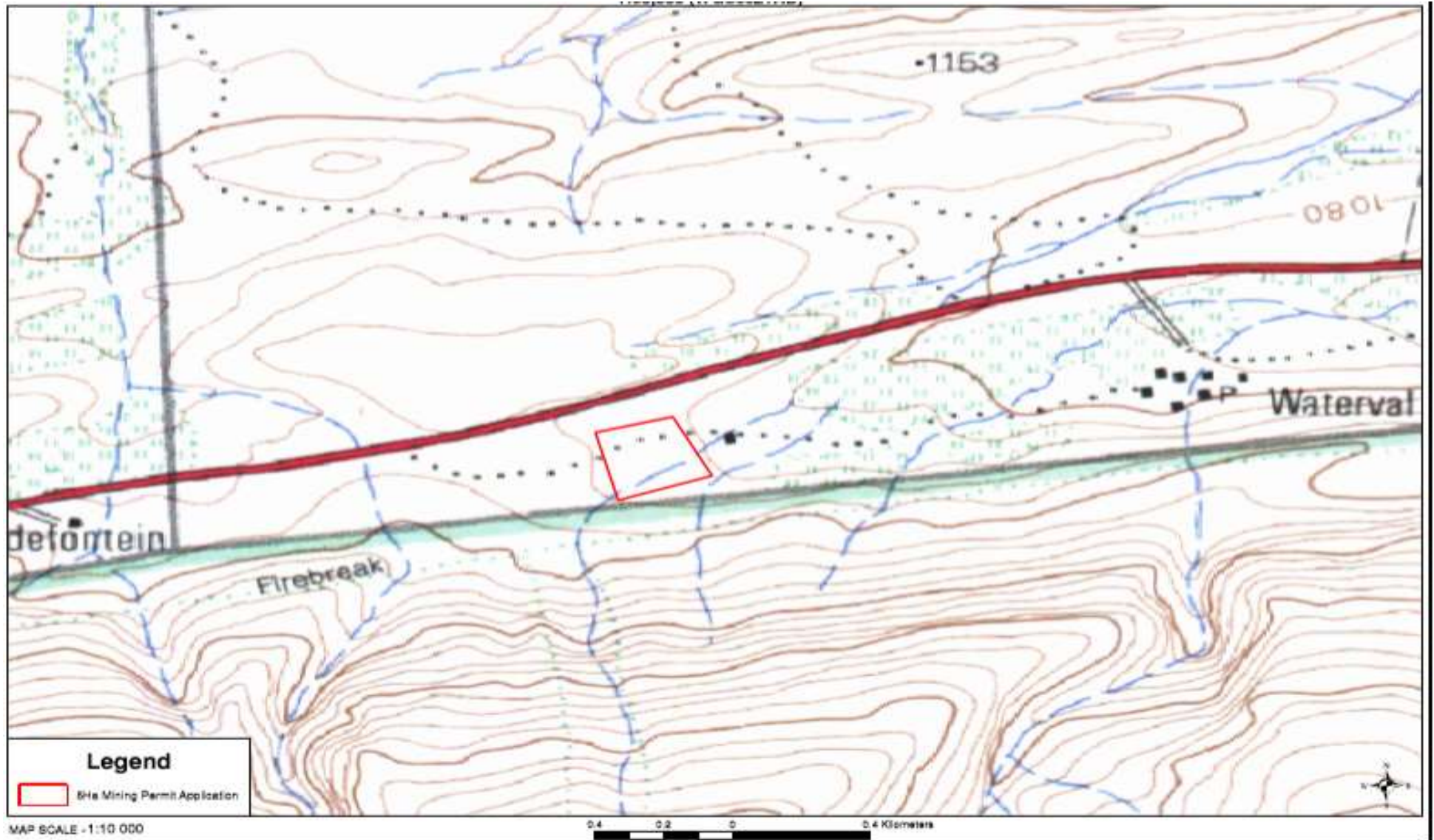


Figure 6. Surface Water Map



Figure 7. Satellite image with wetlands indicated (courtesy of Van Rensburg, 2019)

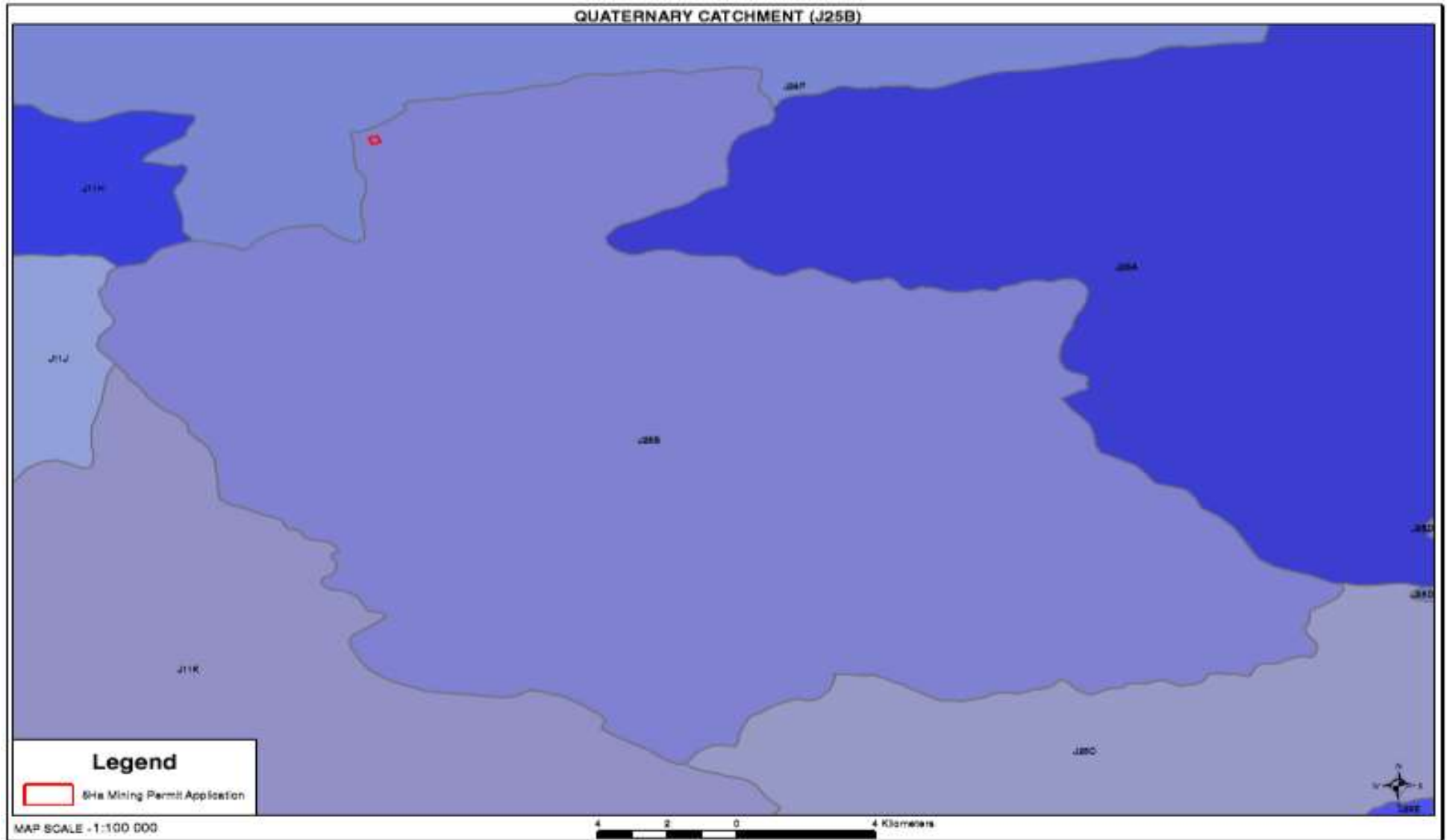


Figure 8. Quaternary Catchment Map (J25B for the site indicated in red)

7. **Ground Water:**

Mean depth of the water table varies with the annual rainfall. The mean water depth of the water table in summer is approximately 300 m. The mean water depth of the water table in winter is approximately 100 m. The excavations planned for 0.6m – 1.2m below surface will never intersect ground water.

8. **Air Quality and Noise:**

With reference to the Scheduled Processes under the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), no scheduled process relates to any proposed mining activity.

The current source of air pollution in the area stems from vehicles travelling on the gravel roads of the area. No farming activities related to dust generation, such as ploughing, are known to occur in the area.

The potential source of air pollution on Bezemfontein will be nuisance dust generated by the earth moving equipment as well as from the movement of vehicles on the site roads. Gas emissions from the vehicles will be negligible and within legal limits. Generated dust will be visible from the secondary gravel road and to local farm residents. Any potential fall-out dust will impact those who reside on the farm.

Noise on site will be generated by the earth moving equipment as well as vehicles. Although these activities do generate noise, the overall impact can be described as negligible. The most susceptible receptors of noise will be the local farm residents.

9. **Flora:**

A field and desktop study was done by Daruis van Rensburg. Mucina and Rutherford (2006) was used to determine the vegetation types of the mining area. Field guides used for the identification of riparian species includes Bromilow (1995 & 2010), Coates-Palgrave (2002), Fish *et al* (2015), Gerber *et al* (2004), Gibbs-Russell *et al* (1990), Griffiths & Picker (2015), Manning (2007 & 2009), Smith *et al* (1998), Van Ginkel *et al* (2011), Van Oudtshoorn (2004) and Vlok & Schutte-Vlok (2010)

The site survey was conducted in spring (October 2019) when most species are in flower and consequently species identification is considered adequate and accurate. Furthermore, the area burned about four years previously (pers. comm. J. Hunlun) and was not senescent at the time of survey and species diversity considered close to its climax.

However, re-establishment of vegetation after the recent fire is evidently not high. This is considered most likely as a result of two-fold disturbance on the site. The site experiences a high natural disturbance regime as sands eroded from the slopes of the mountain is continuously deposited on the site and the sandy soils are also highly mobile, continuously shifting and is easily eroded. Secondly, the site is also affected by relatively high levels of trampling and overgrazing by domestic stock which also decreases the vegetation cover and increases erosion of the sandy soils. Other smaller impacts such as the culverts and drainage from the adjacent gravel road will also contribute to erosion.

Geologically the site is still dominated by the Table Mountain Sandstone Formation though shales of the Witteberg Group becomes evident along the northern border of the site. As a result, the site can also be regarded as forming an ecotone between the fynbos vegetation associated with the sandy soils derived from the sandstone and the renosterveld vegetation associated with the clayey soils derived from the adjacent shales. This is also reflected in the species composition on the site which contains elements of both the adjacent North Swartberg Sandstone Fynbos (FFs 23) as well as the Matjiesfontein Shale Rensoterveld (FRs 6).

The vegetation structure in the majority of the site occurring on the central alluvial sand embankment is dominated by a very sparse shrub, grass and cape reed layer. The vegetation becomes much denser along the two streams where cape reeds, shrubs and grasses become dominant. The Rhinoceros Bush (*Elytropappus rhinocerotis*) is also prominent in most areas of the site but becomes especially abundant along the northern border of the site where shales are more prominent.

The vegetation in the central portion of the site is situated on the elevated alluvial sand embankment. The soils are fast draining with a low soil moisture content and vegetation here is better adapted to this. Several vegetation structural elements are present and will be listed separately. A very sparse grass layer is present represented by a few species adapted to arid environments. These include *Ehrharta calycina*, *Tribolium hispidum*, *Stipagrostis* sp. and *Pentameris airoides*. The cape reed layer is somewhat more prominent and represented by scattered clumps and include *Hypodiscus striatus*, *Restio gaudichaudianus* and *Willdenowia bolusii*. Low and dwarf shrubs are quite abundant and forms a significant component. Prominent species include *Stoebe plumosa*, *Pteronia stricta*, *Metalasia densa*, *Erica quadrangularis*, *Chrysocoma ciliata*, *Rafnia racemosa* subsp. *racemosa*, *Erica cerinthoides* and *Euryops lateriflorus*. Associated with this layer is also several proteoid species which include *Leucadendron barkerae*, *L. eucalyptifolium*, *Protea eximia* and *P. repens*. A few herbaceous species are also present and include *Pelargonium ovale*, *Psammotropha anguina* and *Helichrysum acrophilum*. Another vegetation element which also substantiates that this portion is dominated by arid fynbos is several succulent species which include *Crassula cotyledonis*, *C. dependens*, *Antimima* sp., *Ruschia caroli* and *Lampranthus* sp.

In conclusion, the vegetation on the high alluvial sand embankment consists of a moderately diverse species composition represented by several growth forms or structural elements although the vegetation layer is quite sparse. No species of high conservation significance or endangered, rare or Red Listed species are present and all species on the site are considered relatively widespread. However, a high proportion of the species are still protected with five protected proteoid species, two *Erica* species and three *Vygie* species occurring in this area. However, the proposed mining area is of small extent and seeing as none of these species are rare, endangered or localised their loss is not anticipated to be high. Permits will however have to be acquired to remove these plants. Furthermore, provided that comprehensive rehabilitation and adequate management of topsoil is undertaken it is highly likely that several of these will be able to re-establish on the site after mining has ceased. This will also be the portion of the site which will be most affected by sand excavation.

The northern border of the site contains a much higher proportion of shale with loam/clayey soils and this alters the vegetation structure and species composition significantly. This portion is also somewhat degraded by the proximity of the gravel road. The low shrub, *Elytropappus rhinocerotis*, is dominant here although a few other dwarf shrubs such as *Eriocapalus africanus*, *Chrysocoma ciliata* and *Pelargonium fruticosum* is also present. A few herbaceous species are also present with some of these also being indicative of disturbance, including *Gomphocarpus fruticosus*, *Berkheya sp.* and *Carpobrotus edulis*. This portion of the site is considered to have a low species diversity and consequently a low sensitivity and conservation value. It will however be least affected by the proposed sand excavation but will be affected by a proposed access road.

The vegetation along the two stream systems are much the same and will be discussed together. Here the vegetation cover becomes much denser, though dominated by fewer species. The cape reed, *Elegia capensis*, forms dense stands along these streams and is also a reliable indicator of wetland areas. The riparian grass, *Pennisetum macrourum*, is also abundant, especially along the northern stream. The protected geophyte, *Watsonia angusta*, is also abundant along the streams. Other prominent though scattered shrubs occurring along the streams include *Psoralea arida* (sp. nov.), *Othonna parviflora*, *Anthopsermum aethiopicum*, *Helichrysum petiolare*, *Selago glomerata*, *Lobelia linearis* and *Erica discolor*. The above vegetation is most prominent along the banks of the streams whilst the narrow main channel contains a much shorter vegetation layer dominated by sedges, rushes and a few herbaceous species. This include the sedge, *Ficinia nodosa*, *Epischoenus sp.* and *Isolepis setacea*, the rush, *Juncus lomatoophyllus*, the cape reed, *Hygrophilus rattrayi*, the herb, *Centella asiatica* and the geophyte, *Zantedeschia aethiopica*. Though not diverse or containing a high amount of protected species these streams are still considered to have

a high conservation value. They perform important functions and will influence downstream sections.

Table 10 : Species list. (protected species are coloured orange)

Species	Growth form
<i>Alytropappus rhinocerotis</i>	Shrub
<i>Anthopsermum aethiopicum</i>	Shrub
<i>Antimima sp.</i>	Succulent
<i>Aspalathus hirta</i>	Shrub
<i>Aspalathus rubens</i>	Dwarf shrub
<i>Berkheya sp.</i>	Herb
<i>Carpobrotus edulis</i>	Succulent
<i>Centella asiatica</i>	Herb
<i>Chrysocoma ciliata</i>	Dwarf shrub
<i>Crassula cotyledonis</i>	Succulent
<i>Crassula dependens</i>	Succulent
<i>Cynodon dactylon</i>	Grass
<i>Cyperus thunbergii</i>	Sedge
<i>Dipcadi brevifolium</i>	Geophyte
<i>Drosera capensis</i>	Herb
<i>Ehrharta calycina</i>	Grass
<i>Elegia capensis</i>	Cape reed
<i>Epischoenus sp.</i>	Sedge
<i>Erica cerinthoides</i>	Heath
<i>Erica discolor</i>	Heath
<i>Erica quadrangularis</i>	Heath
<i>Ericephalus africanus</i>	Dwarf shrub
<i>Eriospermum capense</i>	Geophyte
<i>Euryops lateriflorus</i>	Shrub
<i>Ficinia nodosa</i>	Sedge

<i>Gomphocarpus fruticosus</i>	Shrub
<i>Helichrysum acrophilum</i>	Herb
<i>Helichrysum petiolare</i>	Shrub
<i>Hygrophilus rattrayi</i>	Cape reed
<i>Hypodsicus striatus</i>	Cape reed
<i>Isolepis setacea</i>	Sedge
<i>Juncus lomatophyllus</i>	Rush
<i>Lampranthus sp.</i>	Succulent
<i>Leucadendron barkerae</i>	Shrub
<i>Leucadendron eucalyptifolium</i>	Shrub
<i>Leysera tenella</i>	Herb
<i>Lobelia linearis</i>	Shrub
<i>Metalasia densa</i>	Shrub
<i>Othonna parviflora</i>	Shrub
<i>Pelargonium fruticosum</i>	Dwarf shrub
<i>Pelargonium ovale</i>	Herb
<i>Pelargonium sp.</i>	Herb
<i>Pennisetum macrourum</i>	Grass
<i>Pentameris airoides</i>	Grass
<i>Protea eximia</i>	Shrub
<i>Protea laurifolia</i>	Shrub
<i>Protea repens</i>	Shrub
<i>Psammotropha anguina</i>	Herb
<i>Psoralea arida sp. nov.</i>	Shrub
<i>Pteronia stricta</i>	Shrub
<i>Rafnia racemosa subsp. racemosa</i>	Shrub
<i>Restio gaudichaudianus</i>	Cape reed
<i>Ruschia caroli</i>	Succulent

<i>Selago glomerata</i>	Dwarf shrub
<i>Senecio juniperinus</i>	Herb
<i>Stipagrostis sp.</i>	Grass
<i>Stoebe plumosa</i>	Dwarf shrub
<i>Trachyandra sp.</i>	Geophyte
<i>Tribolium hispidum</i>	Grass
<i>Wahlenbergia sp.</i>	Herb
<i>Watsonia angusta</i>	Geophyte
<i>Willdenowia bolusii</i>	Cape reed
<i>Zantedeschia aethiopica</i>	Geophyte

A note should also be made about *Protea convexa*. This species is currently listed as being Critically Endangered (CR) and has previously been recorded in this immediate vicinity (SANBI 2016). This is however a very distinctive species and can with certainty be regarded as being absent from the site. It is much more likely to occur on the low shale ridges to the north of the site.

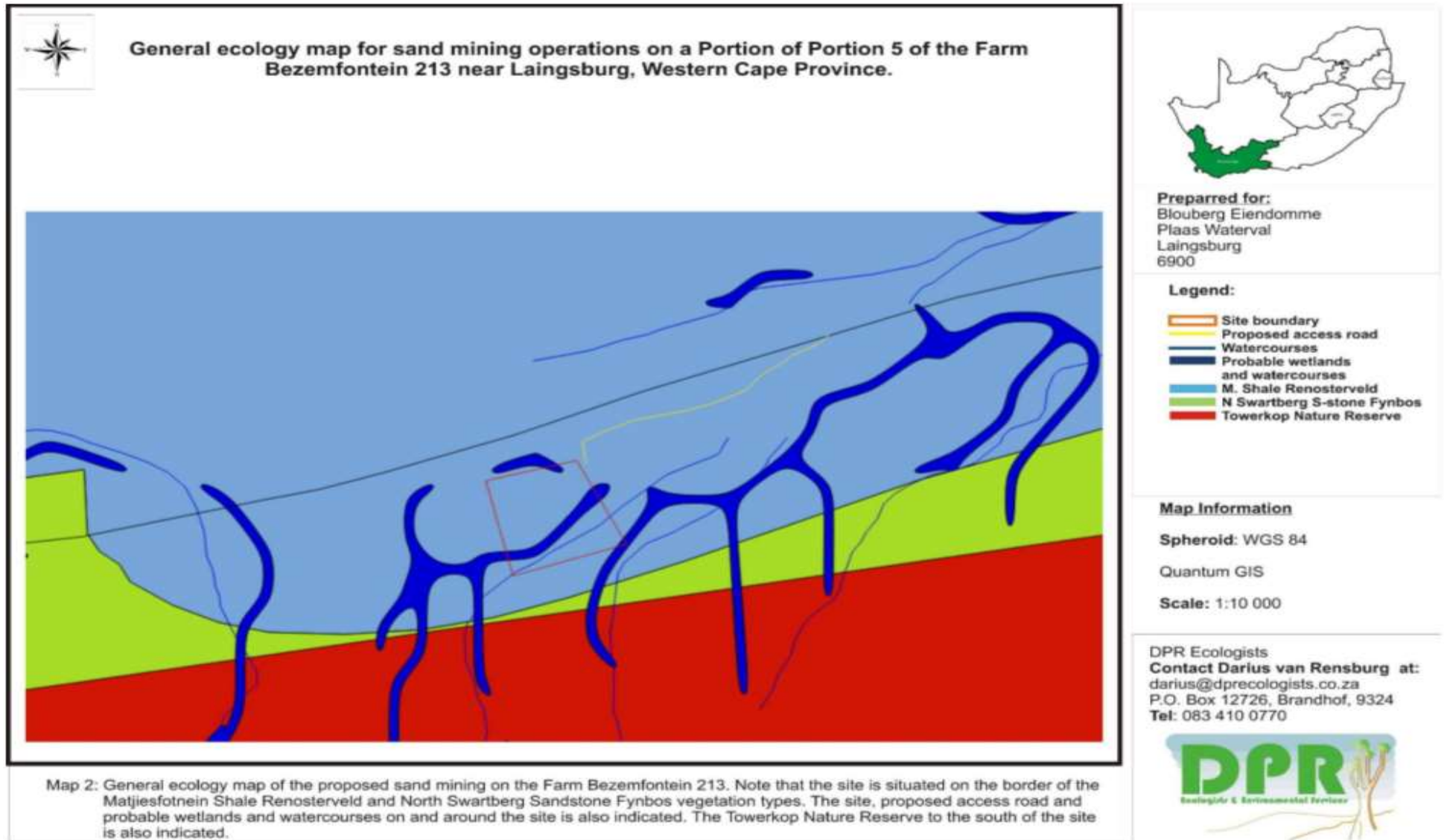


Figure 9. The distribution vegetation units in the study area (Map taken out of the ecological and wetland study by Darius van Rensburg)

(10) **Fauna:**

According to Section 3(a) and 4(a) of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009, no person may, without a permit by means of hunt, kill, poison, capture, disturb, or injure any protected or specially protected animals. Furthermore, Section 12(1) of NCNCA states that no person may, on a land of which he or she is not the owner, hunt a wild animal without the written permission from the landowner.

A field study was done by Daruis van Rensburg to identify terrestrial fauna in the proposed mining area. Field guides used for the identification of species include Smithers (1986) and Child *et al* (2016).

(a) **Mammals**

The site contains several signs and tracks of mammal species and it is considered likely that the mammal population on the site will be close to natural. Watercourses, especially perennial systems, contain a higher moisture regime compared to surrounding habitats and are therefore able to produce a much higher biomass with a higher diversity of habitat. As a result they often sustain a varied and significant mammal population.

Tracks and signs of mammals included the following:

Tunnels of one of the Golden Mole species occur along the shore of the artificial dam on the site. According to distribution data this can only be either the Cape Golden Mole (*Chrysochloris asiatica*) or the Fynbos Golden Mole (*Amblysomus corriae*). Of these the former is listed as being of Least Concern (LC) whilst the latter is listed as Near Threatened (NT). The proposed mining activities are anticipated to have an impact on this species since removal of sand will directly affect the habitat. The extent of operations is however small which therefore also limit the area of impact.

Dung of a small antelope were observed and is most likely a Common Duiker (*Sylvicapra grimmia*) or Steenbok (*Raphicerus campestris*). Although both are widespread and common their presence does indicate that the site is still able to sustain a significant population of mammals.

Mammal species likely to occur on the site has been determined by means of FitzPatrick Institute of African Ornithology (2019). Two Red Listed species has been noted to occur in this region though the

proposed mining operations are not anticipated to have any direct impact on them.

Table 11 : Red listed mammals occurring or likely to occur in the study area (Childet al, 2016)

Common name	Scientific name	Status
Vaal Rhebok	<i>Pelea capreolus</i>	Near Threatened (NT)
Leopard	<i>Panthera pardus</i>	Vulnerable (VU)

Table 12: Likely mammal species in the region.

