mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT:	**KIMCRUSH (Pty) Ltd**
TEL NO:	**0726799556 (Mr H Pan)** **082 466 6633**
FAX NO:	**086 501 9252** **086 510 7120 (Wadala Mining and Consulting)**
POSTAL ADDRESS:	**PO Box 28832** **DANHOF** **Boemfontein** **9310**
PHYSICAL ADDRESS:	**Farm Vooruitzight** **KIMBERLEY** **8301**
FILE REFERENCE NUMBER SAMRAD:	**(NC) 30/5/1/1/3/2/1/10118 MR**

1. IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act, 2002 (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, 1998 (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 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the—

  (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

  (ii) degree to which these impacts—

    (aa) can be reserved;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be avoided, managed or mitigated.

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) identify suitable measures to manage, avoid or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner:	**ROELINA H OOSTHUIZEN**
Tel No.:	(053) 8320029
Cell No.:	**084 208 9088**
Fax No.:	**086 510 7120**
E-mail address:	roosthuizen950@gmail.com

ii) Expertise of the EAP

(1) The qualifications of the EAP

Masters in Environmental Management (UFS)
B-Comm in Human and Industrial- Psychology (NWU)
(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. Please refer to attached CV.

(with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	A Portion of Portion 1 and a Portion of Portion 351 of the farm Vooruitzicht 81
Application area (Ha)	176.3574
Magisterial district:	Kimberley
Distance and direction from nearest town	The mining right area is located within the Kimberley District Municipality of the Northern Cape Province and lies ± 8 km west of the city Kimberley on the N8 (Figure 1). The total extent of the mining right area is 176.3574 ha. The site is accessible from Johannesburg 478km to the north and Bloemfontein, 165 km to the east via modern tarred access roads and services, with gravel roads providing internal access to all portions of the project area. The Kimberley Airport is located about 10km to the south of Kimberley.
21 digit Surveyor General Code for each farm portion	C0370000000000810001 C0370000000000810035**1**

c) Locality map

(show nearest town, scale not smaller than 1:250000)