Family	Common name	Scientific name	Status
Bovidae	Klipspringer	<i>Oreotragus oreotragus</i>	
	Vaal Rhebok	<i>Pelea capreolus</i>	Near Threatened (NT)
	Cape Grysbok	<i>Raphicerus melanotis</i>	
	Bush Duiker	<i>Sylvicapra grimmia</i>	
	Greater Kudu	<i>Tragelaphus strepsiceros</i>	
Canidae	Black-backed Jackal	<i>Canis mesomelas</i>	
Cercopithecidae	Chacma Baboon	<i>Papio ursinus</i>	
Felidae	Caracal	<i>Caracal caracal</i>	
	Wildcat	<i>Felis silvestris</i>	
	Leopard	<i>Panthera pardus</i>	Vulnerable (VU)
Herpestidae	Marsh Mongoose	<i>Atilax paludinosus</i>	
	Yellow Mongoose	<i>Cynictis penicillata</i>	
	Egyptian Mongoose	<i>Herpestes ichneumon</i>	
	Cape Gray Mongoose	<i>Herpestes pulverulentus</i>	

Hyaenidae	Aardwolf	<i>Proteles cristata</i>
Hystricidae	Porcupine	<i>Hystrix africaeaustralis</i>
Leporidae	Smith's Red Rock Rabbit	<i>Pronolagus rupestris</i>
Molossidae	Egyptian Free- tailed Bat	<i>Tadarida aegyptiaca</i>
Muridae	Namaqua Rock Mouse	<i>Aethomys namaquensis</i>
Mustelidae	Honey Badger	<i>Mellivora capensis</i>
Orycteropodidae	Aardvark	<i>Orycteropus afer</i>
Procaviidae	Cape Rock Hyrax	<i>Procavia capensis</i>
Suidae	Red River Hog	<i>Potamochoerus porcus</i>
Vespertilionidae	Melcks' Serotine	<i>Pipistrellus melckorum</i>
Viverridae	Common Genet	<i>Genetta genetta</i>
Viverridae	Cape Genet (Cape Large- spotted Genet)	<i>Genetta tigrina</i>

It is recommended that any hunting, trapping or capturing be strictly prohibited. As mining activities commence they will vacate the area by their own accord. Provided that adequate rehabilitation is undertaken it is likely that the site will again be available as habitat to opportunistic species.

(11) **Critical biodiversity areas and broadscale processes:**

Degree of rarity/conservation value:

According to Mucina & Rutherford (2006) the area consists of Matjiesfontein Shale Renosterveld (FRs 6). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004). It is not currently subjected to any pronounced transformation pressures and the conservation value of this vegetation type is therefore relatively low.

The Western Cape Biodiversity Spatial Plan (2017) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas. The site in question is listed as being largely an Other Natural Area (ONA) although the southern stream system is also listed as being an Ecological Support Area 1 and 2. However, although this is not a Critical Biodiversity Area it still functions in ecological support of such surrounding areas and supports surrounding watercourses and wetlands. This functioning and support should therefore be retained as far as possible.

Biodiversity Conservation

The Anysberg Nature Reserve and the Towerkop Nature Reserve are Type 1 nature reserves, i.e. a national park / provincial nature reserve. The area south of Rouxpos, the Buffelspoort Nature Reserve is a mountain catchment area or a DWAF forest area. This is a Type 2 nature reserve. The Gamkaspoort and the Klein Swartberg catchment and nature reserve areas are located along the eastern and the south-eastern boundaries of the site.

Habitat diversity and species richness:

Habitat diversity on the site is considered to be at least moderate, being dominated by the alluvial sandy plain, although the adjacent stream systems considerably increase the habitat diversity. These will however be excluded from mining operations. As a result the species diversity on the site is also considered to be moderate.

Presence of rare and endangered species:

The site also does not contain any rare or endangered species of high conservation value though it may still be possible that such a species may be present on the site. However, a high proportion of protected species are present, including five protected proteoid species, two Erica species and three Vygie species occurring in this area. These are all relatively widespread and common but still retain a significant conservation value.

Ecological function:

The terrestrial function of the site still largely intact though the functioning of the adjacent streams has been modified to a significant degree. The site functions as habitat for a variety of fauna, supports a specific vegetation type and also functions in terms of water transport with regard to the stream systems. The site is still largely natural, supports the natural vegetation type and will therefore still provide habitat for a relatively natural faunal population. The stream systems

function in terms of water transportation, flood dissipation, wetland and riparian habitat and bioremediation and are therefore highly important in terms of ecological function. Their functioning has however also been modified to a large degree by the artificial impoundment which modifies the flow and flooding regime to a large degree.

Percentage ground cover:

The site has burned approximately four years previously, however, re-establishment of vegetation has not been sufficient and the percentage ground cover is relatively low in comparison to the natural condition. This is most likely as a result of a high natural disturbance regime as sands eroded from the slopes of the mountain is continuously deposited on the site and the sandy soils are also highly mobile, continuously shifting and is easily eroded. In addition, relatively high levels of trampling and overgrazing by domestic stock will also decrease the vegetation cover and increases erosion of the sandy soils.

Vegetation structure:

The vegetation structure on the site is considered to be natural to a large degree although the previous burn and current disturbances on the site does decrease the density somewhat and promotes a higher degree of herbaceous pioneer species.

Infestation with exotic weeds and invader plants:

Although a few indigenous pioneer species and indicators of disturbance are present no exotic species could be identified. Downstream areas do however indicate that exotic tree species are present in the area.

Degree of grazing/browsing impact:

Given the current drought conditions and utilization of the site by domestic stock the degree of trampling and overgrazing is quite high. This is especially notable with palatable species (*Pennisetum macrourum*) and high amount of trampling along the stream systems.

Signs of erosion:

The site is subjected to a high level of erosion. This is natural to a large degree due to the sandy alluvial soils but is definitely exacerbated by on site disturbances.

Terrestrial animals:

The site contains several signs and tracks of mammal species and it is considered likely that the mammal population on the site will be close to natural. Watercourses, especially perennial systems, contain a higher moisture regime compared to surrounding habitats and are therefore

able to produce a much higher biomass with a higher diversity of habitat. As a result they often sustain a varied and significant mammal population. This will most likely also be the case on the site. The proximity of the gravel road and livestock farming will likely cause some modification to the natural mammal population but is not considered significant. It may therefore also be likely that the site may contain species of conservation significance. It is also likely that the site will also contain several other mammal species but these were not observed on the site.

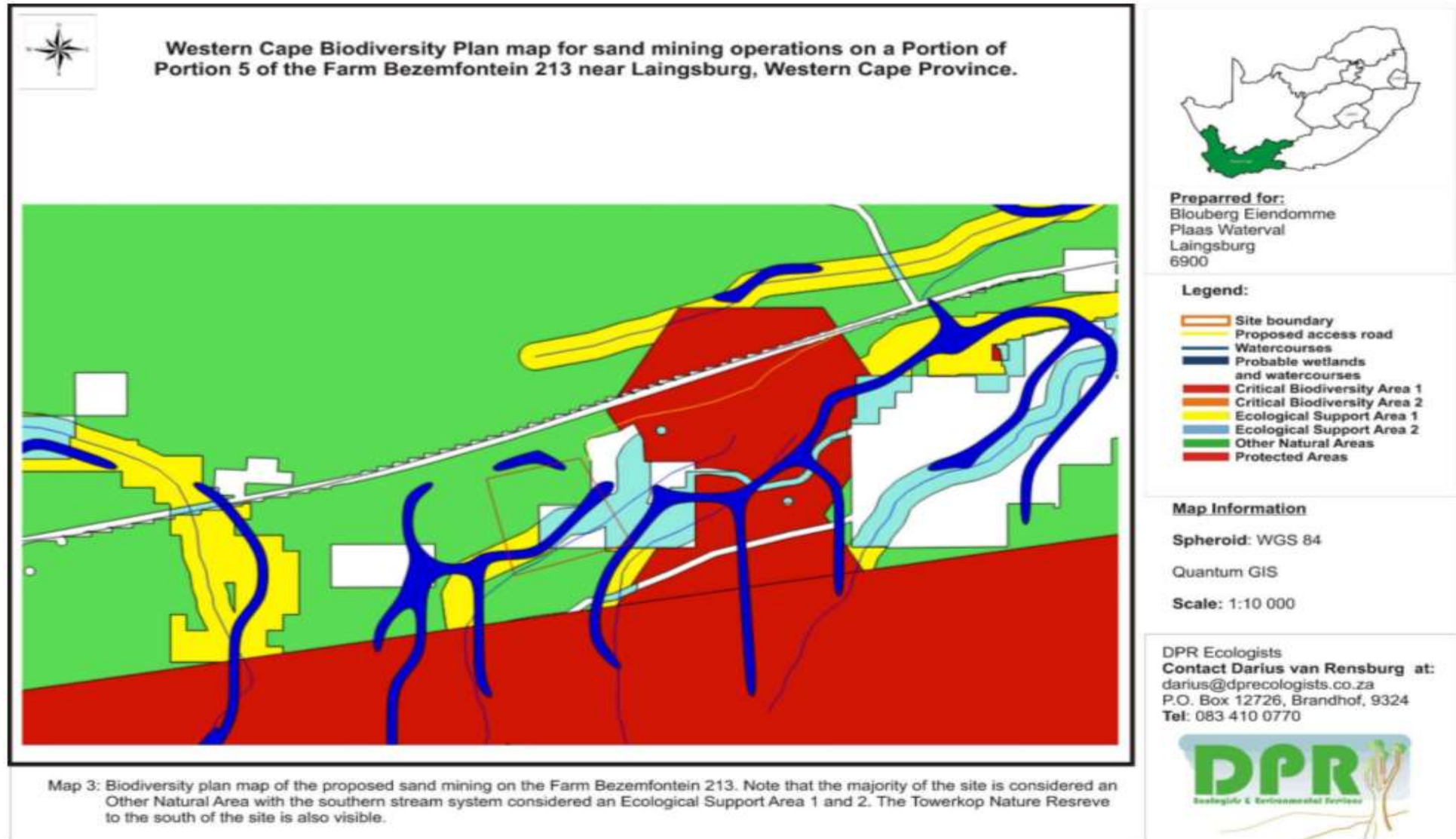


Figure 10. Biodiversity map of the proposed sand mining on the farm Bezemfontei 213 (Map taken out of the ecological and wetland study by DPR).

(12) **Socio-Economic Structure of the Region:**

Laingsburg Municipality is a Category B Municipality in the Central Karoo District. It is the smallest municipality in the Western Cape Province and in South Africa. The municipality covers an area of more than 8781, 44 square kilometres (Population density about 1 person per square km) and straddled by the N1 national road. It accessible from all the major cities of the Western Cape as well as Northern Cape, Eastern Cape, Free State and Gauteng Province.

Generally, Laingsburg is a one town Municipality. Laingsburg town has a population of 7124 people (82.3%) followed by Matjiesfontein, the second largest community, which has about 681 people. The rest of the population (1056 people) is scattered in some farms all over the Local Municipality.

Geographical positioning Laingsburg is the entry point to Central Karoo District if driving from Cape Town along N1 to Johannesburg. The municipality boarder's two Western Cape districts, the Cape Winelands District and the Eden District. The municipality also borders the Northern Cape Province on the northern side of the municipality connecting the municipality to Sutherland.

- Distance from Cape Town 276 Km
- Distance from Johannesburg 1300Km
- Distance from Beaufort West 199Km
- Distance from Ladysmith (Eden District) 110km
- Distance from Touwsriver (Cape Winelands District) 85Km
- Distance from Sutherland (Northern Cape Province) 137Km

The municipality of Laingsburg as per the Demarcation Board covers the following areas:

- Laingsburg, Matjiesfontein, Vleiland, and 250 Farms (refer detail below)
- The population of the municipal area is 8 661 and has a total number of 2604 households that live in the municipal area.
- The biggest part of the population falls within the age group of 15-35 and is mostly unemployed or works on a seasonal basis. (Source: Socio-economic Profile)
- The Municipality of Laingsburg is divided into 4 wards.



The municipal area consists of three main areas:

Area	Neighbourhoods and Settlements
Laingsburg	Bergsig, Goldnerville, Bodorp, Onderdorp, Nuwedorp and Moordenaars Karoo Farms
Matjiesfontein	The Village, Konstabel and the Witteberge farms
Vleiland	Vleiland and Klein Swartberg areas

Table 13: Municipal Area
Population and households

Total Population	(2001)	6621
	(2006)	7320
	(2010)	7989
	(2015)	8661
Households:	2604	Density: 0.99 p/km ²
Population growth rate (average annual)		
2001 - 2006		1.8%
2006 - 2011		1.8%
1995 - 2015		1.8%

Table 14: Population statistics IHS Global Insight Regional eXplorer 1029 (2.5w)

LAINGSBURG MUNICIPALITY	TOTAL	RURAL	URBAN	BACKLOG
Total number of Households	2 604	802	1 802	
Access to basic services				
HH with access to water	2144	342	1 802	460
HH with access to sanitation	1815	13	1 802	789
HH with access to electricity	1980	178	1 802	624
HH with access to refuse removal	2282	480	1 802	322

Table 15: Basic Services per area (Source: WC DoA, 2016 & Farm Worker Study)

Table 15 indicate that basic service delivery in the rural areas needs intervention and the municipality in line with their property rates process engage with farm owners in providing basic services to farmworkers as a human right in line with the rebate programme provided to Farmers. The sanitation background are taken into consideration in the municipal budget to provide VIP Toilets to the

Settlement pattern

Generally Laingsburg is a one town Municipality. Laingsburg town has a population of 7124 people (82.3%) followed by Matjiesfontein, the second largest community, which has about 681 people. The rest of the population (1056 people) is scattered in the some farms all over the Local Municipality.

Wards

The municipality is divided into 4 wards by the Demarcation board. The biggest ward in population numbers is ward 4, consisting of Goldnerville and Acacia Park. The second biggest ward is ward 1, which consisting of Bergsig (RDP Residential Area) and the “Nuwe Dorp” residential area. The 3rd biggest ward is ward 2, consisting of Matjiesfontein, Vleiland and the whole agricultural community but this ward is the biggest with regards to size. The smallest ward is ward 3 which mainly consisting out of Central Business Area, Bo Dorp and Onderdorp as well as a few farms along the urban edge of the municipality.

Education

The education facilities include a distribution of primary, secondary and private schools of the Municipality. There are 4 primary schools, one in Vleiland, one Matjiesfontein and two in Laingsburg. There is only secondary school in Laingsburg and have to serve all the primary schools. One of primary schools is a private school, children from this school leaves after grade 7 and complete their schooling in other schools outside the municipal area. Laingsburg High School’s finances is under severe pressure because it is situated in town and is classified as fee-paying school. The scholars attending is this unable to pay school fess as they are all from previously disadvantaged areas. Because there

is no income, the school is unable to contribute to the school subsidy. This leads to lack of teachers and the inability to pay school accounts. Due to this fact, scholars and teachers has to do without the necessary services. The abovementioned map also shows that the area north of the N1 Freeway is not serviced with education facilities and that the schools are generally distributed along the major road networks in the Municipality.

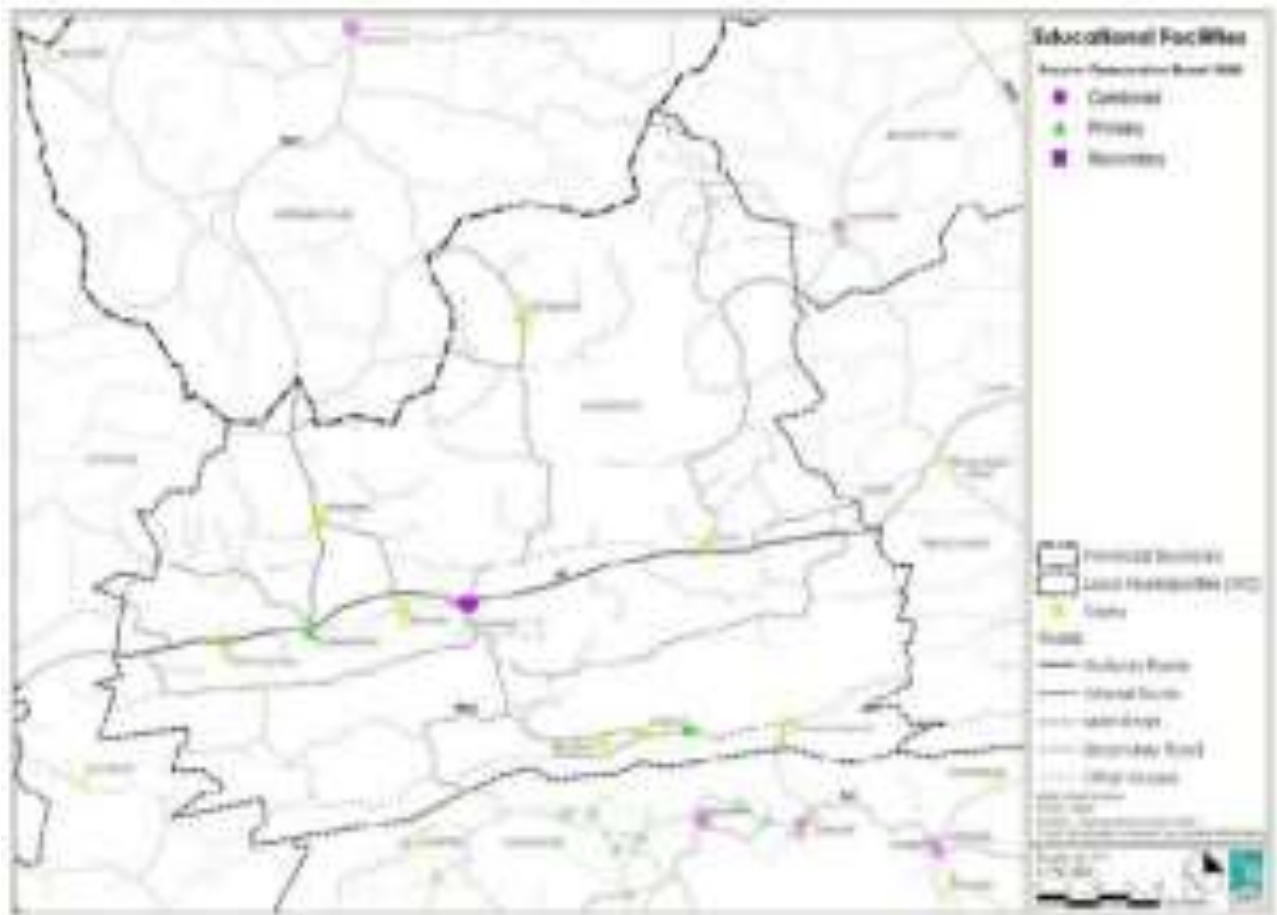


Figure 11. Educational facilities

The LSEP (2016:7) stated that Laingsburg High School as a fee-paying school reported that parents are unable to pay and it leads to an increase in drop-out and suggest that the WCED must declared the school to become a no-fee school. The following table shows the change in the education levels, considering the 2007 Census and 2015 Community Survey and Statistics obtained from IHS Global Insight.

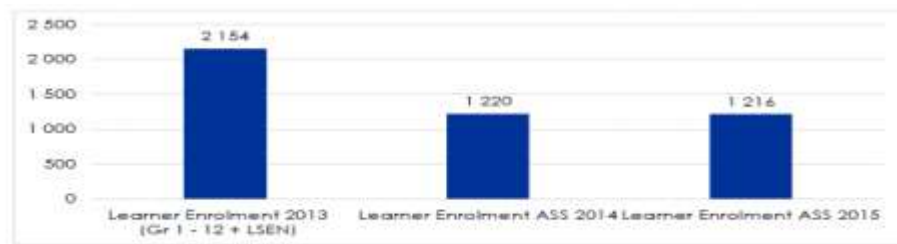
Education	2001	2007	2015	% change
No school	825	732	506	-30.8%
Some primary	1 057	1088	1131	3.9%
Complete primary	1150	1318	1403	6.4%

Education	2001	2007	2015	% change
Secondary	533	781	1020	30.6%
Grade 12	514	545	1070	96.3%
Higher	248	445	707	58.87%
TOTAL	4 335	5163	5808	12.49%

Table 16 Levels of Education by Age (source: HIS Global Insight)

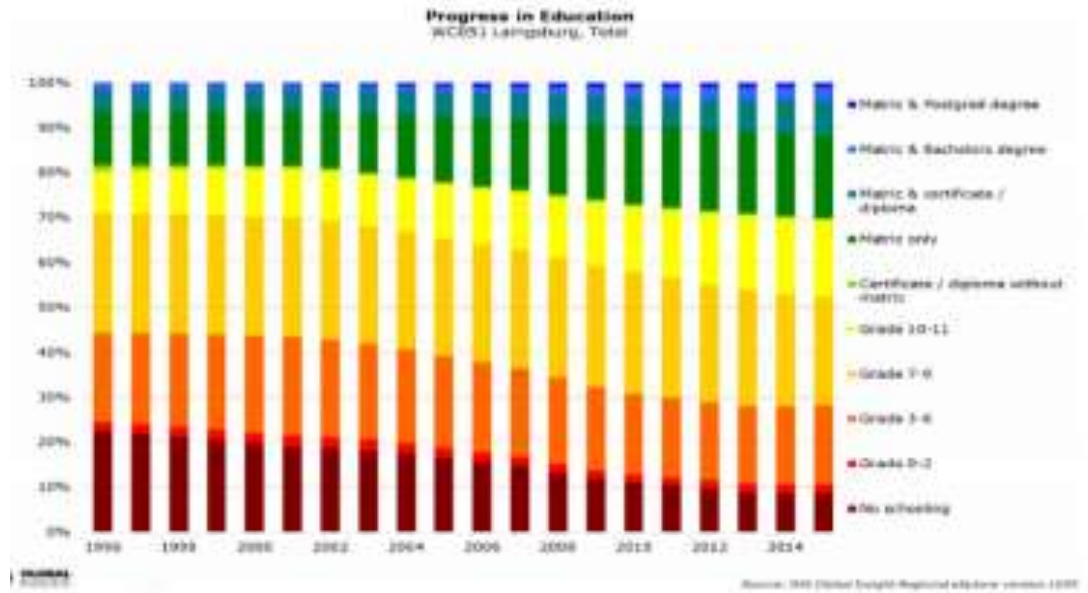
The above table illustrate that education Laingsburg has improved over the period of 2001 as well as 2015. But there is still room from improvement specifically in the two lowest categories. According to the Laingsburg Socio-Economic Profile (LSEP) the graph below indicate that learner enrolment numbers dropped with 934 between 2013 and 2014. It might be because of the inclusion of data on learners with Special Education Need (LSEN) in the Western Cape Education survey done in 2013. A further decline of 4 learners was recorded between 2014 and 2015 indicating that learner enrolment remained static.

Learner Enrolment



Graph 1: Laingsburg learner enrolment numbers (Source: Draft SEPLEG 2016: 6)

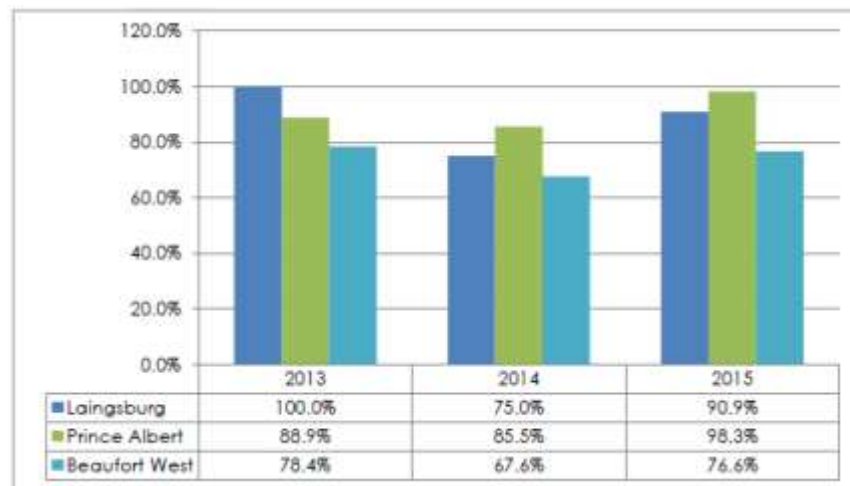
There are no Further Education and Training (FET) colleges in Laingsburg with the closest one being located in Worcester, which falls outside the Central Karoo District. Further away is Beaufort West, Oudtshoorn, Paarl, Stellenbosch, George and Mosselbay. Laingsburg Municipality recorded a 70% literacy rate (successful completion of a minimum of 7 years formal education for 14 years and older) in 2011, lower than Central Karoo District, the Western Cape and the rest of South Africa. Indicating that 30% of people within Laingsburg is illiterate. (LSEP, 2016: 6) The graph below shows that plus minus 10% of the population has no schooling. The graph further illustrate that the Laingsburg situation improved since 1996 until 2015, but there is still opportunity to further improve.



Graph 2: Progress in Education

Education Outcome

Education remain one of the key drive to improve the local economy, and there is an increase requirement for matriculants for employment and youth empowerments programmes.



Graph 3: Education Outcome

The LSEP, 2016:9 specified that the Laingsburg matric outcomes remained consistently above 70 percent between 2013 and 2015, with a 100% pass rate in 2013, 75% in 2014 and 91% in 2015.

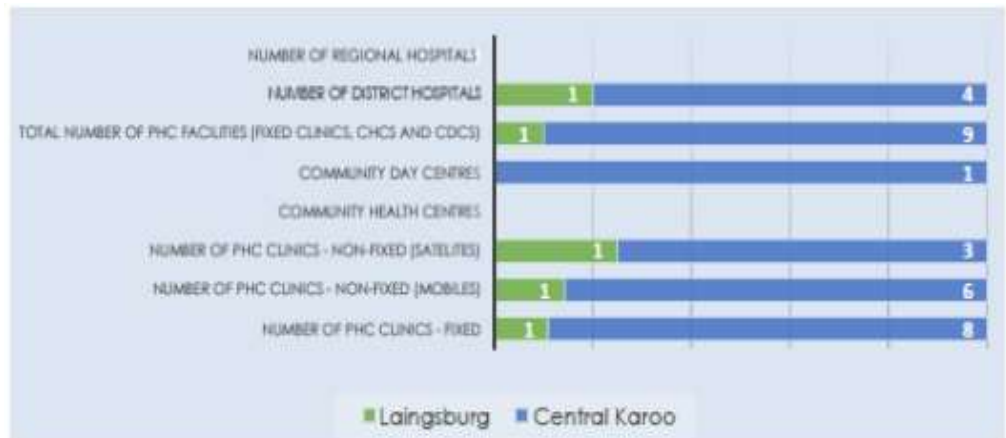
Literacy Rate

In 2015, 74, 3 per cent which is an improvement from the 62.6 per cent in 2007 of Laingsburg's population was considered to be literate. The Department of Social Development defines people aged 14 years and older as literate if they have

successfully completed 7 years formal education (passed Grade 7/Standard 5). An illiterate person would therefore be someone aged 14 years and older with less than 7 years of formal education completed.

Health

Health facilities are only located within Laingsburg and Matjiesfontein. There are four primary health care facilities in the Municipality: one in Matjiesfontein, one mobile clinic service handling the whole farming community and two in Laingsburg. Laingsburg has a district hospital as well as a clinic



Graph 4 Laingsburg Primary Health Facilities (Source LSEP; 2016:11)

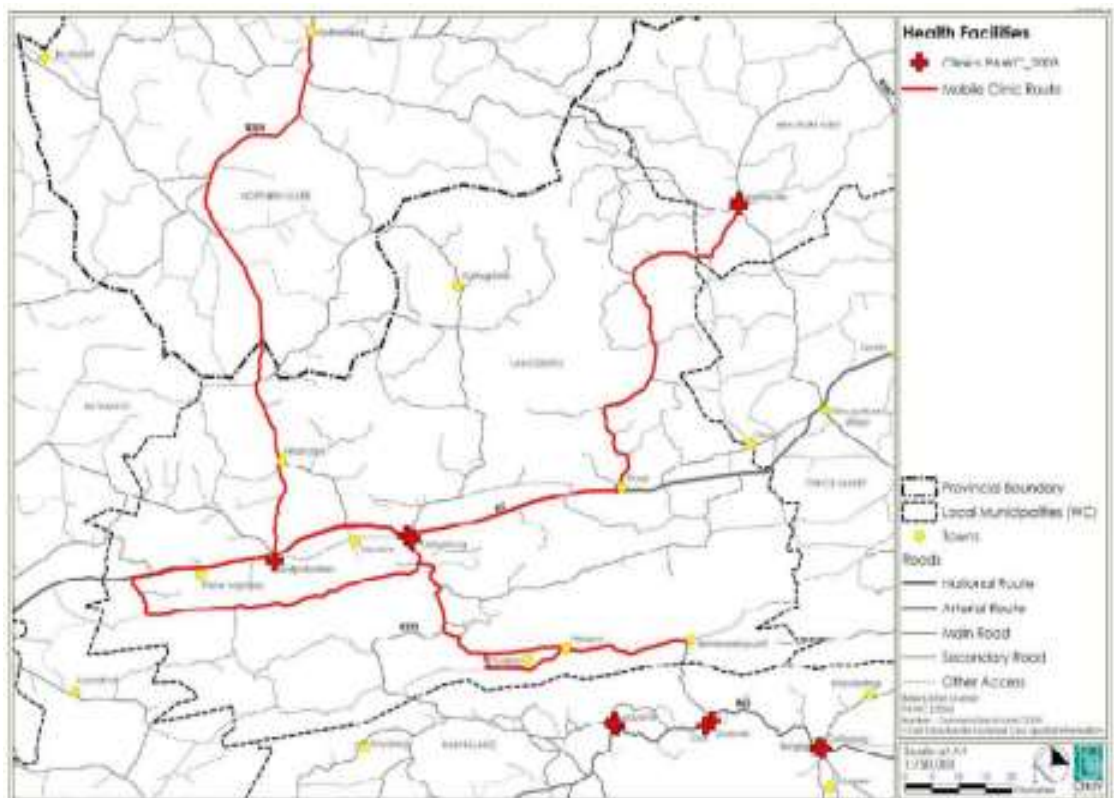


Figure 12. Health Facilities (Source LSDF; 2012)

There are two doctors in the district hospital, three professional nurses, two clinical nurse practitioners, one staff nurse and two councillors employed by Right to Care in the primary health care medical facilities and six professional nurses, four staff nurses and four nursing assistants in the district hospital.

There are no health facilities north of the N1 Freeway, and none in the other rural areas. The rural areas are served by mobile clinic routes. Discussion with the Provincial health practitioners indicated that there are 17 mobile clinic routes in the Municipality. At least one route is covered per day, sometimes even two. If there are medical emergencies, then the farmers bring the patients in either to Matjiesfontein or Laingsburg.

Emergency Medical Services



Health Indicator	Laingsburg	Central Karoo
EMS Operational Ambulances	3	15
Population (2017)	8 416	75 022
No of operational ambulances per 10 000 people	3.56	2

Table 17 Emergency medical services (EMS) (Source: LSEP 2016: 11)

Table 17 states that there is 3 operational ambulances which is higher than norm requirement of 2 for 10 000 people and Laingsburg whole population the within the municipal area below.

The rural distances as well as the high accident reported figures lead to services being rated less accessible for locals with regards to timing and life's saved.

HIV/Aids

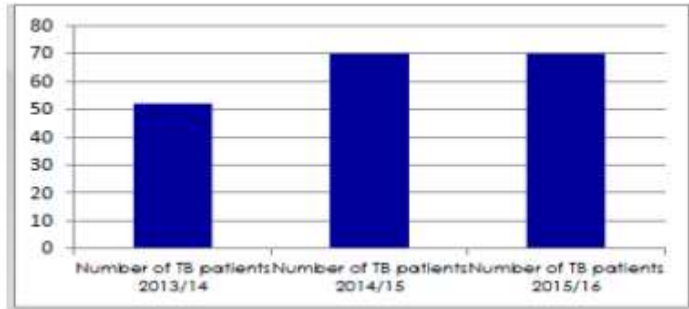
The LSEP, 2016: 12 recorded that by the end of March 2016 157 people within the Laingsburg Municipality were on the anti-retroviral treatment.



Health Indicator	Beaufort West	Central Karoo
Total registered patients receiving ART	157	1 416
No of new ART patients	37	300
HIV Transmission Rate	0.0%	3.4%

37 New ART patients were treated at the Laingsburg treatment site and a zero present mother to child transfer.

Tuberculosis (TB)



Graph 5: Laingsburg TB Treatment, Source: LSEP 2016:12

The above graph illustrate that TB treatment in Laingsburg remained the same as the previous year with a patient load of 70 and are treated at 3 clinics in Laingsburg (LSEP, 2016:12)

Child Care

Immunisation coverage rate is recorded higher that 83%, which is higher than then Central Karoo District which was an improvement of the 72 percent in 2014. Malnourished children under the age of 5 years is lower that 3 percent in comparison with the 10.9 percent of the district. A significant improvement with regards to the neonatal mortality rate was noted for the 2014 rate of 30.9 percent to zero percent in 2015 but 17 percent of babies were underweight at birth. (LSEP, 2016: 13)



Health Indicator	Laingsburg	Central Karoo
Immunisation	83.0%	74.8%
Malnutrition	3.0	10.9
Neonatal mortality rate	0.0	10.2
Low birth weight	17%	20%

Table 18 Laingsburg Child Health (Source: LSEP, 2016:13)

Maternal Health

LSEP, 2016:14 highlighted a high teenage pregnancy rate which 15.3 percent, which is above the 13.3 percent of the District.



Health Indicator	Laingsburg	Central Karoo
Maternal Mortality Ratio	0.0	0.0
Delivery Rate to Women under 18 years	15.3%	13.3%
Termination of Pregnancy Rate	0.0	0.0

Table 19 Laingsburg Maternal Health (Source: LSEP, 2016:14)

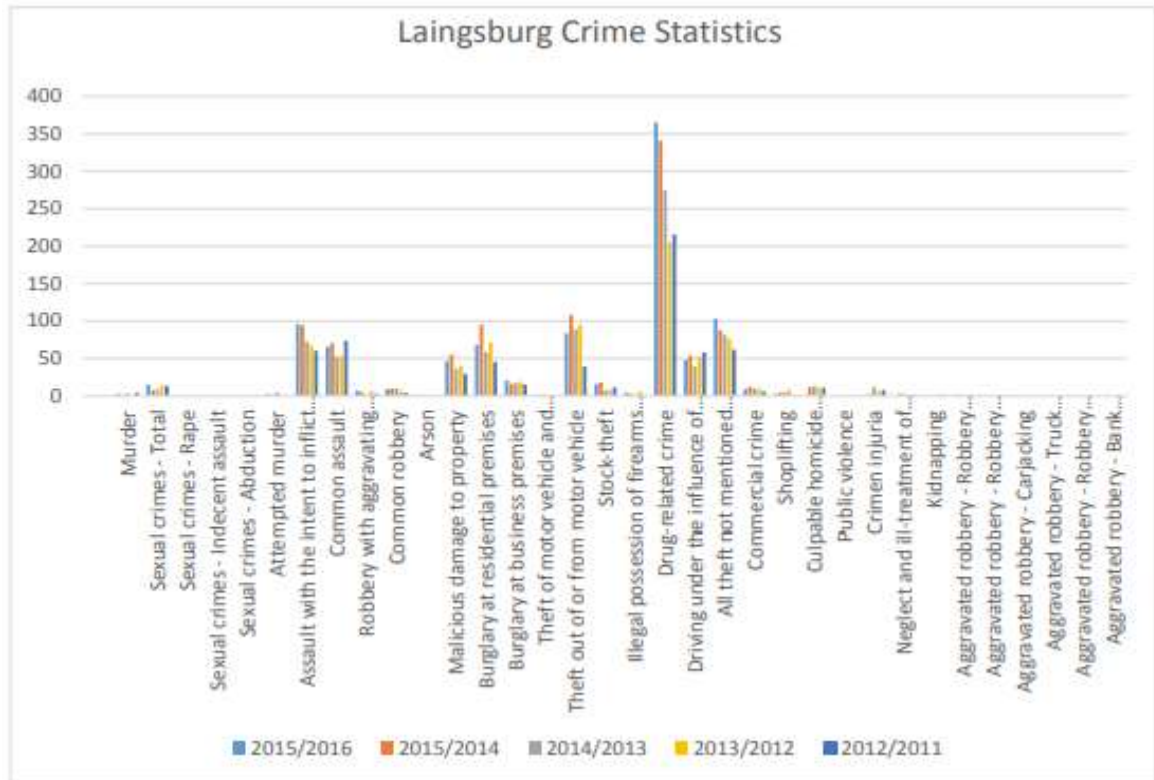
Safety and Security

There is only one police station located in Laingsburg town that services the entire 8781km² of the Municipality.

WC051 Laingsburg Crime [Crime rates by detail categories - financial years (crimes / 100,000 people)]						
Crime Category	Crime Code	2015/2016	2015/2014	2014/2013	2013/2012	2012/2011
Murder	CCMRF11	3	1	3	1	4
Sexual crimes - Total	CCSTF11	15	8	9	14	13
Attempted murder	CCAMF11	3	1	5	0	0
Assault with the intent to inflict grievous bodily harm	CCASF11	96	94	73	68	60
Common assault	CCCAF11	66	71	53	54	74
Robbery with aggravating circumstances	CCRAF11	7	5	2	7	3
Common robbery	CCRCF11	9	10	10	7	4
Arson	CRARF11	1	1	0	2	0
Malicious damage to property	CRMDF11	47	55	36	40	29
Burglary at residential premises	CPBRF11	68	95	58	71	45
Burglary at business premises	CPBBF11	21	16	17	19	15
Theft of motor vehicle and motorcycle	CPTVF11	1	2	2	0	0
Theft out of or from motor vehicle	CPTMF11	84	108	89	95	39
Stock-theft	CPSSF11	16	18	7	8	11
Illegal possession of firearms and ammunition	CAIFF11	4	3	2	6	1
Drug-related crime	CADRF11	365	341	275	205	216
Driving under the influence of alcohol or drugs	CADIF11	48	54	39	53	58
All theft not mentioned elsewhere	COTOF11	103	88	82	76	62
Commercial crime	COCCF11	9	12	10	9	6
Shoplifting	COSLF11	3	4	5	8	1
Culpable homicide (Manslaughter)	CXCHF11	0	12	13	11	11
Public violence	CXPBF11	0	0	0	0	0
Crimen injuria	CXCIF11	0	3	12	6	8
Neglect and ill-treatment of children	CXCAF11	0	3	3	1	2
Kidnapping	CXKNF11	0	1	0	2	1
Aggravated robbery - Robbery at residential premises	CSHSF11	1	2	0	1	1
Aggravated robbery - Robbery at business premises	CSBUF11	0	0	0	2	0
Aggravated robbery - Carjacking	CSCJF11	1	0	0	0	0

Table 20. Five Year Crime Statistics (source: IHS Global Insight; Regional eXplorer 1029 (2.5w))

The most commonly occurring crimes are contact crime and drug related crimes. Within the first category the most dominant crimes committed were those relating to drugs and driving under the influence of alcohol or drugs. The last five years crime numbers increased alarmingly high with regards to incidences reported. The category relating to contact crimes also show high numbers, with the most dominant crime committed being assault with the intent to inflict bodily harm. There has, however, been a trend of reduction in common assault crimes during the 2015/16 financial year. The property related crimes category has been dominated by burglary at residential premises and theft from motor vehicles. In general, there was a significant reduction in crime in 2015/16 except for the crimes requiring police action that appear to be high throughout the reporting periods. However burglary at residential premises has decreased during 2015/16, which could be because of the neighbourhood watch and law enforcement intakes.



Graph 6 Types of crime reported (source: IHS Global Insight Regional eXplorer 1029 (2.5w))

Drug related crime has been on the increase from 2011 to 2016 at an average rate of 46% per annum.

Decay of social fabric

Laingsburg is heavily affected by moral degeneration and the associated socio-economic issues. High teenage pregnancy rates as per table 19 have been sited before and cases of sexual crime are on the increase within the communities. The break of linkages and respect between the youth and old or people have increased the generational gap which is amongst the constraints observed in society. Young girls also don't mind to have relationships with older, married men who can entertain them and support them financially. These are caused once again by aspects related to poverty and low levels of education and hence employable skills. Prostitution, drugs and alcohol abuse especially amongst, under age children is also high.

(b) Description of the current land uses

Please see Baseline Description above.

(c) Description of specific environmental features and infrastructure on the site

In general, the site is considered to be largely natural, but as indicated above is subjected to significant disturbance, both natural and artificially induced. In addition, another large impact on the site and especially affecting the two small stream systems is a large artificial impoundment with an earthen embankment. This inundates and transforms a significant portion of the natural vegetation but also modifies the flow and flooding regime of the two small stream systems significantly.

The site experiences a high natural disturbance regime as sands eroded from the slopes of the mountain is continuously deposited on the site and the sandy soils are also highly mobile, continuously shifting and is easily eroded. Secondly, the site is also affected by relatively high levels of trampling and overgrazing by domestic stock which also decreases the vegetation cover and increases erosion of the sandy soils.

There is also a small dirt track on the dam shore. Other smaller impacts such as the culverts and drainage from the adjacent gravel road will also contribute to erosion.

(d) Environmental and current land use map

(Show all environmental, and current land use features)



Figure 13. Environmental and current land use map

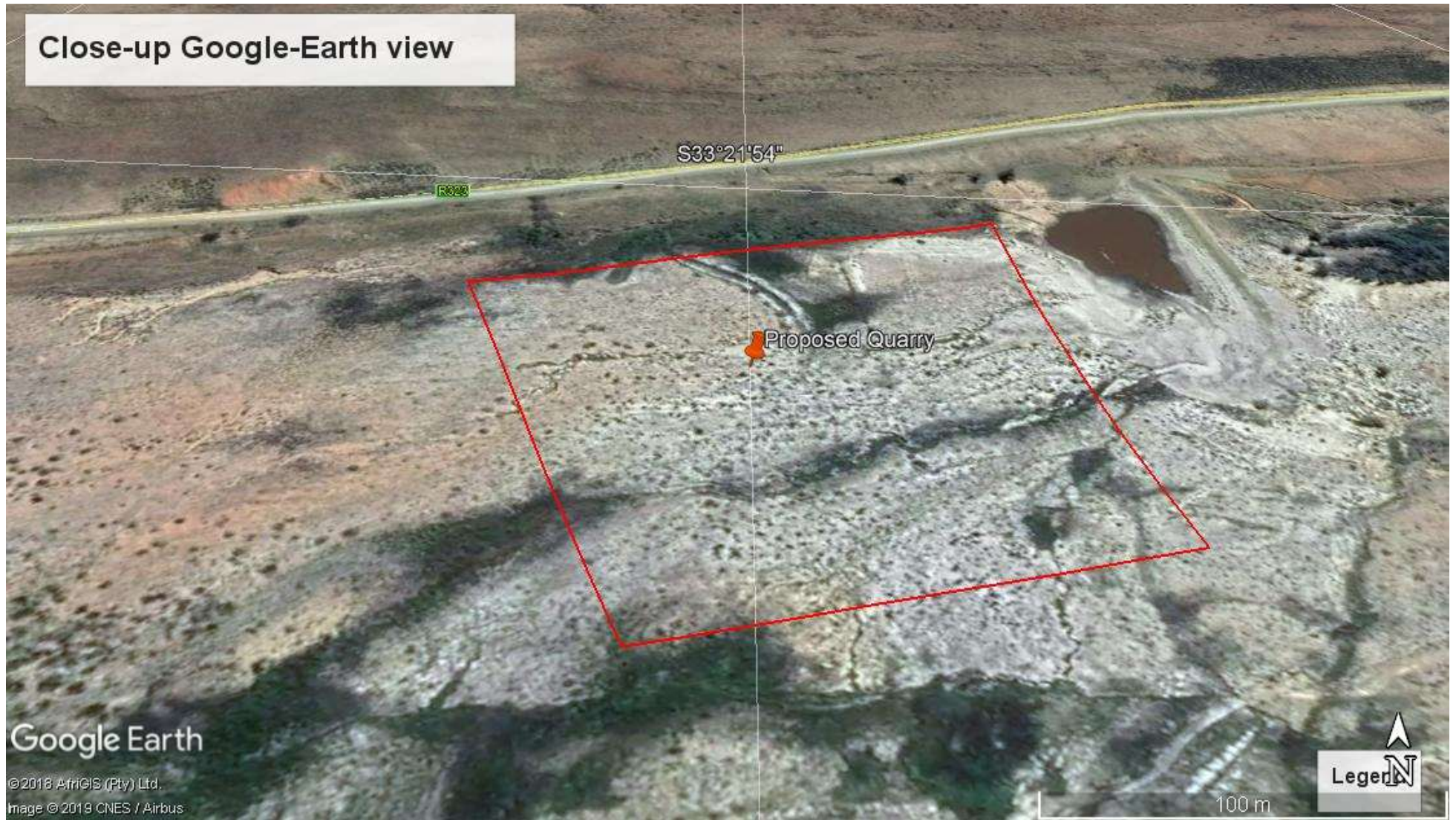


Figure 14. Close up google of Mining Permit site

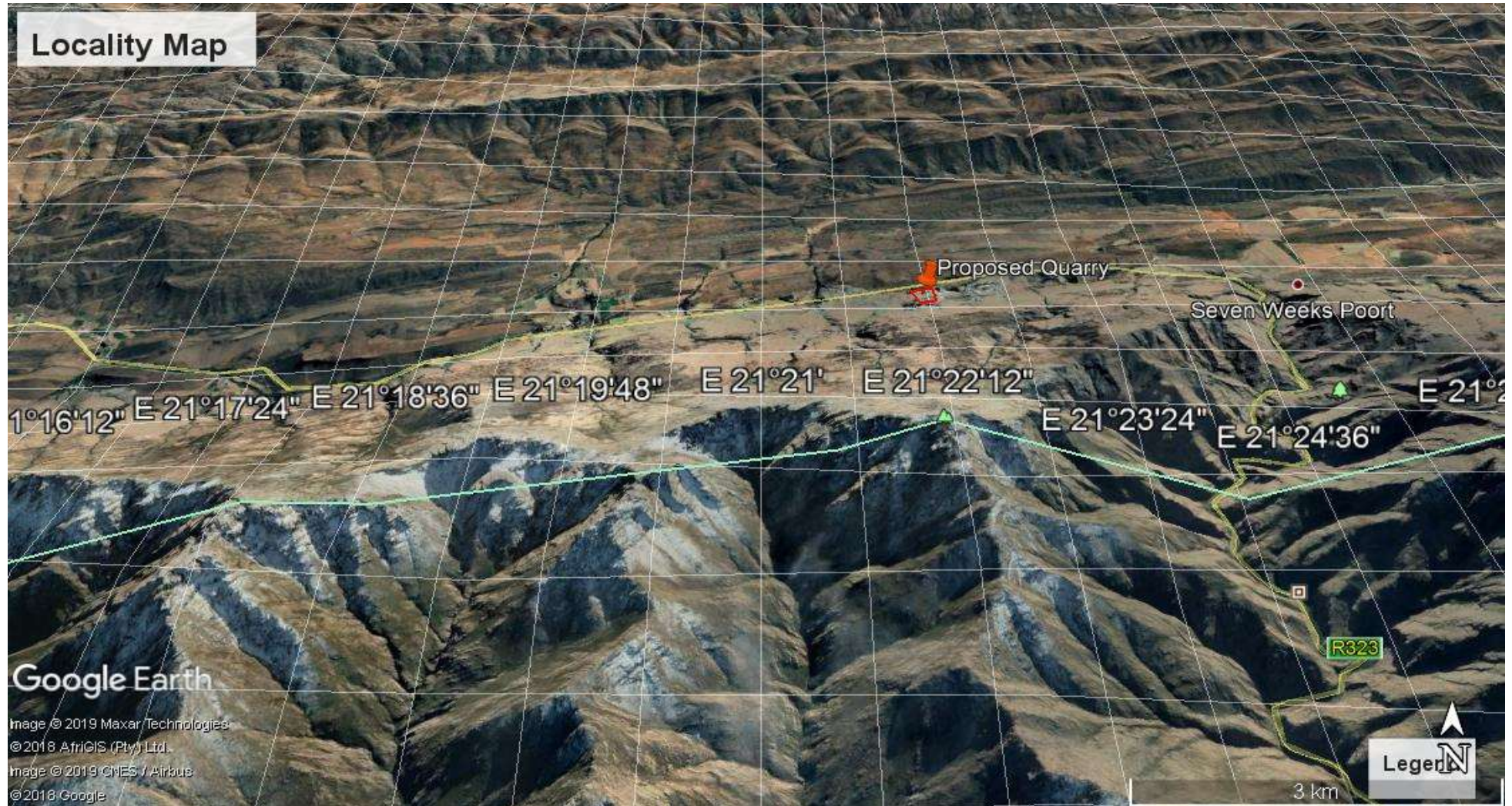


Figure 15. Google with topography and mine site indicated

v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated)

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
PHYSICAL						
Geology and Mineral Resource	<p>Sterilisation of mineral resources</p> <p>Extraction of sand from the alluvial sand embankment between the two stream systems.</p> <p>Sand will be extracted from the alluvial sand embankment between the stream systems which may increase sedimentation, promote erosion and alter the functioning and geomorphology of the adjacent stream systems.</p>	Medium	Highly unlikely	Operational and Decommissioning	Medium Local	<p>Ensure that optimal use is made of the available mineral resource.</p> <p>The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams.</p> <p>These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management</p>

						and monitoring and remediation of erosion.
Topography	<p>Changes to surface topography</p> <p>Extraction of sand from the alluvial sand embankment between the two stream systems.</p> <p>Sand will be extracted from the alluvial sand embankment between the stream systems which may increase sedimentation, promote erosion and alter the functioning and geomorphology of the adjacent stream systems.</p>	Medium	Certain	Mining and Operational	Low Local	<ul style="list-style-type: none"> • The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams. • These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion. • Rehabilitation of and backfilling when possible continuously, if possible and does not influence mining and safety requirements.

						<ul style="list-style-type: none"> • Employ effective rehabilitation strategies to restore surface topography of excavations. • All temporary infrastructures should be demolished during closure.
Soils	<p>The access road will consist of the upgrading of the existing dirt track and will cross the shore of the artificial impoundment.</p> <p>Sand will be extracted from the alluvial sand embankment between the stream systems which may increase sedimentation, promote erosion and alter the functioning and geomorphology of the adjacent stream systems.</p> <p>Topsoil removal; potential runoff.</p>	Low	Probable	Mining and Operational	Low Local	<ul style="list-style-type: none"> • It is recommended that the proposed access road utilise the existing dirt track and that crossing of the stream systems area avoided. • As long as the dirt track is utilised and accesses the site via the shore of the artificial dam the impact should remain low. This is also subject to the upgrading and design of the access road minimising erosion and allows for adequate storm water drainage. • The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly

						<p>be in the form of erosion, sedimentation and modification of the riparian habitat of the streams.</p> <ul style="list-style-type: none"> • These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion • At no point may plant cover be removed within the no-development zones. • Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased. • Ground exposure should be minimised in terms of the surface area and duration, wherever possible. • All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses. • Stockpiled soil material are to be stored and bermed on the
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						<p>higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate.</p> <ul style="list-style-type: none"> • Stockpiles susceptible to wind erosion are to be covered during windy periods. • Audits must be carried out at regular intervals to identify areas where erosion is occurring. • Appropriate remedial action, including the rehabilitation of the eroded areas, must occur. • Rehabilitation of the erosion channels and gullies. • Dust suppression must take place. • Linear infrastructure such as roads will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation

	<p>Loss of soil fertility</p> <p>During the removal of topsoil; stockpiling.</p>	Medium	Certain	Mining Operational Decommissioning	Low Local	<ul style="list-style-type: none"> • Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible onto the cleared areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	<p>Soil pollution</p> <p>Spillage of hazardous material; runoff.</p>	Medium	Probable	Mining and Operational	Low Local	<ul style="list-style-type: none"> • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. • Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.

						<ul style="list-style-type: none"> All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.
Land Capability	Loss of land capability through topsoil removal, disturbances and loss of fertility.	Low	Probable	Short term	Minimal Local	Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation	Low	Probable	Short term	Minimal Local	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.
Ground Water Quantity	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from mine vehicles and fuel storage areas may contaminate the groundwater resource locally	Low	Probable	Mining Operational Decommissioning	Low Local	Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in hydrocarbon spill response. Each area where hydrocarbons are stored or likely to spill should be equipped with sufficient spill response kits and personnel, contaminated soil should be disposed of correctly at a suitable location.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation

Surface Water	<ul style="list-style-type: none"> • Impact on Water Courses • Sand will be extracted from the alluvial sand embankment between the stream systems which may increase sedimentation, promote erosion and alter the functioning and geomorphology of the adjacent stream system • Ground works and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt. 	High	Possible	Mining	Medium Local	<p>The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams.</p> <p>These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion.</p> <p>Water Quality deterioration: change in water quality is caused by a change in natural conditions and/or an enhancement of pollution from sources.</p>
	<ul style="list-style-type: none"> • Spillages that may occur on access and haul roads 	Medium	Possible	Operational	Low to Moderate Local	<p>Mitigation measures (or safety precautions) that are taken in order to eliminate any risk the</p>

	<p>may impact negatively on surface water quality. This issue is dealt with in the EMP.</p> <ul style="list-style-type: none"> • A high potential of soil erosion exists due to an increased percentage of bare surfaces. 					<p>project area could have on the natural, cultural and social environment of the concerned area and that must be implemented during the different phases i.e. mining, operational and post closure to minimize the impacts are as follows:</p> <ul style="list-style-type: none"> • Proper clean and dirty water separation techniques must be used to ensure uncontaminated water returning to the environment. • Non mining waste i.e. grease, lubricants, paints, flammable liquids, garbage, historical machinery and other combustible materials generated during activities should be placed and stored in a controlled manner in a proper designed area. • The topography of rehabilitation disturbed areas must be rehabilitated in such a manner that the rehabilitated area blends in naturally with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation.
	<ul style="list-style-type: none"> • Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of vegetation could lead to erosion and sediment transportation. • Significant dust levels will emanate from the use of heavy mine vehicles. 	Medium to Low	Possible	Closure	Low Local	
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management

<p>Indigenous Flora</p>	<p>Loss of and disturbance to indigenous vegetation</p> <p>Construction of roads as well as other necessary infrastructure; placement of stockpiles; and the clearing of vegetation for mining, materials storage and topsoil stockpiles; vehicular movement.</p>	<p>Medium</p>	<p>Definite</p>	<p>mining and operational</p>	<p>Medium Local</p>	<ul style="list-style-type: none"> • The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams. • These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion. • Minimise the footprint of transformation. • Encourage proper rehabilitation of mined areas. • Encourage the growth of natural plant species. • Ensure measures for the adherence to the speed limit.
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	<p>Loss of flora with conservation concern</p> <p>Removal of listed or protected plant species; during Construction of roads as well as other necessary infrastructure; the placement of stockpiles; and clearing of vegetation for mining.</p>	Medium	Certain	Mining and Operational	Medium Local	<ul style="list-style-type: none"> • Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining. • It is recommended that these plants are identified and marked prior to mining. • These plants should, where possible, be incorporated into the design layout and left in situ. • However, if threatened of destruction by mining, these plants should be removed (with the relevant permits from DAFF and DENC) and relocated if possible. • All those working on site must be educated about the conservation importance of the fauna and flora occurring on site.
	<p>Proliferation of alien vegetation</p> <p>Clearing of vegetation; mining activities</p>	Medium	Certain	Mining and Operational	Medium Regional	<ul style="list-style-type: none"> • Minimise the footprint of transformation. • Encourage proper rehabilitation of mined areas. • Encourage the growth of natural plant species. • Mechanical methods (hand pulling) of control to be implemented extensively.

						<ul style="list-style-type: none"> • Annual follow-up operations to be implemented.
	<p>Encouragement of bush encroachment</p> <p>Clearing of vegetation; disturbance through mining activities.</p>	Medium	Probable	Mining and Operational	Low Local	<ul style="list-style-type: none"> • Minimise the footprint of transformation. • Encourage proper rehabilitation of mined areas. • Encourage the growth of natural plant species. • Mechanical methods (hand pulling) of control to be implemented extensively. • Annual follow-up operations to be implemented.
Fauna	<p>Loss, damage and fragmentation of natural habitats</p> <p>Clearance of vegetation; mining activities</p>	Medium	Probable	Mining and Operational	Low-Medium Local	<ul style="list-style-type: none"> • The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams. • These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive

						<p>rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion.</p> <ul style="list-style-type: none"> • Mining activities must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. • The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance).
	<p>Disturbance, displacement and killing of fauna</p> <p>Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from mining activities.</p>	Medium	Probable	Mining and Operational	Low Local	<ul style="list-style-type: none"> • Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining footprint. • The appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior

						<p>to commencing with work on site.</p> <ul style="list-style-type: none"> • All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. • All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. • The environmental induction should occur in the appropriate languages for the workers who may require translation. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • Employ measures that ensure adherence to the speed limit.
Air Quality	Sources of atmospheric emission associated with the	Low	Certain	Decommissioning	Low Local	Effective soil management; identification of the required control efficiencies in order to

	mining operation are likely to include fugitive dust from materials handling operations, wind erosion of stockpiles, and vehicle entrainment of dust road.					maintain dust generation within acceptable levels.
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil	Medium	Possible	Pre- mining	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Construction of Roads	Medium	Possible	Pre- mining	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels
	Construction of the soil stock pile and material stock pile. Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- mining	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels. Noise survey to be carried out to monitor the noise levels during these activities.

	Clearing of new open cast mining areas, stripping and stockpiling of topsoil. Noise increase at the boundary of the mine footprint.	Medium	Possible	Operational	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels. Topsoil stripping should be limited to daytime only.
	Additional traffic to and from the mine	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels. Noise survey to be carried out to monitor the noise levels during these activities.
	Maintenance activities at the site.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Back fill of mine footprint area.	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels. Backfill of mine footprint area activities should be limited to daytime only.

	Planting of grass and vegetation at the rehabilitated areas	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels. Planting of grass and/or vegetation should be limited to daytime only.
	Removal of infrastructure	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels. Removal of infrastructure should be limited to daytime only. Noise survey to be carried out to monitor the noise levels during these activities.
Visual impacts	Potential visual impact	Low Site	Certain	Mining, Operation and Decommissioning	Low Local Site	The design of the proposed mining development will determine the visual impact. As the visual impact would be low, correct design will ensure that the development will fit into the surrounding area and will become a feature of the area.
	Potential visual impact on the surrounding land users/ residents	Low site	Highly Likely	Mining, Operation and Decommissioning	Low Local Site	The design of the proposed mining development will determine the visual impact.
	Potential visual impact of the proposed development on the operational phase of the surrounding land	Low	Highly likely	Operational	Low Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact.

	users in close proximity.					<ul style="list-style-type: none"> • Ensure that the design fits into the surrounding environment and it is aesthetically pleasing. • Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way; • Rehabilitation of disturbed areas and re-establishment of vegetation.
Traffic	Potential negative impacts on traffic safety and deterioration of the existing road networks.	Medium - Low	Low likelihood	Decommissioning	Low Local	Utilise existing access roads, where applicable; implement measures that ensure adherence to traffic rules.
Heritage resources	The Deterioration of sites of cultural and heritage importance.	Low	Certain	Mining, Operational	Low	Any heritage and cultural resources must be protected and preserved by the delineation of a no-go zone. If any other such sites were identified, discovered, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist. Should any burial remains be uncovered it should not be disturbed or removed until inspected by an archaeologist or for fossil finds by a palaeontologist.

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Socio-Economic	Population Impacts Employment Opportunities and skills Inequities	Medium Positive	Probable	Start-up and Mining	Medium Positive Local	<ul style="list-style-type: none"> • Training of potential future employees, contract workers and/or community members should focus on mining related skills which would furthermore equip trainees/beneficiaries with the necessary portable skills to find employment at the available employment sectors within the study area. Multi-skilling is thus not necessarily the preferred training and skills development method. • Training courses should be accredited and certificates obtained should be acceptable by other related industries.
	Influx of Jobseekers	Low Negative	Highly probable	Start-up and Mining	Low Negative Local	<ul style="list-style-type: none"> • Maximise the use of local labour where possible by developing a strategy to involve local labour in the mining process.
	Conflicts between Local Residents and Newcomers Impact on Social Networks	Low Negative	Probable	Start-up and Mining	Low Negative Local	<ul style="list-style-type: none"> • The appointment of locals and the inflow of temporary workers should still be managed with due cognisance of the sensitivities at hand and the process of introducing

						foreigners should be proactively managed.
	Individual and Family Level Impacts Impact on nearby residential properties.	Low Negative	Low probability	Start-up Mining and	Low Negative Local	<ul style="list-style-type: none"> • Effective management of the mining activities to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services, and limiting any increase in noise levels. • Dust pollution should be kept to a minimum • The active mining area should be fenced to avoid unauthorised entry by animals onto the mining area
	Impact on daily living and movement patterns	Low Negative	Probable	Start-up Mining and	Low Negative Local	<ul style="list-style-type: none"> • Dust suppression methods should be strictly implemented if and where required • All vehicles should be in a good condition and adhere to the road worthy standards • Dust creation should be kept to the minimum by adhering to the speed limits on the gravel road • Speeding of vehicles must be strictly monitored.
	Safety and Security Risks	Low Negative	Highly Probable	Mining	Low Negative Local	<ul style="list-style-type: none"> • A Fire/Emergency Management Plan should be developed and implemented at the outset of the mine.

						<ul style="list-style-type: none"> • Open fires for cooking and related purposes should not be allowed on site. • Appropriate firefighting equipment should be on site and workers should be appropriately trained for fire fighting • The mine sites should be clearly marked and “danger” and “no entry” signs should be erected. • Speed limits on the local roads surrounding the mine site should be enforced. • Speeding of mine vehicles must be strictly monitored • Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Mining	Low Negative Local	<ul style="list-style-type: none"> • Maximise the employment of locals where possible • First aid supplies should be available at the mine site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the mine site
	Community Infrastructure Needs	Low Negative	Highly probable	Mining	Low Negative Local	<ul style="list-style-type: none"> • Maximise the employment of locals where possible

	Impact on Infrastructure and Services					
	Heritage Features	Low Negative	Highly probable	Mining	Low Negative Local	<ul style="list-style-type: none"> Any heritage and cultural resources must be protected and preserved by the delineation of a no go zone. If any other such sites were identified, discovered, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist. Should any burial remains be uncovered it should not be disturbed or removed until inspected by an archaeologist or for fossil finds by a palaeontologist.
	Intrusion Impacts Visual Impact and Sense of Place	Low Negative	Probable	Mining	Low Negative Local	<ul style="list-style-type: none"> The mining site should be kept litter free
	Noise Impact	Low Negative	Probable	Mining	Low Negative Local	<ul style="list-style-type: none"> Vehicles should be in a good working order Activities should be kept to normal working hours e.g. 7 am until 5 pm during weekdays
	Population Impacts Employment Opportunities and skills inequities	Medium Positive	Probable	Operational	High Positive Regional	<ul style="list-style-type: none"> Job creation and training remains critical as there is still a high unemployment rate within the local communities. Training should thus be

						<p>focused on mining related skills.</p> <ul style="list-style-type: none"> • Should retrenchments be necessary, adequate measures should be put in place to assist the affected employees to find alternative forms of employment. • Possible steps to be taken with regards to retrenchments should be clearly communicated to all employees.
	<p>Conflicts between local residents and newcomers</p> <p>Impact on social networks</p>	Low Negative	Probable	Operational	Low Negative Local	<ul style="list-style-type: none"> • Maximise the employment of locals as far as possible.
	<p>Individual and Family level impacts</p> <p>Impacts on daily living and movement patterns and family activities</p>	Low Negative	Highly Probable	Operational	Low Negative Local	<ul style="list-style-type: none"> • Maximise the employment of local labour to limit the negative impacts on the infrastructure and services within the area. • Speed limits on the local roads surrounding the mining site should be enforced. • Speeding of mine related vehicles must be strictly monitored. • Monitoring of possible impacts on water quality and

						quantity, as well as the possible impacts of dust pollution should be undertaken.
	Health and safety risks	Low Negative	Highly Probable	Operational	Low Negative Local	<ul style="list-style-type: none"> The general health of employees should be monitoring on an on-going basis. EMP Guidelines should be strictly adhered to and international best practice should be sought.
	Intrusion Impacts Visual impact and sense of place	Low Negative	Highly Probable	Operational	Low Negative Local	<ul style="list-style-type: none"> Recommendations and mitigation measures as part of the EMP should be strictly implemented. Mining areas should be rehabilitated as soon as the mining allows.
	Noise Impact	Low Negative	Probable	Operational	Low Negative Local	<ul style="list-style-type: none"> Noise generating activities should be kept to normal working hours (e.g. 7 am until 5 pm) where possible.
	Socio-Economic Possible social impacts to be experienced during decommissioning (closure of the mine) could include the following:	Low Negative	Highly probable	Decommissioning	Low Negative Local	<ul style="list-style-type: none"> Downscaling of production should be undertaken over a period of time. Downscaling and retrenchment of contractor and permanent staff should be done over a period of time.

	<p>Job losses due to mine closure; Decline in the sustainability of the local economy as a result of the loss of employment, household income and capital investments; Reduced economic activities within the area with subsequent negative impacts on smaller businesses; Possible negative impact on the crime levels due to increased unemployment rate; Remnants of possible environmental impacts; and Remaining visual impact as a result of mining.</p>					<ul style="list-style-type: none"> • Rehabilitation of all mining and mining related areas should be undertaken. • A closure plan must be developed and a closure quantum must be included in the Environmental Management Programme Report.
Interested and Affected Parties	<p>Loss of trust and a good standing relationship between the IAP's and the mining company.</p>	Low to medium	Possible	Mining, Operational and Decommissioning	Low Local	<p>Ensure continuous and transparent communication with IAP's</p>

vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)

Methodology used in determining and ranking the nature, severity, consequences, extent, duration and probability of potential environmental impacts and risks

The Different environmental components on which the project (can) have an impact are:

1. **Geology**
2. **Topography**
3. **Soil**
4. **Land Capability**
5. **Land Use**
6. **Flora (Vegetation)**
7. **Fauna**
8. **Surface Water**
9. **Ground Water**
10. **Air Quality**
11. **Noise and vibration**
12. **Archaeological and Cultural Sites**
13. **Sensitive Landscapes**
14. **Visual Aspects**
15. **Socio-Economic Structures**
16. **Interested and Affected Parties**

The criteria used to assess the significance of the impacts are shown in the table 20 below/overleaf. The limits were defined in relation to mining characteristics. Those for probability, intensity/severity and significance are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered. These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The significance of the impacts was calculated by using the following formula:

(Severity + Extent + Duration) x Probability weighting

For the impact assessment, the different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts.

Table 21: Significance of impacts is defined as follows.

SIGNIFICANCE				
Colour Code	Significance rating	Rating	Negative Impact	Positive Impact
	Very low	3 -16	Acceptable/Not serious	Marginally Positive
	Low	17 - 22	Acceptable/Not serious	Marginally Positive
	Medium-Low	23 -33	Acceptable/Not desirable	Moderately Positive
	Medium	34 - 48	Generally undesirable	Beneficial
	Medium-High	49 - 56	Generally unacceptable	Important
	High	57 - 70	Not Acceptable	Important
	Very High	90 - 102	Totally unacceptable	Critically Important

Significance of impacts is defined as follows:

Very Low - Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low - Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Medium Low- Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

Medium - Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible and possible.

Medium High- Impact would be real but could be substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and possible but may be difficult and or costly.

High - Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these.

Before any assessment can be made the following evaluation criteria need to be described.

Table 22: Explanation of PROBABILITY of impact occurrence

Weight	Probability of Impact Occurrence	Explanation of Probability
1	Improbable	<20% sure of particular fact or likelihood of impact occurring
2	Low Probability Possible	20 – 39% sure of particular fact or likelihood of impact occurring
3	Probable /Likely	40 – 65% sure of particular fact or likelihood of impact occurring
4	Highly Probable /Likely	66 – 85% sure of particular fact or likelihood of impact occurring
5	Definite	86% - 100% sure of particular fact or likelihood of impact occurring

Table 23: Explanation of EXTENT of impact

Weight	Extent of Impact	Explanation of Extent
1	Footprint	Direct and Indirect impacts limited to the activity, such as footprint occurring within the total site area of impact only.
2	Surrounding Area Site	Direct and Indirect impacts affecting environmental elements within 2 km of site
3	Local Municipality Local	Direct and Indirect impacts affecting environmental elements within the Laingsburg area
4	Regional/District Regional	Direct and Indirect impacts affecting environmental elements within District (Laingsburg District)
5	Provincial	Direct and Indirect impacts affecting environmental elements in the Western Cape Province

Table 24: Explanation of DURATION of impact

Weight	Duration of Impact	Explanation of Duration
1	Temporary (Very Short)	Less than 1 year
2	Short term	1 to 5 years
3	Medium term	6 to 15 years
4	Long term (Life of project)	16 to 50 years
5	Very Long term	Longer than 50 years
6	Permanent	Permanent

Table 25: Explanation of SEVERITY of the impact

Weight	Impact Severity	Explanation of Severity
1	No Impact	There will be no impact at all – not even a very low impact on the system or any of its parts.

2	Very Low	Impact would be negligible. In the cast of negative impacts, almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple. In the case of positive impacts alternative means would almost all likely to be better, if one or a number of ways, then this means of achieving the benefit.
3	Low	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and/or remedial activity would be either easily achieved or little would be required or both. In the case of positive impacts alternative means for achieving this benefit would be easier, cheaper, more effective, less time-consuming, or some combination of these.
4	Moderately Severe	Impact would be real but not substantial within the bounds of those which could occur. In the case of negative impacts, mitigation and/or remedial activity would be both feasible and fairly easily possible. In the case of positive impacts other means other means of covering these benefits would be about equal in cost and effort.
5	High Severance	Impacts of substantial order. In the case of negative impacts, mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these. In the case of positive impacts other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
6	Very High Severity	Of the highest order possible within the bounds of impacts which could occur, in the case of negative impacts, there would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted. In the case of positive impacts there is no real alternative to achieving the benefit.

The impact is of great importance. Failure to mitigate, with the objective to reduce the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

During the operational stages of the mining operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. The infrastructure and stockpiles will alter the topography by adding features to the landscape. Vegetation will be stripped in preparation for placement of infrastructure and removing of dumps, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated,

but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. Most of the site has a land capability for grazing, but the area has been converted due to the aggregate mining and material but with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be affected, if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources (drainage lines) during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.

Mining activities on site will reduce the natural habitat for ecological systems to continue their operation. While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such

as traffic on the secondary road and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

The activities on site will not impact on heritage resources. Any heritage and cultural resources must be protected and preserved by the delineation of a no go zone if any have been identified. No such sites were identified but should any resources be discovered, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist. Should any burial remains be uncovered it should not be disturbed or removed until inspected by an archaeologist or for fossil finds by a palaeontologist. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage resources.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local residents. During the decommissioning and at closure of the site, staff will most likely be retrenched, resulting in people being unable to find new employment for a long period of time.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

viii) The possible mitigation measures that could be applied and the level of risk

Impact	Mitigation	Risk
Air quality	<ul style="list-style-type: none"> • Speed limits; • Spraying of surfaces with water; • Avoidance of unnecessary removal of vegetation; • Re-vegetation; • Monitoring; • Rehabilitation of disturbed areas; and • Controlled excavation operations, preferably on wind-free days. 	Medium
Fauna	<ul style="list-style-type: none"> • Minimise the footprint of transformation. • Encourage proper rehabilitation of cleared areas. 	Medium

	<ul style="list-style-type: none"> • Encourage the growth of natural plant species. • Ensure measures for the adherence to the speed limit. • Mining activities must be planned, where possible in order to encourage (faunal dispersal) and should minimise dissection or fragmentation of any important faunal habitat type. • The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). • Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. • All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. • All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. • The environmental induction should occur in the appropriate languages for the workers who may require translation. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • In the case of any mortalities resulting from birds flying into power lines, these should be recorded including the date of the observation and the species affected and any other relevant information. • Employ measures that ensure adherence to the speed limit. • Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of pristine habitats and minimise the overall mining footprint. • The extent Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; • Snares & traps removed and destroyed; and • Maintenance of firebreaks. 	
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<p>Flora</p>	<ul style="list-style-type: none"> • Minimise the footprint of transformation. • Encourage proper rehabilitation of cleared areas. • Encourage the growth of natural plant species. • Ensure measures for the adherence to the speed limit. • Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; • It is recommended that these plants are identified and marked prior to mining. • These plants should where possible, be incorporated into the design layout and left in situ. • However if threatened of destruction by mining these plants should be removed (with the relevant permits from DAFF and DENC) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. • Minimise the footprint of transformation • Encourage proper rehabilitation of mining areas • Encourage the growth of natural plant species (diverse selection of natural plant species). • Mechanical methods (hand-pulling) of control to be implemented extensively. • Annual follow-up operations to be implemented. • Ensure measures for the adherence to speed limit. • Maintenance of firebreaks; • No trees felled for firewood; 	<p>Medium</p>
<p>Ground water</p>	<ul style="list-style-type: none"> • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent ground water pollution. • Spill kits to clean up accidental spills from the machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles should be regularly serviced and maintained. 	<p>Low</p>

	<ul style="list-style-type: none"> Monitoring of groundwater abstraction and quality; and Clean & Dirty water system must be well maintained. 	
Noise	<ul style="list-style-type: none"> Hearing protection; Non-metallic washers to join infrastructure; Working hours; Controlled excavation operations; Silencers on equipment and vehicles; Acoustic enclosure for generators; and Distance from residence of surface owner. 	Low
Soil	<ul style="list-style-type: none"> At no point may plant cover be removed within the no-development zones; All attempts must be made to avoid exposure of dispersive soils; Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased; Ground exposure should be minimized in terms of the surface area and duration, wherever possible; The mining operation must co-ordinate different activities in order to optimise the utilisation of the yellow fleet and thereby prevent repeated and unnecessary excavations. The run-off from the exposed ground should be controlled with the careful placement of flow retarding barriers. The soil that is excavated during mining should be stock-piled in layers and protected by berms to prevent erosion. All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses. Excavated and stockpiled soil material are to be stored and bermed on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate. Stockpiles susceptible to wind erosion are to be covered during windy periods. Audits must be carried out at regular intervals to identify areas where erosion is occurring. Appropriate remedial action, including the rehabilitation of eroded areas, must occur. Rehabilitation of the erosion channels and gullies. Linear infrastructure such as roads will be inspected at least monthly to check that the 	Medium

	<p>associated water management infrastructure is effective in controlling erosion.</p> <ul style="list-style-type: none"> • Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible on to the backfilled areas, thereby allowing for the re-growth of the seed bank contained within the topsoil. • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. • Spill kits to clean up accidental spills from earthmoving machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. 	
<p>Surface water</p>	<ul style="list-style-type: none"> • The stream systems should be excluded from mining activities and treated as no-go areas. • A berm should be erected between the mining area and the stream systems in order to prevent sediments from entering them. • Adequate storm water management measures should be implemented and should include diverting storm- and floodwater around the mining area and preventing sediment and silt from entering the streams. • The depth of sand excavation should not exceed the level of the banks of these streams. • The border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion. • The site will remain highly susceptible to erosion and comprehensive rehabilitation will be crucial. • Adequate topsoil management will be important and the upper 30 cm of soil should be removed, stored on site and utilised during the rehabilitation of the site. • Upgrading of the existing dirt track to provide access to the site should include design aimed at 	<p>Medium</p>

	<p>minimising erosion and allowing for adequate storm water drainage. Structures such as culverts and v-drains should be considered.</p> <ul style="list-style-type: none"> • Refuelling must take place in well demarcated areas and over suitable drip trays to prevent surface water pollution. • Spill kits to clean up accidental spills from machinery must be well marked and available on site. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall. • Vehicles and machinery should be regularly serviced and maintained. • Storm water control; • Clean & dirty water plan. 	
Topography	<ul style="list-style-type: none"> • Backfill or slope all excavations continuously. • Employ effective rehabilitation strategies to restore surface topography of excavations; • All temporary infrastructures should be demolished during closure. 	Medium
Visual	<ul style="list-style-type: none"> • Continuous backfilling of excavations; • Replacing layer of topsoil over backfilled areas; • Sloping of rehabilitated and disturbed areas; • Removal of all infrastructures upon mine closure. 	Low

ix) Motivation where no alternative sites were considered

No viable alternative sites were identified for the following reasons:

- The applicant is also the farm owner and knows the viability of the specific area.
- The location of deep Sands indicates that the mining within the boundaries of the abovementioned property can be a viable project.

x) Statement motivating the alternative development location within the overall site

Not applicable. There is no alternative development location for the site as this is the site with sand that are deposited continuously.

i) 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

Not applicable. There is not alternative development location for the site and therefore the initial site locality is considered to be the final site locality. The impact assessment provided in section g(v) is therefore sufficient and the process undertaken to identify impacts is the same as in section g(vi).

j) Assessment of each identified potentially significant impact and risk

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties)

In this section, the potential impacts and associated risk factors that may be generated by the proposed mining operation on Bezemfontein are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the mining activities are listed.

NAME OF ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	SIGNIFICANCE If not mitigated	MITIGATION TYPE	SIGNIFICANCE If mitigate
Roads	Air quality	Nuisance dust will be created by the mining fleet.	Mining	Medium	Dust control Water spraying. Well maintained equipment	Low
	Fauna	Where new haulage roads will be created the natural habitat of the animals will be disturbed and/or destroyed. Habitat fragmentation The mining operation is not expected to cause major habitat transformation or habitat loss. Terrestrial habitats such as rock crevices, burrows, nests and vegetation on which small mammals, insects, amphibians, reptiles and birds	Mining	Medium	Speed limits Environmental Awareness Habitat fragmentation	Medium

		<p>are heavily reliant could however be disturbed during the clearing activities associated with the mining operation, causing temporary displacement of these animals. During the creating of mine roads vegetation will be cleared, which will create unnatural open spaces within the landscape. This might restrict the movement of smaller species and limit their access to foraging sites, but it is not expected to have major impacts on the nutrient cycle or ecological functioning.</p> <p>Intentional/accidental killing of fauna Smaller fauna might be killed along with their habitat during the clearing of land. Some species, particularly snakes and lizards are often intentionally killed as they are thought to be dangerous, while vultures and owls are killed for cultural and religious beliefs or for medicinal purposes. Furthermore, vehicular traffic is often a significant cause of accidental road kill.</p> <p>Anthropogenic disturbances</p>				
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	<p>Disturbance, like excavation activities and vehicular movement, result in disturbances to the naturally occurring faunal species. Possible associated disturbances include increased levels of noise, pollution, vibrations, illumination and human presence. Sensitive and shy fauna would move away from the area during the operation as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the activities and might be killed.</p> <p>Broadscale ecological processes Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The proposed mining activities on Bezemfontein are not likely to contribute significantly to these cumulative impacts.</p>				
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	Flora	<p>The vegetation in the path of excavations will be damaged or completely removed. Vegetation clearing during these activities will lead to loss of intact habitat within the mining area and habitat disturbances. Such disturbances destroy primary vegetation and can allow secondary pioneers species or invasive plants to enter and recolonize disturbed area. As primary vegetation is more functional in an ecosystem, this could irreversibly transform the vegetation characteristics in the area.</p> <p>Loss of Red data and/or protected floral species</p> <p>It is possible that there can be some protected species present at the site. It is possible that some of the protected species would be impacted by the operation. The most profound impacts will most likely be on larger trees or individuals that occur in the excavation areas. Apart from its conservation concern, a tree is a valuable sources of shade, especially in arid areas, where</p>	Mining	Medium	<p>Stripping of topsoil and concurrent rehabilitation excavations</p> <p>Loss of natural and unique habitats</p>	Medium
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	<p>mammals seek protection and shade from its canopy. Other fauna also utilise trees for nesting. Furthermore, the shade that the tree provides serves as a significant microhabitat for invertebrates, suggesting its importance in continuing biodiversity patterns in the region. Further ecological functions provided by the tree include nutrient cycling, diminishing nutrient leaching, mitigating soil degradation, preventing soil erosion, sequestering carbon and replenishing organic matter.</p> <p>Introduction or spread of alien species The disturbance created during the operation could encourage the invasion of the disturbed areas by alien species. This includes <i>Opuntia</i> spp, <i>Prosopis glandulosa</i> and <i>Eucalyptus</i> sp. Some of these species, especially the <i>Opuntia</i> spp. will rapidly increase in abundance and expand into the disturbed areas if given the opportunity.</p> <p>Encouraging bush encroachment</p>				
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		<p>The disturbance created during the mining operation could potentially encourage bush encroachment. This is especially likely during the clearing of diverse habitats where opportunity is provided for highly competitive encroaching species like <i>Senegalia mellifera</i> to establish.</p> <p>Broadscale ecological processes Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The proposed mining activities on Bezemfontein are not likely to contribute significantly to these cumulative impacts.</p>				
	Surface Water	Access road from the main gravel road the alluvial sand embankment.	Mining	Medium	It is recommended that the proposed access road utilise the existing dirt track and that crossing of the stream systems area avoided.	Medium

					As long as the dirt track is utilised and accesses the site via the shore of the artificial dam the impact should remain low. This is also subject to the upgrading and design of the access road minimising erosion and allows for adequate storm water drainage.	
	Ground water	No impact to groundwater is expected from the roads that will be used by the planned mining operation.	Mining	Low	Pollution control and good housekeeping practice	Low
	Noise	Noise from the mining equipment on the roads will be created.	Mining	Medium	Noise control Well maintained equipment	Low
	Soil	Extraction of sand from the alluvial sand embankment between the two stream systems. Access road from the main gravel road the alluvial sand embankment Topography, soil erosion and associated degradation of ecosystems	Mining	Low	The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils	Low

		<p>The plains of the site are fairly flat; the minimal amount of disturbances and vegetation clearing created during mining activities are not expected to leave the site vulnerable to soil erosion. Furthermore, no change to surface topography is expected and therefore local runoff erosion is not considered a likely impact during the operation.</p>			<p>the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams.</p> <p>These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion.</p> <p>Stripping of topsoil and concurrent rehabilitation</p> <p>It is recommended that the proposed access road utilise the existing</p>	
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					<p>dirt track and that crossing of the stream systems area avoided.</p> <p>As long as the dirt track is utilised and accesses the site via the shore of the artificial dam the impact should remain low. This is also subject to the upgrading and design of the access road minimising erosion and allows for adequate storm water drainage.</p>	
	Topography	<p>No impact to topography is expected from the roads that will be used by the planned mining operation.</p> <p>Topography, soil erosion and associated degradation of ecosystems</p> <p>The plains of the site are fairly flat; the minimal amount of disturbances and vegetation clearing created during mining activities are not expected to leave the site vulnerable to soil erosion. Furthermore, no change to surface</p>	Mining	Low	Concurrent rehabilitation	Low

		topography is expected and therefore local runoff erosion is not considered a likely impact during the operation.				
	Visual	The mining roads will be visible to some extent from the immediate surroundings.	Mining	Low	Concurrent Rehabilitation	Low
Excavation	Air quality	Nuisance dust will be created by the excavations.	Operational	Medium	Dust control Well maintained equipment	Low
	Fauna	<p>Where new excavations will be created the natural habitat of the animals will be disturbed and/or destroyed.</p> <p>Habitat fragmentation The mining operation is not expected to cause major habitat transformation or habitat loss. Terrestrial habitats such as rock crevices, burrows, nests and vegetation on which small mammals, insects, amphibians, reptiles and birds are heavily reliant could however be disturbed during the clearing activities associated with the mining operation, causing temporary displacement of these animals. During the creating of mine roads vegetation will be cleared, which will create unnatural open spaces within the landscape. This might restrict</p>	Operational	Medium	Speed limits Environmental Awareness Habitat fragmentation	Medium

		<p>the movement of smaller species and limit their access to foraging sites, but it is not expected to have major impacts on the nutrient cycle or ecological functioning.</p> <p>Intentional/accidental killing of fauna Smaller fauna might be killed along with their habitat during the clearing of land. Some species, particularly snakes and lizards are often intentionally killed as they are thought to be dangerous, while vultures and owls are killed for cultural and religious beliefs or for medicinal purposes. Furthermore, vehicular traffic is often a significant cause of accidental road kill.</p> <p>Anthropogenic disturbances Disturbance, like excavation activities and vehicular movement, result in disturbances to the naturally occurring faunal species. Possible associated disturbances include increased levels of noise, pollution, vibrations, illumination and human presence. Sensitive and shy fauna would move away from the area</p>				
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		<p>during the operation as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the activities and might be killed.</p> <p>Broadscale ecological processes Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The proposed mining activities on Bezemfontein are not likely to contribute significantly to these cumulative impacts.</p>				
	Flora	<p>Where new excavations will be created the vegetation will be disturbed and/or destroyed.</p> <p>The vegetation in the path of excavations will be damaged or completely removed. Vegetation clearing during these activities will lead to loss of intact habitat within the mining area and habitat disturbances.</p>	Operational	Medium	Stripping of topsoil and concurrent rehabilitation Loss of natural and unique habitats	Medium

	<p>Such disturbances destroy primary vegetation and can allow secondary pioneers species or invasive plants to enter and recolonize disturbed area. As primary vegetation is more functional in an ecosystem, this could irreversibly transform the vegetation characteristics in the area.</p> <p>Loss of Red data and/or protected floral species</p> <p>It is possible that there can be some protected species present at the site. It is possible that some of the protected species would be impacted by the operation. The most profound impacts will most likely be on larger trees or individuals that occur in the excavation areas. Apart from its conservation concern, a tree is a valuable sources of shade, especially in arid areas, where mammals seek protection and shade from its canopy.</p> <p>Other fauna also utilise trees for nesting. Furthermore, the shade that the tree provides serves as a significant microhabitat for invertebrates, suggesting its importance in continuing</p>				
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		<p>biodiversity patterns in the region. Further ecological functions provided by the tree include nutrient cycling, diminishing nutrient leaching, mitigating soil degradation, preventing soil erosion, sequestering carbon and replenishing organic matter.</p> <p>Introduction or spread of alien species The disturbance created during the operation could encourage the invasion of the disturbed areas by alien species. This includes <i>Opuntia</i> spp, <i>Prosopis glandulosa</i> and <i>Eucalyptus</i> sp. Some of these species, especially the <i>Opuntia</i> spp. will rapidly increase in abundance and expand into the disturbed areas if given the opportunity.</p> <p>Encouraging bush encroachment The disturbance created during the mining operation could potentially encourage bush encroachment. This is especially likely during the clearing of diverse habitats where opportunity is provided for highly competitive encroaching species like <i>Senegalia mellifera</i> to establish.</p>				
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		<p>Broadscale ecological processes Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The proposed mining activities on Bezemfontein are not likely to contribute significantly to these cumulative impacts.</p>				
	Ground water	No impact to groundwater is expected from the creation of the excavations. It is not expected that ground water will be intercepted.	Operational	Low	Pollution control and good housekeeping practice	Low
	Noise	Noise impact from the yellow gear will be created.	Operational	Medium	Noise control Well maintained equipment	Low
	Soil	<p>The disturbance of the soil structure during mining activities.</p> <p>Topography, soil erosion and associated degradation of ecosystems</p> <p>The plains of the site are fairly flat; the minimal amount of disturbances and</p>	Operational	Medium	Stripping of topsoil and concurrent rehabilitation	Medium

		vegetation clearing created during mining activities are not expected to leave the site vulnerable to soil erosion. Furthermore, no change to surface topography is expected and therefore local runoff erosion is not considered a likely impact during the operation.				
	Surface water	Extraction of sand from the alluvial sand embankment between the two stream systems.	Operational	Medium	The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams. These impacts can be mitigated by limiting the	Medium

					depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion.	
	Topography	<p>Breaking of the Sky-line by the equipment and mining activities. Topography, soil erosion and associated degradation of ecosystems</p> <p>The plains of the site are fairly flat; the minimal amount of disturbances and vegetation clearing created during mining activities are not expected to leave the site vulnerable to soil erosion. Furthermore, no change to surface topography is expected and therefore local runoff erosion is not considered a likely impact during the operation.</p>	Operational	Medium	Concurrent rehabilitation	Low
	Visual	The mining will be visible to some extent from the immediate surroundings.	Operational	Low	Concurrent Rehabilitation	Low

k) Summary of specialist reports

Table 26.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	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>PALAEONTOLOGICAL IMPACT ASSESSMENT ON PORTION WATERVAL ON FARM BEZEMFONTEIN 213, LAINSBURG DISTRICT, WESTERN CAPE PROVINCE by Prof Marion Bamford 29 November 2019</p> <p>Appendix 4</p>	<p>Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose sands of the Waboomberg Formation of the Devonian. There is a very small chance that fossil may occur in the adjacent hard shales and sandstones so a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once mining has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.</p>	<p>X</p>	<p>e) Policy and Legislative Context</p> <p>g) Motivation for the overall preferred site, activities and technology alternative</p> <p>h) Full description of the process followed to reach the proposed preferred alternatives within the site</p> <p>iv)The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)</p> <p>vii) The positive and negative impacts that the proposed</p>

			<p>activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected</p> <p>v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts</p> <p>k) Summary of specialist reports</p> <p>l) Environmental impact statement</p> <p>(i) Summary of the key findings of the environmental impact assessment;</p> <p>t) Specific information required by the competent Authority</p> <p>i) Compliance with the provisions of sections 24 (4)(a) and (b) read with section 24 (3)(a) and (7) of the National Environmental Management</p>
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			<p>Act (Act 107 of 1998), the EIA Report must include the:-</p> <p>(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act</p>
<p>ECOLOGICAL AND WETLAND ASSESSMENT ON A PORTION OF PORTION 5 OF THE FARM BEZEMFONTEIN 213 NEAR LAINSBURG, LAINSBURG DISTRICT, WESTERN CAPE PROVINCE by Daruis van Rensburg November 2019</p> <p>Appendix 5</p>	<p>The following highly sensitive areas should be excluded and avoided by mining operations:</p> <ul style="list-style-type: none"> ▪ The excavation of sand should be restricted to the central embankment of alluvial sand, excluding the adjacent stream systems, treating these as no-go areas. ▪ Sediments from the site should be prevented from entering the adjacent stream systems and it is recommended that berms be erected between the site and these streams. ▪ Crossing of these streams by the proposed access road should be avoided. Instead the existing small dirt track should be upgraded and the site accessed via the dam shore which is already an artificial and degraded area and will prevent impacting on the stream systems. <p>Permits must be obtained for protected plant species which will require removal from the site. These may include; Erica quadrangularis, E. cerinthoides, E. discolor, Leucadendron barkerae, L. eucalyptifolium, Protea</p>	<p>X</p>	<p>e) Policy and Legislative Context</p> <p>g) Motivation for the overall preferred site, activities and technology alternative</p> <p>h) Full description of the process followed to reach the proposed preferred alternatives within the site</p> <p>iv) The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)</p> <p>vii) The positive and negative impacts that the proposed</p>

	<p>eximia, P. laurifolia, P. repens, Antimima sp., Ruschia caroli, Lampranthus sp. and Watsonia angusta.</p> <p>Due to the removal of vegetation and disturbance of the soil surface the mining area will be highly susceptible to the establishment of weeds. It is therefore recommended that weed control be judiciously and continually practised. Monitoring of weed establishment should form a prominent part of management of the mining area.</p> <p>The following mitigation measures are recommended where mining activities will impact on the adjacent stream systems:</p> <ul style="list-style-type: none"> ▪ The stream systems should be excluded from mining activities and treated as no-go areas. ▪ A berm should be erected between the mining area and the stream systems in order to prevent sediments from entering them. ▪ Adequate storm water management measures should be implemented and should include diverting storm- and floodwater around the mining area and preventing sediment and silt from entering the streams. ▪ The depth of sand excavation should not exceed the level of the banks of these streams. ▪ The border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion. 		<p>activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected</p> <p>v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts</p> <p>j) Assessment of each identified potentially significant impact and risk</p> <p>l) Environmental impact statement</p> <p>(i) Summary of the key findings of the environmental impact assessment;</p> <p>REGULATION 51(a): DESCRIPTION OF THE ENVIRONMENTAL OBJECTIVES AND SPECIFIC GOALS FOR MINE CLOSURE</p>
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	<ul style="list-style-type: none"> ▪ The site will remain highly susceptible to erosion and comprehensive rehabilitation will be crucial. ▪ Adequate topsoil management will be important and the upper 30 cm of soil should be removed, stored on site and utilized during the rehabilitation of the site. ▪ Upgrading of the existing dirt track to provide access to the site should include design aimed at minimizing erosion and allowing for adequate storm water drainage. Structures such as culverts and v-drains should be considered <p>The hunting, capturing and trapping of fauna should be prevented by making this a punishable offense during the mining operations.</p> <p>No littering must be allowed and all litter must be removed from the site.</p> <p>Monitoring of mining and compliance with recommended mitigation measures must take place. This must include at least annual monitoring of the adjacent streams by means of an Index of Habitat Integrity (IHI), sedimentation monitoring and monitoring of the vegetation condition.</p> <p>Comprehensive rehabilitation should be undertaken after mining has ceased. This should include re-instatement of the natural topography as far as possible, replacing</p>		
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	topsoil in disturbed areas, prevention of erosion and monitoring and eradication of exotic invasive species.		
PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEOONTOLOGICAL DESKTOP ASSESSMENT) REQUESTED IN TERMS OF SECTION 38 (8) OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR THE PROPOSED MINING PERMIT APPLICATION ON A PORTION OF PORTION 5 (A PORTION OF PORTION 2 - WATERVAL) OF THE FARM BEZEMFONTEIN 213 IN THE MAGISTERIAL DISTRICT OF LAINGSBURG,	<p>EXECUTIVE SUMMARY</p> <p>This document is a Heritage Impact Assessment (HIA) report which has been prepared at the behest of Blouberg Eiendomme (Pty) Ltd in support a mining permit application “a portion of portion 5 (a portion of portion 2 - Waterval) of the farm Bezemfontein 213 in extent 4.99 ha located in the Laingsburg District, Western Cape Province”. The target product is sand. A ground survey was conducted on 8 November 2019 for the identification and documentation of any archaeological and historical material that might occur on the property.</p> <p>The following is a summary of the findings of the survey:</p> <p>The Stone Age A lithic was found representing a Middle Stone Age Scraper (BZKo6). The paucity of evidence for the Stone Age is likely due to the fact that the size of the area under investigation is relatively small at 4.99 ha.</p> <p>The Iron Age No material dating to the Iron Age was found.</p> <p>Historic buildings and structures</p>	X	<p>e) Policy and Legislative Context</p> <p>g) Motivation for the overall preferred site, activities and technology alternative</p> <p>h) Full description of the process followed to reach the proposed preferred alternatives within the site</p> <p>iv) The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)</p> <p>vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected</p>

<p>WESTERN CAPE</p> <p>Prepared by Edward Matenga (PhD Archaeology & Heritage, MPhil, Archaeology; Uppsala/Sweden)</p> <p>Appendix 6</p>	<p>One building was observed located outside the area of the proposed sand mining. It is a small isolated gabled farmhouse with roof of corrugated iron sheets. It has a gabled veranda set against it in the midsection facing north. This building may be significant as it exemplifies rural buildings of the modern commercial farming period. But it will not be affected as it lies outside the limits of the proposed development.</p> <p>Early commercial farmers used dolerite monoliths as posts to erect fences around their properties and to divide them into paddocks. It is reported that barbed wire fencing was first used in South Africa at the end of the 19th century. Monoliths were observed in 6 places. Five of these (BZF01-BZF05) stand or lie in a line to suggest that they formed a section of early fencing. These lie outside the limits of the proposed sand mining and will therefore not be affected. One of the standing monoliths (BZF09) stand within the footprint of the proposed mining. The relic is however considered of to be of low cultural significance to warrant protection in situ.</p> <p>Burials and burial grounds There were no graves or burial ground found.</p> <p>Aspects of cultural landscapes Cultural Landscapes are “cultural properties that represent the combined works of nature and of man” ...</p>		<p>v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts</p> <p>k) Summary of specialist reports</p> <p>l) Environmental impact statement</p> <p>(i) Summary of the key findings of the environmental impact assessment;</p> <p>t) Specific information required by the competent Authority</p> <p>i) Compliance with the provisions of sections 24 (4)(a) and (b) read with section 24 (3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998), the EIA Report must include the:-</p>
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	<p>They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.”</p> <p>Elsewhere on the farm Bezemfontein there are characteristic elements of a Karoo commercial farming landscape such as the long boundary and partition stonewalls, farmsteads, orchards and irrigated fields. None of these elements will be affected by the proposed development.</p> <p>RECOMMENDATIONS AND CONCLUSIONS</p> <p>The mining application can be considered in light of the low cultural significance of material found. However it is a standard precaution that in the event of other heritage resources being discovered in future phases of the project, the Provincial Heritage Resources Authority or SAHRA must be alerted immediately and an archaeologist or heritage expert called to attend.</p>		<p>(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act</p>
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I) Environmental impact statement**(i) Summary of the key findings of the environmental impact assessment;**

The site proposed for the sand mine has been rated as being acceptable for the development. This is however subject to the two adjacent stream systems being **excluded from mining activities** as indicated, adequate topsoil management, erosion monitoring and remediation and comprehensive rehabilitation.

The site is situated at the foot of the Klein Swartberge on a Portion of Portion 5 of the Farm Bezemfontein 213. The site is situated approximately 50 km to the north east of Ladismith and approximately 70 km to the south east of Laingsburg and has an extent of 4.99 hectares. The site is situated at the foot of the north facing slopes of the Klein Swartberg where sands eroding from the slopes are continuously deposited. The site does contain some transformation in the form of a large artificial impoundment and embankment but is still largely natural. Two prominent and largely natural stream system are also present on the site. The proposed mining development will excavate sand from a low mound between the streams. The mining activities are not anticipated to utilise any processing plant and will remain at a very small scale.

According to Mucina & Rutherford (2006) the area consists of Matjiesfontein Shale Renosterveld (FRs 6). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004). It is not currently subjected to any pronounced transformation pressures and the conservation value of this vegetation type is therefore relatively low. According to the Western Cape Biodiversity Spatial Plan (2017) the site in question is listed as being an Other Natural Area (ONA) although the southern stream system is also listed as being an Ecological Support Area 1 and 2. This does not significantly contribute to its conservation value. The two stream systems do have a high conservation value but they will be excluded from mining activities and treated as no-go areas.

The site has burned approximately four years previously, however, re-establishment of vegetation has not been sufficient and the percentage ground cover is relatively low in comparison to the natural condition. This is most likely as a result of a high natural disturbance regime as sands eroded from the slopes of the mountain is continuously deposited on the site and the sandy soils are also highly mobile, continuously shifting and is easily eroded. In addition, relatively high levels of trampling and overgrazing by domestic stock will also decrease the vegetation cover and increases erosion of the sandy soils.

The habitat on the site is predominately formed by sands deposited by alluvial deposition. The site is situated at the foot of the north facing slope of the Klein Swartberg. Rainfall along the peaks and steep slopes create runoff with a high velocity,

which therefore cause erosion of the sandy soils down the slope to the foot of the mountain. Here the slope drastically and suddenly decreases to a flat plain with low ridges to the north. This essentially halts water flow which allows for the deposition of the sands and forms an alluvial plain. Although water is slowed drastically at the foot of the mountain, large flow events or flooding has caused the formation of two prominent channels, incised into the sandy alluvial plain. These channels form two prominent streams. The aim of the mining activities will be to excavate and remove the accumulated sands between these two streams.

From the description of the vegetation on the site it is clear that natural vegetation dominates the site though significant disturbance is also present. The ecological processes on the site are clearly defined and should allow for adequate management of mining operations and rehabilitation after cessation of mining activities. The site contains an elevated alluvial sand embankment which will be the main area of sand excavation. This portion has a moderate species diversity, though sparse vegetation cover with a high proportion of protected species including five protected proteoid species, two Erica species and three Vygie species. None of these are however rare or endangered and they are all relatively widespread. However, the proposed mining area is of small extent and seeing as none of these species are rare, endangered or localised their loss is not anticipated to be high. Permits will however have to be acquired to remove these plants. Furthermore, provided that comprehensive rehabilitation and adequate management of topsoil is undertaken it is highly that several of these will be able to re-establish on the site after mining has ceased. This portion of the site is bordered to the north and south by two streams which are considered to have a high conservation value. It is therefore recommended that these be excluded from the mining area and that the proposed access road avoid crossing these streams.

The impact that the proposed mining operations will have on fauna is mainly the loss of habitat which will decrease the available habitat. The faunal population will vacate the site into adjacent natural areas which will put a strain on surrounding populations. However, the development will be of such low extent (approximately 5 hectares) that this impact cannot be considered as high. In order to prevent any direct impact on fauna it is recommended that any hunting, trapping or capturing be strictly prohibited. As mining activities commence they will vacate the area by their own accord. Provided that adequate rehabilitation is undertaken it is likely that the site will again be available as habitat to opportunistic species. Tunnels of one of the Golden Mole species occur along the shore of the artificial dam on the site. According to distribution data this can only be either the Cape Golden Mole (*Chrysochloris asiatica*) or the Fynbos Golden Mole (*Amblysomus corriae*). Of these the former is listed as being of Least Concern (LC) whilst the latter is listed as Near Threatened (NT). The proposed mining activities are anticipated to have an impact on this species since removal of sand will directly affect the habitat. The extent of operations is however small which will limit the impacts on fauna to moderate.

The proposed development will include excavation of sand from the alluvial floodplain and construction of an access road to remove the product from the site. The streams will be excluded from mining operations but may still be affected by it.

Soil samples taken along the main channel of these streams contain clear signs of wetland conditions and is also indicative of a perennial zone of wetness. Wetland conditions can therefore be confirmed to be present along these two small stream systems. Obligate wetland vegetation could be easily utilised to provide an accurate border of wetland conditions. Obligate wetland species are only able to inhabit wetland areas and as a result where they occur wetland conditions can be assumed to occur. The obligate wetland cape reed (*Elegia capensis*), riparian grass (*Pennisetum macroum*) and geophyte (*Watsonia angusta*) was utilised to provide a quite accurate boundary of wetland conditions and the floodplain of these streams. The main channel and marginal zone can be characterised as a channel wetland system (SANBI 2009). However, the northern stream also contains a portion with a lower gradient, a more diffuse flow regime and consequently also contains elements of an unchanneled valley-bottom wetland (SANBI 2009). Along the northern stream system there is also an artificial crescent shaped channel and berm. This furrow or channel diverts a portion of the flow in the stream although its intended function is unclear. It has however also manifested some wetland conditions due to continued inundation and saturated soil conditions. These wetland conditions are however artificial and do not perform any function which is important to the continued natural functioning of the stream. This channel and berm can therefore be included in the sand excavation operations without having a large impact on the functioning of the stream.

The two streams are considered to be mostly natural though some increased erosion due to trampling by domestic stock is likely. This will decrease the vegetation, mobilise the sandy sediments and in so doing increase erosion and sedimentation of the streams. The functioning of these streams is considered highly modified by the artificial impoundment along the eastern border of the site. It is clear that this impoundment has heavily modified the natural flow and flooding regime of these streams.

An Index of Habitat Integrity (IHI) was conducted for the two affected streams. The results of the IHI indicated that the study area has an Instream IHI of Category C: Moderately Modified and Riparian IHI of Category C: Moderately Modified. This can be mostly attributed to the modification of the streams brought about by the artificial impoundment.

The EI&S of the stream systems has been rated as being High: Floodplains that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.

A Risk Assessment for the proposed sand mine and affected stream systems has been undertaken according to the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment Matrix for Section 21(c) & (i) water use.

The mining operations are anticipated to remain at a very small scale. This will significantly decrease the risk on the streams. However, as indicated these streams must be regarded as highly sensitive. They should therefore be excluded from any mining activities and the necessary mitigation, mining methods and procedures implemented to minimise any impacts on them. Should these be implemented the risk should remain moderate. Firstly, the excavation of sand should be restricted to the central embankment of alluvial sand, excluding the adjacent stream systems, treating these as no-go areas. Sediments from the site should be prevented from entering the adjacent stream systems and it is recommended that berms be erected between the site and these streams. Secondly, the depth of sand excavation should not exceed the level of the banks of these streams. This should be feasible since adequate material is not present beyond this depth. In addition, the border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion. Thirdly, the site will remain highly susceptible to erosion and comprehensive rehabilitation, including adequate management of topsoil, will be crucial. Extended monitoring and implementation of erosion measures will also be necessary.

The alluvial plain on the site is highly conducive to erosion and even when comprehensive erosion management measures are implemented it remains likely that sand mining will considerably increase the sediment load in downstream sections. However, the artificial impoundment essentially acts as a sediment trap and will prevent any mobilised sediments from entering the downstream sections. This will effectively contain impacts associated with sand mining in the immediate area.

The excavated sand will have to be transported from the site by trucks and heavy vehicles and will require an adequate access road which may affect the two stream systems. Crossing of these streams by such a road will have a significant impact on them and should be avoided. This can be achieved by utilising an existing small dirt track which can be upgraded and accessing the site via the dam shore which is already an artificial and degraded area and will prevent impacting on the stream systems. Should this route be used the risk should remain low. It is however also subject to the upgrading of the existing track minimising erosion and its design allowing for adequate drainage of surface runoff without exacerbating erosion.

The impact significance has been determined and it is clear that the majority of impacts will be moderate although the impact on the adjacent streams are moderate-high. Through adequate mitigation this impact can also be decreased to moderate.

The nature of impacts can vary widely depending on the type of physical environment, the size of activity and the perceptions and values of each of the affected parties. It was

the objective of the assessment to identify both positive and negative impacts. The existing information was reviewed to assess the present status of the environment and the extent to which they have already been modified. The planned activities and associated infrastructure was used as reference to assess potential impacts.

The most profound impacts are expected to be related to the possible accidental/intentional killing of fauna, proliferation of alien invasive species and contribution to the cumulative effects of other mining activities in the region. These impacts are however not considered to significant and can be well mitigated.

Species of conservation concern that are found in these earmarked habitats could potentially be damaged or removed.

A permit application regarding protected flora as well as the harvesting of indigenous vegetation need to be lodged with the Western Cape Department of Environment and Nature Conservation prior to any clearance of vegetation.

Positive impacts include the demarcation and subsequent protection of heritage resources and the eradication of alien invasive species. Positive social impacts include the creation of jobs, social upliftment, training opportunities, community development and numerous benefits.

To conclude, the proposed mining activities will not have a major impact on the ecological integrity of Bezemfontein, with associated impacts mainly considered to be low. Authorisation should nevertheless be granted on condition that the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures (Taken from the ecological and wetland assessment DPR Darius van Rensburg, 2019).

(ii) Final Site Map;



Figure 16. Final Site Map with wetland delineation map of the proposed sand mining on the Farm Bezemfontein

(iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

The proposed mining operation will be done in such a way that farming will still be possible on the rest of the farm. If mining is done the loss of land use will be temporary as the site will be rehabilitated in such a way that it allows the establishment of a grass cover again. The rest of the farm will still be able to be used for grazing purposes.

The extraction of sand will be confined to the central alluvial embankment and the stream systems themselves will be excluded from mining activities. However, due to the close proximity and erosive sandy soils the streams are still likely to be affected by sand excavations. This will mostly be in the form of erosion, sedimentation and modification of the riparian habitat of the streams.

These impacts can be mitigated by limiting the depth of sand excavation to the level of the banks of these streams. Furthermore, comprehensive rehabilitation will be necessary, adequate topsoil management and monitoring and remediation of erosion.

It is recommended that the proposed access road utilise the existing dirt track and that crossing of the stream systems area avoided.

As long as the dirt track is utilised and accesses the site via the shore of the artificial dam the impact should remain low. This is also subject to the upgrading and design of the access road minimising erosion and allows for adequate storm water drainage.

This mining operation will provide 7 temporary jobs. This will also add to the increased economic activity and area surrounding the farm.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMP are adhered to e.g. rehabilitation.

No concerns in terms of the mining itself have been raised.

The specific occurrence of sand in the area dictates the selection of the specific mining site.

m) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

The main closure objective of Blou Berg Eiendomme planned mining operation is to restore the site to its current land capability in a sustainable matter.

- To prevent the sterilization of any sand reserves.
- To prevent the establishment of any permanent structures or features.

- To manage and limit any impact to the surface and groundwater aquifers in such a way that an acceptable water quality and yield can still be obtained, when a closure certificate is issued.
- The mine also has the objective to establish a stable and self-sustainable vegetation cover.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability of the mine.
- To limit and manage the visual impact of the mine.
- To safeguard the safety and health of humans and animals on the mine.
- The last closure objective is that the mine is closed efficiently, cost effectively and in accordance with government policy.

Rehabilitation Plan

Infrastructure areas

On completion of the mining operation, the various surfaces, including the access road, the excavations will finally be rehabilitated as follows:

All material on the surface will be removed to the original level where possible. This material will then be backfilled into the excavations. Any compacted area will then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.

All infrastructures, equipment, and other items used during the operational period will be removed from the site.

Final rehabilitation of Excavations

After rehabilitation has been completed, all roads will be ripped or ploughed, fertilized and seeded, providing the landowner does not want them to remain that way and with written approval from the Director: Mineral Development of the Department of Mineral Resources.

Submission of information

Reports on rehabilitation and monitoring will be submitted annually to the Department of Mineral Resources – Cape Town, as described in regulation 55.

Maintenance (Aftercare)

Maintenance after closure will mainly concern the regular inspection and monitoring and/or completion of the re-vegetation programme.

The aim of the Basic Assessment Report is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.

The aim with the closure of the mine will be to create an acceptable post-mine environment and land-use. Therefore all agreed commitments will be implemented by Mine Management.

After-effects following closure

- *Acid mine drainage*

No potential for bad quality leachate or acid mine drainage development exist after mine closure.

- *Long term impact on ground water*
No after effect on the ground water yield or quality is expected.
- *Long-term stability of rehabilitated land*
One of the main aims of any rehabilitated ground will be to obtain a self-sustaining and stable end result.

n) **Aspects for inclusion as conditions of Authorisation**

The following highly sensitive areas should be excluded and avoided by mining operations:

- **The excavation of sand should be restricted to the central embankment of alluvial sand, excluding the adjacent stream systems, treating these as no-go areas.**
- **Sediments from the site should be prevented from entering the adjacent stream systems and it is recommended that berms be erected between the site and these streams.**
- **Crossing of these streams by the proposed access road should be avoided. Instead the existing small dirt track should be upgraded and the site accessed via the dam shore which is already an artificial and degraded area and will prevent impacting on the stream systems.**

Permits must be obtained for protected plant species which will require removal from the site. These may include; *Erica quadrangularis*, *E. cerinthoides*, *E. discolor*, *Leucadendron barkerae*, *L. eucalyptifolium*, *Protea eximia*, *P. laurifolia*, *P. repens*, *Antimima* sp., *Ruschia caroli*, *Lampranthus* sp. and *Watsonia angusta*.

- Due to the removal of vegetation and disturbance of the soil surface the mining area will be highly susceptible to the establishment of weeds. It is therefore recommended that weed control be judiciously and continually practised. Monitoring of weed establishment should form a prominent part of management of the mining area.
- The following mitigation measures are recommended where mining activities will impact on the adjacent stream systems:
 - The stream systems should be excluded from mining activities and treated as no-go areas.
 - A berm should be erected between the mining area and the stream systems in order to prevent sediments from entering them.
 - Adequate storm water management measures should be implemented and should include diverting storm- and floodwater around the mining area and preventing sediment and silt from entering the streams.
 - The depth of sand excavation should not exceed the level of the banks of these streams.

- The border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion.
- The site will remain highly susceptible to erosion and comprehensive rehabilitation will be crucial.
- Adequate topsoil management will be important and the upper 30 cm of soil should be removed, stored on site and utilised during the rehabilitation of the site.
- Upgrading of the existing dirt track to provide access to the site should include design aimed at minimising erosion and allowing for adequate storm water drainage. Structures such as culverts and v-drains should be considered.

The hunting, capturing and trapping of fauna should be prevented by making this a punishable offense during the mining operations.

No littering must be allowed and all litter must be removed from the site.

Monitoring of mining and compliance with recommended mitigation measures must take place. This must include at least annual monitoring of the adjacent streams by means of an Index of Habitat Integrity (IHI), sedimentation monitoring and monitoring of the vegetation condition.

Comprehensive rehabilitation should be undertaken after mining has ceased. This should include re-instatement of the natural topography as far as possible, replacing topsoil in disturbed areas, prevention of erosion and monitoring and eradication of exotic invasive species.

No Trucks will be allowed to use the Seven Weeks Poort as per comments from Western Cape Government Transport and Public Works which required a professional registered civil engineer's Traffic Impact Statement.

A professional registered engineer has been appointed but indicated that the study could take another 8 – 12 weeks to finalize.

o) Description of any assumptions, uncertainties and gaps in knowledge

This report was compiled by incorporating information provided by the applicant and the specialists and no warranty or guarantee, whether expressed or implied, is made by the EAP with respect to the completeness, accuracy or truth of any aspect of this document with reference to the instructions, information and data supplied by the aforementioned parties.

Some geophytic or succulent species may have been overlooked due to a specific flowering time or cryptic nature. Several geophytic species may have finished flowering during autumn and would likely have been overlooked. Although a comprehensive survey of the site was done it is still likely that several species were overlooked. Smaller drainage lines may have been overlooked where a distinct channel or riparian vegetation is absent. Due to time constraints, only limited soil sampling could be done. Some animal species may not have been observed as a result of their nocturnal and/or shy habits (van Rensburg, 2019:10).

All possible care was taken to identify and document heritage resources during the survey in accordance with best practices in archaeology and heritage management. However, it is always possible that some hidden or subterranean sites are overlooked during a survey (Matenga, 2020:2).

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the sandstones, shales and sands are typical for the country and could contain fossil, invertebrates and invertebrate burrows. The loose sands would not preserve fossils (Bamford, 2019:11).

The impact assessment was conducted based on the EAPs knowledge and experience with the input from the specialist studies. The probability, intensity/severity and significance pertaining to the criteria used to assess the significance of the impacts were based on rule-of-thumb, experience and input from specialists.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why the activity should be authorized or not.

There are no significant reasons why the activity should not be authorised. However, if the proposed management and mitigation measures are not properly applied or if the mining operation intentionally disregards any of these measures, it will negatively affect the environment and have more long-term consequences. Therefore, the competent authority and the applicant should take all the necessary steps to ensure that the mining operation complies with the conditions set out in the approval of the EMPR.

ii) Conditions that must be included in the authorisation.

The site proposed for the sand mine has been rated as being acceptable for the development. This is however subject to the two adjacent stream systems being excluded from mining activities as indicated and adequate topsoil management, erosion monitoring and remediation and comprehensive rehabilitation.

q) Period for which the Environmental Authorisation is required

It is required for 5 years.

r) Undertaking

We hereby undertake to meet the requirements as provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

s) Financial Provision

The progressive rehabilitation cost that will be paid into the fund to make provision for premature closure and end of life closure is estimated at **R158 963.83**.

i) Explain how the aforesaid amount was derived

The quantum of the financial provision contemplated in Regulation 54 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) will be revised and adjusted accordingly annually, based on a survey assessment of the environmental liability of Blou Berg Eiendomme. Surveys of excavations are conducted by a registered surveyor and results are forwarded to an independent EAP who calculates the outstanding rehabilitation as per the agreed rate in the DMR Guideline. A bank guarantee is prepared for the amount and submitted to the DMR.

Financial provision for the rehabilitation or management of negative environmental impacts caused by the mining operation [as required by Section 41 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] will be made in the form of a financial guarantee from a South African registered bank. This document will guarantee the financial provision relating to the Environmental Management Programme in a format as approved by the Director-General.

ii) Confirm that this amount can be provided from operating expenditure

It is confirmed that the amount for outstanding rehabilitation can be provided from operating expenditure.

t) Specific information required by the competent Authority**i) Compliance with the provisions of sections 24 (4)(a) and (b) read with section 24 (3)(a) and (7) of the National Environmental Management Act (Act 107 of 1998), the EIA Report must include the:-****(1) Impact on the socio-economic conditions of any directly affected person**

The applicant is also the owner of the farm it can therefore be said that the mining operation was thoroughly discussed with the landowners.

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEOLOGICAL DESKTOP ASSESSMENT) REQUESTED IN TERMS OF SECTION 38 (8) OF THE

NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR THE PROPOSED MINING PERMIT APPLICATION ON A PORTION OF PORTION 5 (A PORTION OF PORTION 2 - WATERVAL) OF THE FARM BEZEMFONTEIN 213 IN THE MAGISTERIAL DISTRICT OF LAINGSBURG, WESTERN CAPE Prepared by Edward Matenga (PhD Archaeology & Heritage, MPhil, Archaeology; Uppsala/Sweden)

EXECUTIVE SUMMARY

1. This document is a Heritage Impact Assessment (HIA) report which has been prepared at the behest of Blouberg Eiendomme (Pty) Ltd in support a mining permit application “a portion of portion 5 (a portion of portion 2 - Waterval) of the farm Bezemfontein 213 in extent 4.99 ha located in the Laingsburg District, Western Cape Province”. The target product is sand. A ground survey was conducted on 8 November 2019 for the identification and documentation of any archaeological and historical material that might occur on the property.
2. The following is a summary of the findings of the survey:
3. **The Stone Age**
A lithic was found representing a Middle Stone Age Scraper (BZK06). The paucity of evidence for the Stone Age is likely due to the fact that the size of the area under investigation is relatively small at 4.99 ha.
4. **The Iron Age**
No material dating to the Iron Age was found.
5. **Historic buildings and structures**
One building was observed located outside the area of the proposed sand mining. It is a small isolated gabled farmhouse with roof of corrugated iron sheets. It has a gabled veranda set against it in the midsection facing north. This building may be significant as it exemplifies rural buildings of the modern commercial farming period. But it will not be affected as it lies outside the limits of the proposed development.
6. **Early commercial farmers used dolerite monoliths as posts to erect fences around their properties and to divide them into paddocks. It is reported that barbed wire fencing was first used in South Africa at the end of the 19th century. Monoliths were observed in 6 places. Fiver of these (BZF01-BZF05) stand or lie in a line to suggest that they formed a section of early fencing. These lie outside the limits of the proposed sand mining and will therefore not be affected. One of the standing monoliths (BZF09) stand within the footprint of the proposed mining. The relic is however considered of to be of low cultural significance to warrant protection in situ.**
7. **Burials and burial grounds**
There were no graves or burial ground found.

8. Aspects of cultural landscapes
Cultural Landscapes are “cultural properties that represent the combined works of nature and of man” They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.”
9. Elsewhere on the farm Bezemfontein there are characteristic elements of a Karoo commercial farming landscape such as the long boundary and partition stonewalls, farmsteads, orchards and irrigated fields. None of these elements will be affected by the proposed development.
10. **Recommendations and conclusions**
The mining application can be considered in light of the low cultural significance of material found. However it is a standard precaution that in the event of other heritage resources being discovered in future phases of the project, the Provincial Heritage Resources Authority or SAHRA must be alerted immediately and an archaeologist or heritage expert called to attend.

A palaeontological Impact Assessment desktop study was done by Prof. Marion Bamford on November 2019 for the Mining Right Application for sand on portion Waterfal of farm Bezemfontein 213, Laings District.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the right age to contain fossils but in the finer-grained material that has not weathered to form loose sand. Furthermore, the material to be mined is loose sand and this does not preserve fossils. Since there is an extremely small chance that fossils from the Waboomberg Formation may be disturbed, although none has been reported from this site, a Fossil Chance find protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low and the mining for sand and rehabilitation of the land may proceed.

v) Other matters required in terms of sections 24(4)(a) and (b) of the Act

There are no alternatives, as the application area applied for is the area where the applicant has proven sand and has found potential for a sand mining operation.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme

- a) Details of the EAP** (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required)

I hereby confirm that the requirements for the provision of the details and expertise of the EAP are already included in PART A, section 1(a).

Confirmed (Mark with an X)	X
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- b) Description of the Aspects of the Activity** (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required)

I hereby confirm that the requirements to describe the aspects of the activity that are covered by the draft environmental management programme are already included in PART A, section 1(h).

Confirmed (Mark with an X)	X
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- c) Composite Map**

The final site map below indicates the mining permit application area in which all mining will take place. Existing roads are also depicted. The associated infrastructure relating to the mining site will be placed in the area marked as the “mine infrastructure footprint”.

The two stream systems do have a high conservation value but they will be excluded from mining activities and treated as no-go areas see map below.

It is therefore recommended that these be excluded from the mining area and that the proposed access road avoid crossing these streams.

The mining operations are anticipated to remain at a very small scale. This will significantly decrease the risk on the streams. However, as indicated these streams must be regarded as highly sensitive. They should therefore be excluded from any mining activities and the necessary mitigation, mining methods and procedures implemented to minimise any impacts on them. Should these be implemented the risk should remain moderate. Firstly, the excavation of sand should be restricted to the central embankment of alluvial sand, excluding the adjacent stream systems, treating these as

no-go areas. Sediments from the site should be prevented from entering the adjacent stream systems and it is recommended that berms be erected between the site and these streams. Secondly, the depth of sand excavation should not exceed the level of the banks of these streams. This should be feasible since adequate material is not present beyond this depth. In addition, the border between mined areas and adjacent natural areas should be faired in so that sheer drops or steps are avoided as these will cause significant erosion. Thirdly, the site will remain highly susceptible to erosion and comprehensive rehabilitation, including adequate management of topsoil, will be crucial. Extended monitoring and implementation of erosion measures will also be necessary.

The alluvial plain on the site is highly conducive to erosion and even when comprehensive erosion management measures are implemented it remains likely that sand mining will considerably increase the sediment load in downstream sections. However, the artificial impoundment essentially acts as a sediment trap and will prevent any mobilised sediments from entering the downstream sections. This will effectively contain impacts associated with sand mining in the immediate area.

The excavated sand will have to be transported from the site by trucks and heavy vehicles and will require an adequate access road which may affect the two stream systems. Crossing of these streams by such a road will have a significant impact on them and should be avoided. This can be achieved by utilising an existing small dirt track which can be upgraded and accessing the site via the dam shore which is already an artificial and degraded area and will prevent impacting on the stream systems. Should this route be used the risk should remain low. It is however also subject to the upgrading of the existing track minimising erosion and its design allowing for adequate drainage of surface runoff without exacerbating erosion.

The only other buffers that must be implemented is the 100m away from any fixed infrastructure like the tar road and the farm house and out buildings in terms of the Mine Health and Safety Act 1996 (Act No. 29 of 1996) Regulations relating to surveying, mapping and mine plans.

These regulations states that mine must take reasonable measures to ensure that:

No mining operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways or any other structure whatsoever including such structure beyond the mining boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with.



Figure 17: Composite map



Figure 18. View of site of the proposed Quarry NE with the R323 in the background

d) Description of impact management objectives including management statements**i) Determination of closure objectives**

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Proof of this should be submitted at closure. Specific objectives include:-

Rehabilitation of Infrastructure Areas although none is anticipated except for the chemical toilet

The objectives for the removal and infrastructure and the subsequent rehabilitation of the areas they occupied include:

- To ensure the infrastructure identified for removal is successfully demolished and removed.
- To ensure that infrastructure identified to remain after mine closure is maintained until the issue of a closure certificate.

Maintenance

The necessary agreements and arrangement will be made by Blou Berg Eiendomme to ensure that all natural physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state or for three (3) years after closure or as long as deemed necessary at the time.

- Such processes include erosion of the rehabilitated surfaces, surface water drainage, air quality, surface water quality, ground water quality, vegetative re-growth, weed encroachment.
- The closure plan will be reviewed yearly.
- Rehabilitation of the land will be maintained until a closure certificate is granted or until the land use is regarded as sustainable.
- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

Performance Assessments

As per the MPRDA and associated Regulations, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Blou Berg Eiendomme will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of the EMPR;
- Conduct performance assessments of this EMPR as required by the MPRDA and associated Regulations; and

- Compile and submit the afore-mentioned performance assessment reports to the DMR. The frequency of the performance assessments will occur every year. An independent and competent person will undertake all performance assessments.

Decommissioning and Closure Objectives

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas will be left in a stable, self-sustainable state. Proof of this will be submitted at closure. Specific objectives include:

- To identify potential post-closure land uses in consultation with the surrounding land owners and land users. This should be done during the operational phase of the mine.
- Rehabilitate disturbed land to a state suitable for its post-closure uses.
- Rehabilitate disturbed land to a state that facilitates compliance with applicable environmental quality objectives.
- Limit the impact on staff whose positions become redundant at the tie of mine closure.
- Keep relevant authorities informed of the progress of the decommissioning phase.
- Submit monitoring data to the relevant authorities.
- Maintain required pollution control facilities and rehabilitated land until closure.

Negative Economic Impacts

The objective is to alleviate the negative socio-economic impacts that will result from mine closure. Management principles to achieve this include:

- Blou Berg Eiendomme will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of planning.
- Strategies for sustainable development of surrounding towns have been and will continue to be developed by the project in collaboration with district and local authorities, local businesses and other interested parties. Early warning of impending closure will be given to IAPs.
- In conjunction with long-term closure planning, the mine will actively participate in regional and local planning to enhance the economic benefits of the project through development of alternative forms of income generation.
- Blou Berg Eiendomme will initiate and participate in regional planning exercises that will mitigate the impacts of closure of the mine, the local and regional economies and associated abandonment of community infrastructures surrounding the mine.

ii) **Volumes and rate of water use required for the operation**

No water except for a little bit of domestic water will be required for the 7 workers on site. This water will be bought in Laingsburg as bottled water and transported to site for use every day.

iii) **Has a water use licence been applied for?**

A Risk Assessment for the proposed sand mine and affected stream systems has been undertaken according to the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment Matrix for Section 21(c) & (i) water use. The necessary application is in the process of being prepared.

iv) **Impact to be mitigated in their respective phases**

Table 27: Impact to be mitigated in their respective phases

Activity and Phase	Potential Impact	Size and Scale	Mitigation or control measure related to compliance with standards
ENVIRONMENTAL IMPACTS			
Mining Construction Activities	Geology Sterilisation of mineral resources	Local	- Proper planning of sand mining.
Control measures are to be applied during the implementation of respective activities	Topography Changes to surface topography due to placement of excavations.	Local	- Prominent natural features will not be disturbed such as heritage sites; - All temporary infrastructure will be demolished during closure; - Waste will be disposed of at the farm waste disposal site; - All disturbed areas will be rehabilitated.
	Soils Loss of soils resources due to erosion Soil contamination due to hydrocarbon spillages	Local	- All temporary infrastructures will be demolished during closure; - Waste will be disposed of at a the farm waste disposal site; - Agreement to use this site will be sought from the municipality; - All disturbed areas (excavations) will be backfilled and rehabilitated; - Topsoil will be stripped according to the soil type and the available soil depth in the areas to be disturbed (up to 150mm) as per soil analysis of the area; - Soil will be stockpiled in windrows not higher than 2m with as little compaction as possible; - Stockpiling will be done as close as possible to areas where the soils will be replaced and single handling practised; - Soil stockpiles will be kept in a weed-free condition;

		<ul style="list-style-type: none"> - Stockpiled soil will be used in ongoing rehabilitation of disturbed areas; - Rehabilitation will include:- <ul style="list-style-type: none"> ✓ removing of all debris, ✓ replacement of soil with as little compaction as possible, ✓ reshaping, ploughing or ripping to break compaction; and ✓ introduction of organic matter as necessary. - Soil contamination will be prevented through:- <ul style="list-style-type: none"> ✓ bunding of all above-ground storage facilities, ✓ construction on impervious floors for hazardous substances such as diesel, oil and chemicals; and ✓ regular inspections of equipment and vehicles for leaks - Spillages of oil, grease and hydraulic fuels will be reported. The spillages will be cleaned up by removing the soil and disposing such soil in a waste receptacle called soil farm. A dedicated engineer will be appointed to oversee the soil farm. - Contaminated soil will be removed taken to this soil farm, where it will be treated with decontaminant. The treated soil samples will be taken to the laboratory to determine if this soil is suitable for taking back to rehabilitation areas. - Contractors, staff and drivers will be trained on how to deal with spillage of hydrocarbons and other potential contaminants. - All domestic and industrial waste generated on site will be contained in skips and appropriate receptacles, collected and if required sorted by the approved contractor, and removed to approved waste disposal site. - Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. - All surface water management infrastructure constructed from soil (berms, canals and bunds) will be inspected at least monthly, with more frequent inspections during periods of high rainfall and after major rainfall events. - The disturbed areas will be rehabilitated to grazing potential and appropriate erosion control measures will be implemented. <p>Available soils will be used for top soiling.</p>
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			<ul style="list-style-type: none"> - Any excavation of topsoil's will be done such that the cleared area is also ripped and allow to re-vegetate.
	Land capability Loss of land capability	Local	<ul style="list-style-type: none"> - All mining activities to be restricted within the demarcated areas. - Check, service and maintain vehicles and equipment to minimise the risk of hydrocarbon and chemical leakages and spillages.
	Land use Fragmentation of farm land	Local	<ul style="list-style-type: none"> - Restrict mining activities to demarcated areas and consider all other areas as no-go areas to minimise loss of grazing land. - Do not disturb any possible grave sites. - Ensure that land which is not used during mining is made available for grazing.
	Fauna and Flora Loss of habitat	Local	<ul style="list-style-type: none"> - Service and maintain mining vehicles in order to reduce noise emissions. - Advise persons entering the site not to disturb or harm animals. - Implement a biodiversity action plan that is available as part of the Biodiversity Specialist Report. - Avoid sensitive areas, such as pans and streams banks-no infrastructure within 100m of any road or water course.
	Wetlands and streams Loss or disturbance of habitat through encroachment of mining related activities	Local	<ul style="list-style-type: none"> - Educate employees, contractors and visitors on biodiversity and land management principles. - Planning & Surveying Department to be provided with relevant buffer areas to incorporate in future planning. - Applicable Water Use Licenses should be applied for disturbance of any pans.
	Alien Species Contamination by chemical control agents (users need to be registered and certified for use of dangerous products) Large areas denuded of vegetation (small-scale rehabilitation of denuded areas to be implemented)	Local and regional	<ul style="list-style-type: none"> - Mechanical and chemical methods will be implemented initially to bring about a quick reduction in these species that pose the greatest invasive threat to the area. - Mechanical (tree-felling) and chemical (stump treatment) methods to be implemented. Market for harvested wood to be investigated. - Mechanical methods (hand-pulling) of control to be implemented extensively in the early stages of establishment of the mine. - Annual follow-up operations to be implemented. - Control measures to be implemented on an opportunistic basis. - Alien plants are to be removed whenever possible.
	Biodiversity Loss of biodiversity	Local, regional	<ul style="list-style-type: none"> - Conduct rehabilitation. - Provide training in the identification of protected species.

		and national	<ul style="list-style-type: none"> - Re-establish using mix of indigenous locally occurring species. - Re-establish tree species on the field away from the mining areas. - Set up fixed point monitoring sites to check progress of rehabilitation. - Fence off newly rehabilitated areas and protect from grazing until well established.
	Ground water Contamination of ground water	Regional	<ul style="list-style-type: none"> - Implement waste management plan for handling hazardous waste. - Conduct ground water monitoring as per the monitoring plan.
	Air quality Deterioration of air quality	Regional	<ul style="list-style-type: none"> - Rehabilitate and maintain disturbed surfaces that are not going to be utilised after mining. - Promote use of PPE such as dust masks.
	Noise Increase in ambient noise level	Regional	<ul style="list-style-type: none"> - Service mining vehicles and equipment on a regular basis to ensure noise suppression mechanisms are functioning. - Construct enclosures/bunds and berms for generators and other noise generating equipment. - Equip vehicles with noise silencers. - Switch equipment off when not in use. - Demarcate and clearly mark noise zones. - Adhere to occupation health and safety noise limits. - Maintain occupational noise monitoring to determine noise levels from equipment as increased noise may indicate other issues. A noise monitoring programme and grievance procedure must be implemented.
	Visual Visual intrusion	Regional	<ul style="list-style-type: none"> - Turn lights off using a timer or occupancy sensor or manually when not needed. - On-site landscape rehabilitation of areas affected by the project should be considered. This may include re-instating landforms and natural vegetation, provision of landscaped open space, or other agreed upon facilities.
	Sensitive areas Destruction of sensitive areas	Local	<ul style="list-style-type: none"> - Avoid all identified wetlands and ensure that no activities take place within wetland areas. - Conduct monitoring programme for water, soil and biodiversity. - Introduce a hydrocarbon management system to ensure that hydrocarbon pollution is minimised. - Ensure that infrastructure is constructed outside the 100 year flood line and or within 100m from streams and pans in order to minimise impacts on water courses.

			<ul style="list-style-type: none"> - Comply with Regulation 704 of the National Water Act of 1998 for all designs of mine residue disposal infrastructure. - Minimise the removal of vegetation during stripping.
	Traffic and safety	Local	<ul style="list-style-type: none"> - Allocate and adhere to speed limits. - To reduce negative impacts of increased traffic on and around the site. - Restrict traffic to demarcated areas. - Public to be given right of way on public roads and contractors shall make use of approved methods to control the movement of vehicles so as not to constitute a road hazard. - Erect safety signs in the local languages to warn people of the danger on roads. - Keep in constant liaison with the local Department of Roads who will need to be aware of any proposed road plans and who may be able to assist in terms of making recommendations and road maintenance. - Ensure that all site access points are clearly visible from the main road. - Ensure that all drivers employed are certified with appropriate training levels for the required vehicle. - Ensure that all vehicles entering and leaving the site use demarcated routes.
	Surface water Contamination of surface water resources	Regional	<ul style="list-style-type: none"> - Clean surface water or runoff will be prevented from entering dirty areas by diverting it around these areas; - The discharge positions might also require additional reinforcement in the form of a suitably designed gabion or similar structure to prevent erosion at the discharge positions.
	Fauna and flora Loss of natural vegetation and species of conservation value	Local, regional and national	<ul style="list-style-type: none"> - Ensure that vegetation is not unnecessarily removed. - Remove with care and relocate Red Data List Species to avoid destruction. - Manage and control plant species declared as invasive and declared weeds.
Operational activities Control measures are to be applied during the implementation of respective activities	Air quality Deterioration in air quality	Local	<ul style="list-style-type: none"> - Minimise the removal of vegetation in order to reduce the possibility of dust pollution. - Vegetate topsoil stockpiles as soon as possible to reduce dust and particulate emissions. - Locate topsoil stockpiles in order to reduce its exposure to wind, thereby reducing the likelihood of particle entrainment. - Spray road surfaces with water and treat it with a dust binding agent to minimise emissions of fugitive dust. The type of dust-binding agent should determine the amount of watering.

	Topography Change in surface topography	Local	Mine owner and environmental consultant should supervise vegetation and rehabilitation activities in accordance with post mining topographical plan.
	Land capability Loss of land capability	Local	<ul style="list-style-type: none"> - Plan all mining activities to prevent the incorrect stripping of topsoil which leads to the reduction in land capability. - Restrict all mining activities to demarcated areas.
	Soils Loss of soil fertility	Local	<ul style="list-style-type: none"> - Vegetate soil stockpiles and berms to minimise the risk of erosion. - Implement erosion control measures, such as contour banks in the area prone to erosion, including slopes and uneven ground; c) Vegetate preferential flow paths of storm water runoff. - Remove soils in dryer months, due to their increased susceptibility to compaction and erosion during rains. - Separate topsoil (A horizon) and sub-soils (B horizon) where possible and stockpile separately. - Construct berms around soil stockpiles in order to divert water away from the stockpile to prevent erosion. - Restrict stockpile height to less than 3m and shape to reduce soil compaction. - Minimise the removal of topsoil in order to reduce dust and particulate emissions.
	Surface water Deterioration in water quality	Regional	<ul style="list-style-type: none"> - Ensure that mining activities are at least 100m from wetlands and flood lines. - Stabilise soil stockpiles with vegetation in order to reduce exposure to erosion and minimise the effects of slit loading of surface water running over exposed soil.
	Surface water Deterioration of a water resource	Regional	<ul style="list-style-type: none"> - Dispose of domestic and hazardous waste originating from temporary and permanent offices and workshops at an authorised landfill facility to minimise the risk of surface water pollution. - Dispose of hazardous waste and effluent at an authorised landfill facility.
	Ground water Contamination of ground water	Regional	<ul style="list-style-type: none"> - Check, service and maintain vehicles used during mining to reduce the risk of hydrocarbon and chemical leakages and spillages. - Contain and remediate hydrocarbon or chemical leakages and spillages to prevent leaching into the ground water. - Develop an emergency spill response plan and train all mining personnel in the emergency spill response procedure.

	Fauna and flora Loss of natural vegetation and species of conservation nature	Local, regional and national	<ul style="list-style-type: none"> - Plan and construct strip areas carefully to minimise the impact on flora species. - Avoid the unnecessary removal of vegetation. - Set and enforce speed limits to prevent accidental injury or death to animals. - Restrict vehicles to road and demarcated areas to prevent damage to vegetation. - Prevent disposal of waste in non-designated areas and the reputable clearing and disposal of any such waste, as these can cause harm to animals, particularly poisonous waste and plastics.
	Noise Noise disturbance	Local	<ul style="list-style-type: none"> - Restrict operational activities to normal working hours. - Service vehicles and equipment on a regular basis to ensure noise suppression mechanisms are functioning. - Limit the speed of vehicles to 40km/h. - Train workers in safety and the use of personal protective equipment to prevent damage to their hearing.
SOCIO-ECONOMIC IMPACTS			
Mining, operational and decommissioning Control measures are to be applied during the implementation of respective activities	Socio-Economic negative impacts on employment and loitering of people in the area resulting in lack of security and safety	Local and regional	<ul style="list-style-type: none"> - Where possible local service providers and workers will be recruited during the mining operation. - The recruitment selection process to promote gender equality and the employment of women wherever possible.
	Interested and affected parties Lack of communication with stakeholders and loss of trust	Local and regional	<ul style="list-style-type: none"> - Implementation of EMP recommendations, involvement of communities in LED initiatives, ongoing communication to provide feedback and updates. - IAPs must be kept up to date on any changes to mining or of alternative routes. - A complaints management system should be maintained by the mine to ensure that all issues raised by community members are followed up and addressed appropriately.
	Heritage resources Destruction of heritage resources	Local	<ul style="list-style-type: none"> - In the event that any major features such as a burial or cache of ostrich eggshell flasks is uncovered during mining operation, an archaeologist should be called in to evaluate the finds. - In the event of an archaeological artefact being unearthed, an accredited archaeologist will inspect the site and make recommendations. - Promote archaeological awareness and investigate sustainable initiatives with communities to promote the local culture.

	<p>Land use Loss of land use</p> <p>Proliferation of alien invasive species</p>	Local	<ul style="list-style-type: none"> - Incorporate an alien invasive eradication and control programme into the rehabilitation efforts. This programme should be formulated according to relevant legislation. - All temporary infrastructures will be demolished during closure.
	<p>Employment Loss of jobs and employment</p>	Local and regional	<ul style="list-style-type: none"> - Increased employment opportunities during decommissioning for local contractors. - The workforce should undergo multiple skills training during the operation of the mine so that they can be productively absorbed into the local economy after mine closure. - Where retrenchments are unavoidable, they will be managed humanely according to legislative requirements. - The workforce should be empowered to develop skills that will equip them to obtain employment in other sectors of the economy. - A strategy for saving jobs and management of downscaling and/or retrenchment should be implemented. - Assistance should be given for help with redeployment of retrenches in other operations or assistance with alternative livelihood strategies. - Identify and implement training needs and training programmes for decommissioning and closure.

e) Impact Management Outcomes

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDDARED TO BE ACHIEVED
Please refer to the above table in section ix.					

f) Impact Management Actions

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE	MITIGATION TYPE	STANDDARED TO BE ACHIEVED
Please refer to the above table in section ix.					

i) Financial Provision**(1) Determination of the amount of Financial Provision**

- (a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.

REGULATION 51(a):**DESCRIPTION OF THE ENVIRONMENTAL OBJECTIVES AND SPECIFIC GOALS FOR MINE CLOSURE****Closure**

The main closure objective of this mining operation is to rehabilitate the mined areas in such a way to ensure that the rehabilitated topographical landscape would blend in with the surrounding landscape, would not pose a safety hazard for human and animal, but at the same time allow a certain alternative land use. Establish a self-sustaining and stable vegetation cover in order to mitigate the visual impact, to control erosion and to create some habitat for animals. The rehabilitated environment also needs to be aesthetically acceptable according to the principle of BPEO.

Blou Berg Eiendomme will ensure that the mining operation is:

- Neither a danger to public health and safety nor to animal health and safety.
- Not a source of any pollution.
- Stable (ecological and geophysical).
- Rehabilitated to the state that is suitable for the predetermined and agreed land use.
- Compatible with the surrounding biophysical environment.
- A sustainable environment.
- Aesthetically acceptable.
- Not an economic, social or environmental liability to the local community or the state now or in the future.

Blou Berg Eiendomme will ensure that the physical and chemical stability of the rehabilitated mining site will be such that risk to the environment is not increased by naturally occurring forces to the extent that such increased risk cannot be contended with by the installed measures.

Blou Berg Eiendomme will subscribe to the optimal exploitation and utilization of South Africa's mineral resources (Sand).

Blou Berg Eiendomme will ensure that the mining site is closed efficiently and cost effectively.

Blou Berg Eiendomme will ensure that the operation is not abandoned but closed in accordance with the relevant requirements.

Blou Berg Eiendomme will ensure that the interest of all interested and affected parties will be considered.

Blou Berg Eiendomme will ensure that the all-relevant legislation regarding mine closure will be adhered to, and all relevant application procedures followed.

The management of environmental impacts

With regard to the extension, the mitigation of all environment impacts on all applicable aspects uses BPEO (Best practical environmental option) principles.

- Optimal utilization and maintenance of existing facilities in a well-planned manner.
- To take care that no new land surface, habitats of vegetation and animals are destroyed, disturbed or alienated unnecessarily.
- To contain and prevent any pollution (physical and chemical) from the mining operation within structures, facilities provided therefore.
- To ensure an effective surface run-off control system in order to deal with the separation of clean and dirty water environment.
- The sustainable and responsible utilization (re-use) of all water resources and the prevention of pollution thereof.
- The sustainable rehabilitation of the mining site (excavations, topsoil stockpiles, rest of terrain) in order to address all environmental impacts as far as practical.

Socio-Economic conditions

- Promote employment and advance the social and economic welfare of all South Africans.
- Contribute to the transformation of the mining industry.

Historical and Cultural aspects

The mining application can be considered in light of the low cultural significance of material found. However it is a standard precaution that in the event of other heritage resources being discovered in future phases of the project, the Provincial Heritage Resources Authority or

SAHRA must be alerted immediately and an archaeologist or heritage expert called to attend.

- (b) **Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.**

The consultation process with interested and affected parties (neighbouring farmers and land owners) was completed. Regular contact sessions will be held with neighbouring farmers and land owners which will be affected by the mining operations. Records will be kept of the complaints and mitigation measures will be implemented. An advert in the Burger was also placed in order for other interested parties to come forward and register as interested parties in the project. This is an ongoing process.

- (c) **Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.**

Infrastructure Areas

On completion of the mining operation, the various surfaces, including the access road and the excavation site, should finally be rehabilitated as follows:

- All remaining material on the surface should be removed to the original topsoil level. This material should then be backfilled into the excavation area. Any compacted area should be ripped to a depth of 300 mm, where possible, the topsoil or growth medium returned and landscaped.
- All infrastructures and other items used during the operational period should be removed from the site.
- On completion of operations, all structures or objects on the site should be dealt with in accordance with Regulation 44 of the Minerals and Petroleum Resources Development Act, 2002.

Topsoil and Stockpile Deposits

Disposal Facilities: Waste material of all description inclusive of receptacles, scrap rubble and tyres should be removed entirely from the mining area and disposed of at a recognized landfill facility. It should not be permitted to be buried or burned on the site.

Ongoing Seepage, Control of Rain Water: It is not foreseen that any monitoring of ground or surface water should take place after mine closure, except is so requested by the DWS – Cape Town.

Long Term Stability and Safety: It should be the objective of mine management to ensure the long term stability of all rehabilitated areas including the backfilled excavations. This should be done by the monitoring of all areas until a closure certificate has been issued.

Final Rehabilitation in Respect of Erosion and Dust Control: Self-sustaining vegetation will result in the control of erosion and dust and no further rehabilitation is deemed necessary, unless vegetation growth is not returned to a desirable state by the time of mine closure.

Final Rehabilitation Roads

- After rehabilitation has been completed, all roads should be ripped or ploughed, fertilized and seeded, providing the landowner does not want them to remain that way and with written approval from the Director: Mineral Development of the Department of Mineral Resources.

Submission of Information

- Reports on rehabilitation and monitoring should be submitted annually to the Department of Mineral Resources – Cape Town, as described in Regulation 55.

Maintenance (Aftercare)

- Maintenance after closure should include the regular inspection and monitoring and/or completion of the re-vegetation programme.
- The aim of the Environmental Management Programme is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.
- The aim with the closure of the mine should be to create an acceptable post-mine environment and land-use. Therefore, all agreed commitments should be implemented by Mine Management.

After-effects Following Closure

Long Term Impact on Ground Water: No after effect on the ground water yield or quality is expected.

Long Term Stability of Rehabilitated Land: One of the main aims of any rehabilitated ground should be to obtain a self-sustaining and stable end result. The concurrent cleaning of all waste material and replacement of topsoil where available should be ensured.

- (d) **Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.**

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Proof of this should be submitted at closure. Specific objectives include:

Rehabilitation of infrastructure areas

The objectives for the removal of infrastructure and the subsequent rehabilitation of the areas they occupied include:

Rehabilitation of excavation areas will be done concurrently as each excavation is completed. Access road rehabilitation is carried out when all mining are completed at the end of the mining activity. Rehabilitated sites will be monitored after backfilling and sloping has been completed to ensure vegetation growth re-occurs.

- Rubble will be disposed of at a suitable site. The site will be selected in consultation with DENC.

Maintenance

The necessary agreements and arrangement will be made by Blou Berg Eiendomme to ensure that all natural physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state or for three (3) years after closure or as long as deemed necessary at the time.

- Such processes include erosion of rehabilitated surfaces, surface water drainage, air quality, surface water quality, ground water quality, vegetative re-growth, weed encroachment.
- The closure plan will be reviewed yearly.
- Rehabilitation of the land will be maintained until a closure certificate is granted or until the land use is regarded as sustainable.
- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

Performance assessments

As per the MPRDA and associated Regulations, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Blou Berg Eiendomme will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of the EMPR.

- Conduct performance assessments of the EMPR as required by the MPRDA and associated Regulations.
- Compile and submit the afore-mentioned performance assessment reports to the DMR. The frequency of the performance assessments will occur every year. An independent and competent person will undertake all performance assessments.

Decommissioning and closure objectives

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas will be left in a stable, self-sustainable state. Proof of this will be submitted at closure. Specific objectives include:

- To identify potential post-closure land uses in consultation with the surrounding land owners and land users. This should be done during the operational phase of the mine.
- Rehabilitate disturbed land to a state suitable for its post-closure uses.
- Rehabilitate disturbed land to a state that facilitates compliance with applicable environmental quality objectives.
- Limit the impact on staff whose positions become redundant at the time of closure.
- Keep relevant authorities informed of the progress of the decommissioning phase.
- Submit monitoring data to the relevant authorities.
- Maintain required pollution control facilities and rehabilitated land until closure.

Negative economic impacts

The objective is to alleviate the negative socio-economic impacts that will result from mine closure. Management principles to achieve this include:

- Blou Berg Eiendomme will undertake a carefully planned step-wise decommissioning process.
- Closure planning will form an integral part of mine planning.
- Strategies for sustainable development of surrounding towns have been and will continue to be developed by the project in collaboration with district and local authorities, local businesses and other interested parties. Early warning of impending closure will be given to IAPs.
- In conjunction with long-term closure planning, the mine will actively participate in regional and local planning to enhance the economic benefits of the project through development of alternative forms of income generation.
- Blou Berg Eiendomme will initiate and participate in regional planning exercises that will mitigate the impacts of closure of the

mine, the local and regional economies and associated abandonment of community infrastructures surrounding the mine.

- o The mine will fulfil the requirements for closure and the management of downscaling.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

The financial provision was calculated in accordance with Regulation 54 of the Minerals and Petroleum Resources Development Act, 2002 (Act 28 of 2002). The quantum was calculated taking into consideration what the outstanding rehabilitation will be in the event of sudden and/or premature closure, decommissioning and final closure of the operational and post closure management of residual environmental impacts. The quantum calculation was based on current disturbances. The total extent of the outstanding rehabilitation in the event of sudden or premature closure was taken into consideration in determining the quantum.

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
Remark:							
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	m3	0	15,68	1	1	-
2 (A)	Demolition of steel buildings and structures	m2	0	218,41	1	1	-
2(B)	Demolition of reinforced concrete buildings and structures	m2	0	321,86	1	1	-
3	Rehabilitation of access roads	m2	1000	37,00	1	1	37 000,00
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	379,34	1	1	-
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	206,91	1	1	-
5	Demolition of housing and/or administration facilities	m2	0	436,81	1	1	-
6	Opencast rehabilitation including final voids and ramps	ha	0,25	222 313,32	0,52	1	28 900,73
7	Sealing of shafts adits and inclines	m3	0	117,25	1	1	-
8 (A)	Rehabilitation of overburden and spoils	ha	0,1225	152 653,61	1	1	18 700,07
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	190 127,32	1	1	-
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	552 219,84	1	1	-
9	Rehabilitation of subsided areas	ha	0	127 824,41	1	1	-
10	General surface rehabilitation	ha	0,25	120 927,41	1	1	30 231,85
11	River diversions	ha	0	120 927,41	1	1	-
12	Fencing	m	0	137,94	1	1	-
13	Water management	ha	0	45 980,00	1	1	-
14	2 to 3 years of maintenance and aftercare	ha	0,25	16 093,00	1	1	4 023,25
15 (A)	Specialist study	Sum	0			1	-
15 (B)	Specialist study	Sum	0			1	-
						Sub Total 1	118 855,90
1	Preliminary and General			7 131,35		weighting factor 2 1,05	7 487,92
2	Contingencies				11885,59013		11 885,59
						Subtotal 2	138 229,41
						VAT (15%)	20 734,41
						Grand Total	158 963,83

(f) **Confirm that the financial provision will be provided as determined.**

It is hereby confirmed that the financial provision will be provided as determined.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

- g) **Monitoring of Impact Management Actions**
- h) **Monitoring and Reporting Frequency**
- i) **Responsible persons**
- j) **Time Period for Implementing Impact Management Actions**
- k) **Mechanisms for Monitoring Compliance**

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Topography	To minimise the reduction of land capability.	To ensure that rehabilitation post-mining slopes are stable, free draining and no slopes have an angle of 18°.	Site Manager/ Environmentalists	Monitoring will be done on an <i>annual basis</i> to ensure that the levels and the slopes are in order.
Soil	To prevent soil pollution; To limit soil compaction; To curb soil erosion; and To reinstate a growth medium able to sustain plant life.	Soil depth and chemical composition will be tested and possible erosion damage will be assisted and rectified.	Site Manager/ Environmentalists	Monitoring will be done on an <i>annual basis</i> or after a heavy rain event.
Air Quality	To control the incidence of unacceptable levels of dust pollution on site.	To ensure that the mine minimizes dust omissions, so that dust does not become a nuisance for affected parties and a health hazard.	Site Manager/ Foreman appointed SHE Consultant	Visual inspections will be done and managed by dust suppression by a water tanker. Quarterly tests will also be conducted by a Safety Health and Environmental

				Consultant and submitted to Mine Health and Safety for monitoring purposes if required.
Fauna	To minimise vegetation destruction in excavation, areas, and therefore a habitat for wildlife; and To eliminate poaching and the extermination of animal species within the boundaries of the study area as well as the surrounding areas.	To ensure that the species diversity and abundance is not significantly reduces.	Site Manager/ Environmentalists	Monitoring will be done at rehabilitated area on an <i>annually basis</i> to investigate species diversity and abundance.
Flora	To minimise the destruction of vegetation units; and To control invasion of exotic and invasive plant species.	To ensure that the rehabilitated areas become self-maintaining.	Site Manager/ Environmentalists	Monitoring will be done at the rehabilitated areas on a <i>twice a year basis</i> (mid-summer and mid-winter), where species diversity and vegetation cover will be investigated.
Noise	To control the incidence of unacceptable noise levels on site.	The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals.	Site Manager/ Foreman appointed SHE Consultant.	Quarterly reports on fall-out noise monitoring will be conducted as required by legislation. If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.
Surface Water	To conserve water; and	There are no sources in the vicinity of the mine.	Site Manager/ Water Supply	Monitoring will be done to monitor

	To eliminate the contamination of run-off and sources of surface water.			the quality of the surface water if required by DWA.
Ground Water	To minimise and prevent as far as practically possible the contamination of ground water.	No ground water is used.	Site Manager/Water Supply	No monitoring will be done to monitor the levels and quality.

l) Indicate the frequency of the submission of the performance assessment/environmental audit report

EMP monitoring and performance assessments, compliant with Regulation 55 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) will be conducted until closure. Results in recommendations from monitoring reports will be scrutinized.

An EMPA Report will be submitted to the Management and the DMR on an annual basis.

m) Environmental Awareness Plan

The objective of the environmental awareness plan is to ensure that:

- Training needs are identified and all personnel whose work may create a significant impact upon the environment have received appropriate training.
- All employees are aware of the impact of their activities.
- Procedures are established and maintained to make appropriate employees aware of:
 - The significant environmental impacts (actual or potential) of their work activities and environmental benefits of improved personal performance;
 - Their roles and responsibilities in achieving conformance with environmental policies, procedures and any implementation measures;
 - The potential consequences of departure from specified operating procedures.
- Personnel performing tasks, which can cause significant environmental impacts, are competent in terms of appropriate education, training and/or experience.

Environmental awareness will be part of the existing training and development plan. Key personnel with environmental responsibilities will be identified and the following principles will apply:

- Procedures will be developed to facilitate training of employees, on-site service providers and contractors.

- Environmental awareness will focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements.
- Top management will build awareness and motivate and reward employees for achieving environmental objectives.
- Environmental policies will be availed to contractors.
- Environmental inductions will be conducted for employees, contractors and visitors.
- There will be an ongoing system of identifying training needs.

General environmental awareness training as part of the induction at the mine should focus on the following:

- General environmental awareness.
- The mine policies and vision concerning environmental management.
- Legal requirements.
- Mine activities and their potential impacts.
- Different management measures to manage identified impacts.
- Mine personnel's role in implementing environmental management objectives and targets.

(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

- ✓ An environmental, health and safety induction programme will be provided to all employees prior to commencing work, and they will sign acknowledgement of the induction.
- ✓ A daily "toolbox talk" will be held prior to commencing work, which will include discussions on health, safety and environmental consideration. The toolbox talks should be led by the Site Manager.

Environmental Awareness Training Programme Procedure

Natural resources are limited and not always renewable and it is the responsibility of management to ensure that all employees are trained to understand the impacts of their tasks on the environment and to reduce them wherever possible.

Environmental awareness training must be given to new employees on site and any contractors who may come onto site for a short period of time. Refresher training must be given to permanent employees on an annual basis.

The objective of this procedure is to ensure that all employees on the, including contractors, are competent to perform their duties, thereby eliminating negative impacts on their safety, health and environment.

The environmental topics to be covered in awareness training should include the following:-

- **Resource Management**
 - a. The importance of saving water:
 - i. South Africa is a water scarce country and rivers are polluted.
 - ii. Do not throw litter into river or water drains.
 - iii. Do not dispose of oils in sewers.
 - b. Air pollution – climate change:
 - i. The use of fossil fuels is increasing the amount of greenhouse gasses that are discharged to the atmosphere. Share transport or public transport.
 - ii. Don't burn any rubbish, the smoke pollutes the air.
 - iii. Plant trees, they clean the air, provide us with oxygen and remove greenhouse gas carbon dioxide from the air.
 - c. Soil conservation:
 - i. Prevent overgrazing of farmlands, keep vegetation on the surface of the land to prevent soil erosion.
 - ii. Plant trees.
- **Hazardous Substance Use and Storage**
 - a. Solvent, petrol, diesel, insecticides, chlorine, detergents, chemical fertilisers are harmful to the environment and to your health. Use them sparingly and do not let them get into the water systems. Containers must be disposed of to a licensed hazardous waste disposal facility.
 - b. Hazardous substances must be stored and used correctly.
 - c. Ensure that 16 point Material Substances Safety Data Sheets (MSDA) are available at point of store.
 - d. Compressed gas storage requirements.
 - e. Flammable substances store requirements.
- **Incident and Emergency Reporting**
 - a. The mine must have an emergency/incident reporting system whereby environmental incidents can be reported and actioned to mitigate and follow up on.
- **Oil / Diesel / Petrol Spill Clean Up**
 - a. All employees who work with machines and vehicles must be instructed how to prevent and clean up an oil or diesel spill

appropriately. Spill kits must be available on site, drip trays must be used when servicing vehicles.

- **Conservation of Water**
 - a. Campaign to save water on site.
 - b. Clean water is expensive and potable water must be used carefully.
 - c. Prevent pollution of water by preventing spills and dispose of wastes properly.

- **Conservation of Vegetation**

Plants, grasses and trees are very important to our existence on the earth, they provide food, fuel, shelter, raw materials and they clean the air. Indigenous plants are especially important for *muti* and the whole ecology of life. Human activities are destroying the natural forests of the earth. The natural forests are the “lungs” of the planet and unfortunately they are being cleared faster than they can be regenerated.

 - a. EIA’s are to be done before virgin bush can be cleared.
 - b. Vegetation cover reduces water and topsoil loss from the ground, do not clear vegetation unnecessarily.
 - c. Indigenous trees provide shade, attract wild birds.
 - d. Do not chop down indigenous trees without good reason.
 - e. Implement a tree planting programme.
 - f. Remove alien invasive trees in your area such as Prosopis, Syringa and Pepper trees, cactus plant.

- **Waste Management**
 - a. Employees must be instructed on how to tell the difference between hazardous waste and general waste.
 - b. They must know how to separate hazardous and general waste and where to dispose of these wastes in the correct way.
 - c. Examples of hazardous waste which must be recycled or sent to Waste Tech for disposal.
 - i. Oil, diesel, batteries, acids, paint, thinners, electronic waste.
 - ii. Pesticides, Jik, Handy Andy.
 - iii. Old oil, old oil filters, old paint is hazardous and must not be disposed of to a general land fill. Oilkol of the Rose Foundation will collect old oil.
 - iv. Mercury in fluorescent light bulbs is hazardous, fluorescent lights must be handled with great care so as not to break the glass and release the mercury vapour into the air which you breathe.
 - d. Examples of general wastes which can go the municipal landfill.
 - i. Wood, paper, plastic, glass, old PPE.
 - e. Recycle, Reuse, Reduce and Recover wherever possible.

- **Conclusion**

Blou Berg Eiendomme will utilize the Environmental Awareness Plan to assure that all employees and contractors are aware of the environment and know how to manage it correctly.

(2) **Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment**

Air Quality

Control the incidence of unacceptable levels of dust pollution on site.

Surface Water

Conserve water and eliminate the contamination of run-off and sources of surface water.

Ground Water

Minimise and prevent as far as practically possible the contamination of ground water.

Natural Flora

Minimise the destruction of vegetation units and control invasion by exotic and invasive plant species.

Fauna

Minimise vegetation destruction in excavation areas, and therefore a habitat for wildlife and eliminate poaching and the extermination of animal species within the boundaries of the study area, as well as in the surrounding areas.

Noise

Control the incidence of unacceptable noise levels on site.

Aesthetics

Minimise aesthetic disturbance and reduce the visual impact of the proposed mining operation through a process of on-going rehabilitation and reclamation.

Soils

Prevent soil pollution, limit soil compaction, curb soil erosion and reinstate a growth medium able to sustain plant life.

Land Capability

Minimise the reduction of land capability.

Sensitive landscapes

Protect sensitive landscapes from potential negative impacts.

Surface Environment – Waste Management

Ensure that the discarding of any waste material produced as a result of the proposed mining operation, including rubble, litter, garbage, rubbish or discards of any description, whether solid or liquid, takes place only at a site or sites demarcated for such purposes. Prevent waste material from being dumped within the borders or the vicinity of the mining area.

n) Specific information required by the Competent Authority

Section 41 of the MPRDA and regulation 53 and 54 promulgated in terms of the MPRDA deal with financial provision for mine rehabilitation and closure.

The holder of a right as described in the relevant sections of the MPRDA and its regulations must provide the Department of Mineral Resources (DMR) with sufficient financial provision. Officials in the DMR Regional Offices are required to assess, review and approve the quantum of financial provision submitted (that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review) as being sufficient to cover the environmental liability at that time and for closure of the mine at that time.

The holder of a prospecting right, mining right or mining permit is required to annually assess the total quantum of environmental liability for the mining operation and to ensure that financial provision are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-mine liability.

It is hereby confirmed that the financial provision will be reviewed annually.

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

A handwritten signature in black ink, appearing to be 'R. Botha', with a long horizontal flourish extending to the right.

Date: 28 January 2020

-END-

Appendix 1

**DIE UNIVERSITEIT
VAN DIE ORANJE-
VRYSTAAT**

Maria Catharina Viviers
COMMISSIONER OF OATHS (RSA)
MARIA CATHARINA VIVIERS
Professional Accountant (SA)
Practice number: 19262
5 Karibia Street, Rhoedensdene
Kimberley 8301



**THE UNIVERSITY
OF THE ORANGE
FREE STATE**

CERTIFIED A TRUE COPY
OF THE ORIGINAL

HIERMEE WORD VERKLAAR DAT DIE GRAAD THIS IS TO CERTIFY THAT THE DEGREE

**Magister in Omgewingsbestuur
Master in Environmental Management**

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

ROELINA HENRIËTTE OOSTHUIZEN

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS, AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEËL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY, AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.



A.J. Booitze
.....
VISEKANSIELER/VICE-CHANCELLOR

G. N. van Wyk
.....
DEKAAN/DEAN

[Signature]
.....
REGISTRATEUR/REGISTRAR

BLOEMFONTEIN
2000-09-16

Appendix 2

CURRICULUM VITAE

Roelina Henriette Oosthuizen

Cell: 084 208 9088

E-Mail: roosthuizen950@gmail.com

1. PERSONAL INFORMATION

Name: Roelina Henriette Oosthuizen

Surname: Oosthuizen (Maiden: Alberts)

Identity number: 7004180037082

Date of birth: 18 April 1970

Gender: Female

Marital status: Married (26 years) with 3 children

Driving license: Yes, Code EB

Languages: Fluent in Afrikaans and English

Nationality: South African

Criminal offences: None

Health: Excellent, fit

2. SYNOPSIS OF PROFESSIONAL CAREER

Roelina Henriette Oosthuizen has 22 years of experience in the environmental management field. She started her career in the area of Environmental Management and Environmental Impact Assessment (EIA) evaluation in 1997 at the Department of Minerals and Energy. After moving to industry in 2005, Roelien became involved in the practical aspects of environmental management. A major project during her early years outside of government was that of the EIA for a Game Reserve and Lodge development near Barkly-Wes, she did this project together with a consultancy firm from Kimberley AWS water solutions (Mr. Adriaan du Toit). In 2007 the Company she worked for was bought by a Canadian Group of Companies and she became more involved in practical aspects of the operations and worked closely with operations personnel in dealing with ongoing management of environmental impacts at the Mine (e.g. monitoring, auditing, operating procedures). She was also centrally involved in liaison with the authorities and with stakeholders in neighbouring areas.

During her time at the Canadian Group of Companies, Roelien was the environmental manager overseeing operations in the Barkly-West, Prieska and Douglas areas. She was responsible for preparing the environmental compliance documents for each operation which included Performance Assessments (Audit reports) and Financial Quantum submissions as well as new applications for Prospecting Rights and Mining Rights with the relevant Scoping, EIA / EMP documents. Her activities included liaison with stakeholders and also with the relevant Departments. During this time, Roelien became increasingly involved in environmental policy and strategy work, as well as the environmental aspects of corporate governance.

She has assisted a range of clients with Environmental Due Diligence audits and compliance audits. Roelien has also undertaken numerous environmental audits, particularly compliance and due diligence audits for clients in the mining industry. Thus, she is familiar with best practice standards in environmental auditing.

Roelien have also represented the South African Diamond Producers Organisation (SADPO) on the Environmental Policy Committee (EPC) at the Chamber of Mines between 2005 and 2011.

In a nutshell, Roelien has wide ranging experience and is thus well-positioned to assist clients in any matter related to sustainability and environmental management. This is achieved through her own skills base and on drawing on specialists.

3. QUALIFICATIONS

MEM (Master in Environmental Management) University of the Orange Free State (2000)
B – Comm NWU (1991)

4. TRAINING COURSES

Roelien have attended various mining and environmental conferences and seminars to stay abreast with the latest changes in legislation, legal compliance and policy positions in the sector.

October 1997	Mineral Laws Administration & Environmental Management (University of Pretoria)
July 2002	Project Management for Environmental Systems (University of the Orange Free State)
August 2004	Environmental and Sustainability in Mining Minerals and Energy Education and Training Institute (MEETI)
September 2005	Converting Old Order Rights to New Order Rights in Mining International Quality & Productivity Centre Johannesburg)
November 2006	Mine waste disposal and Achievement of Mine Closure
February 2007	Introduction to ArcGis 1
April 2010	Mining Law Update Conference (IIR BV South Africa)
November 2010	Social Labour Plans for Mining Workshop (Melrose Training)
August 2011	Mineral Resources Compliance and Reporting (ITC)
May 2012	Enviro Mining Conference 2012 (Sustainability and Rehabilitation) (Spectacular Training Conferences)
August 2012	Mineral Resources Compliance and Reporting 4th Annual (ITC)
March 2013	1st EnviroMining-Ensuring Environmental Compliance and reporting
March 2014	4th Annual EnviroMining Conference
March 2015	5th Annual EnviroMining Conference
February 2018	Seminar by the Department of Environmental Affairs on knowledge sharing workshops on the Screening Tool

5. PROFESSIONAL REGISTRATION

Registered as a professional at IAIAAsa (International Association for Impact Assessment South Africa). IAIAAsa is a voluntary organisation and is not a statutory body regulating the profession. Its members are however expected to abide by the organisations code of ethics.

6. PROFESSIONAL EXPERIENCE

Projects are listed below by area of expertise.

Environmental Management Systems (EMS) and Environmental Auditing

Development of EMS and Compilation of INCIDENT REPORT AND INVESTIGATION FORMS for the EMS of the Canadian group of Companies on various sites.

Undertaking of a range of due diligence and performance audits for operations, including those listed below:

Performance Assessment reports for a mining company with various infrastructure and mining operations near Barkly-West and Windsorton.

Performance Assessment reports for a mining company near Douglas.

Preparation of an environmental auditing checklist / protocol for a Community project with restitution ground in assisting the community to determine environmental legal compliance at their operations.

Environmental audit as part of a closure with Dr. Betsie Milne another specialist. This Annual Rehabilitation Plan has been developed to match the various requirements set out in the National Environmental Management Act (No 107 of 1998) (NEMA) Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015). This project had the objective of ensuring that this company are accounting for environmental liabilities and risks adequately. The plan distinguishes between (a) those environmental rehabilitation liabilities pertaining to drilling, for which the Company was legally responsible and (b) those environmental rehabilitation liabilities pertaining to historic mining activities, for which the Company is not legally responsible, but consider performing as part of their best practice environmental principals. Three costing scenarios were explored in order to evaluate the most feasible rehabilitation plan, i.e. (1) Total cost (worst-case scenario) including risks, (2) legally required cost and (3) features currently available that do not involve any risks.

Sustainability projects: policies, guidelines, strategies and performance reporting

Involved in the compilation of 43-101 technical documents for listed companies which included information on sustainability and performance in rehabilitation and sustainable mining.

Alien species eradication project guideline and strategy near Barkly-Wes in terms of Regulations that have been promulgated in terms of the Conservation of Agricultural Resources Act, No. 43 of 1983 further make it unlawful to allow various species of weeds and invader plants to grow. The target species was Wild tobacco (declared weed), Pink Tamarisk (declared weed) and Mexican poppy, it also involved the community for job creation and training (2008).

Investigations for a Company near Prieska on Development of a biodiversity offsets policy for the applications for forestry tree licences for protected tree species.

Strategic Environmental Studies and Environmental Impact Assessment (EIA)

Undertaking of a Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2006 for a Private Individual which involved the proposed extension of a roof over an existing deck with two wood pillars by means of the excavating of 0.5m X 0.5m X 1m X 2 (½m²) OF SOIL WITHIN 100M OF THE HIGH WATER MARK OF THE SEA. A Positive Record of Decision (ROD) Granted (2010).

Undertaking of an ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) near Boshof for a kimberlite Diamond Mining Company (2015)

Undertaking of a strategic environmental review and amendment for a Chinese group of Companies near Postmasburg. The study provided baseline environmental information and a high-level review of the potential impacts of various components of the development (2014 – 2016). Roelien worked as a member (EAP) of a large team consisting of a project Coordinator, attorneys, water specialists, other specialist and an engineer.

Environmental Impact Assessments for various developments including the proposed mining project for the former retrenchees of De Beers in Kimberley. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialist with contributions of specialist reports to compile the EIA EMP report (2017). Roelien worked as a member (EAP) of a team consisting of De Beers (attorneys and environmentalists), the retrenchees, the appointed contractor, EKAPA, and specialist appointed for the studies.

Environmental Impact Assessments for a Salt operation near Upington. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialists with contributions of specialist reports to compile the EIA EMP report (2019). Roelien also worked as part of a team with the Company and another consultant that started with the Water Use Licence application. The public participation was done to include the water use activities.

Environmental Impact Assessment for a change in scope of a prospecting right application consisting of the sole and exclusive right to prospect for iron, silver, zinc, copper and sulphur ore. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialists with contributions of specialist reports to compile the EIA EMP report (2019). Roelien also worked as a member (EAP) of a team consisting of the directors of the company and specialists appointed for the studies

7. CAREER PATH

01 April 1997 to 28 February 2005

DEPT OF MINERALS & ENERGY

Senior Environmentalist - Assistant Director Environment

MAIN JOB FUNCTIONS

- Collect analyse and interpret information regarding the measurement of impacts of mining operations on the environment, the rehabilitation of land surfaces.
- The prevention, control and combating of pollution.
- Co-ordinate and prioritise the rehabilitation of derelict and ownerless mines.
- Co-ordinate, investigate, audit and resolve environmental problems in conjunction with the Department of Water Affairs and Forestry, Department of Agriculture and the provincial Department of Tourism, Environment and Conservation.
- Address complaints and inquiries received from the public and mining industry.
- Consult with relevant authorities and interested and affected people regarding the approval of Environmental Management Programmes.
- Ensuring that rehabilitation standards are applied.
- Ensuring that the requirements stated in Environmental Management Programme Reports are adhered to.
- Conduct inspections and recommendations on mines that apply for closure.
- Evaluate mining licences and prospecting applications and recommend site-specific conditions according to legislative requirements.
- Constant liaison with the public, the mining industry and other government authorities on environmental matters, legislation and agreements.
- Influence new development processes through participation in the EMPR and EIA processes and give guidance through education and awareness programmes.
- Calculate and verify financial provision for outstanding rehabilitation.

01 March 2005 – 30 September 2012

Appointed as professional Mineral Law Administration and Environmental Manager for HC van Wyk Diamonds which was bought over in 2007 by a **Canadian group of Companies**.

MAIN JOB FUNCTIONS

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.

Undertaking of environmental reviews, audits and management plans:

Formulation of an environmental policy and guidelines for the Group.

Participation in the development of the budget for environmental expenditure.

Co-ordination of technical studies (e.g. monitoring of groundwater quality).

Environmental compliance measurement and reporting with respect to environmental permit conditions (e.g. Forestry Licences and water sampling for Water Use Licences).

Development of environmental guidelines for contractors on sites.

Liaison with regulatory authorities on compliance with environmental legislation.

Documentation of environmental incidents.

Environmental awareness and training.

Development of a public participation strategy.

Formulation of a complaint's procedure.

01 October 2012 to Present

Appointed as professional Mineral Law Administration and Environmental Manager for **Mentor Trade and Investments Pty Ltd**

MAIN JOB FUNCTIONS

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans.
Formulation of an environmental policy and guidelines for the Mine.
Co-ordination of technical studies (e.g. monitoring of groundwater quality) as well as updating of the Mine's IWWMP.
Environmental compliance measurement and reporting with respect to environmental permit conditions (e.g. as water sampling and effluent).
Development of environmental guidelines for contractors.
Liaison with regulatory authorities on compliance with environmental legislation.
Documentation of environmental incidents.
Environmental awareness and training.
Development of a public participation strategy.
Formulation of a complaint's procedure.

01 October 2012 to Present part time

*Appointed as EAP on some projects for **Wadala Mining and Consulting Pty Ltd***

*Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans.
Liaison with regulatory authorities on compliance with environmental legislation.
Environmental awareness and training*

Appendix 3

PUBLIC PARTICIPATION DOCUMENTS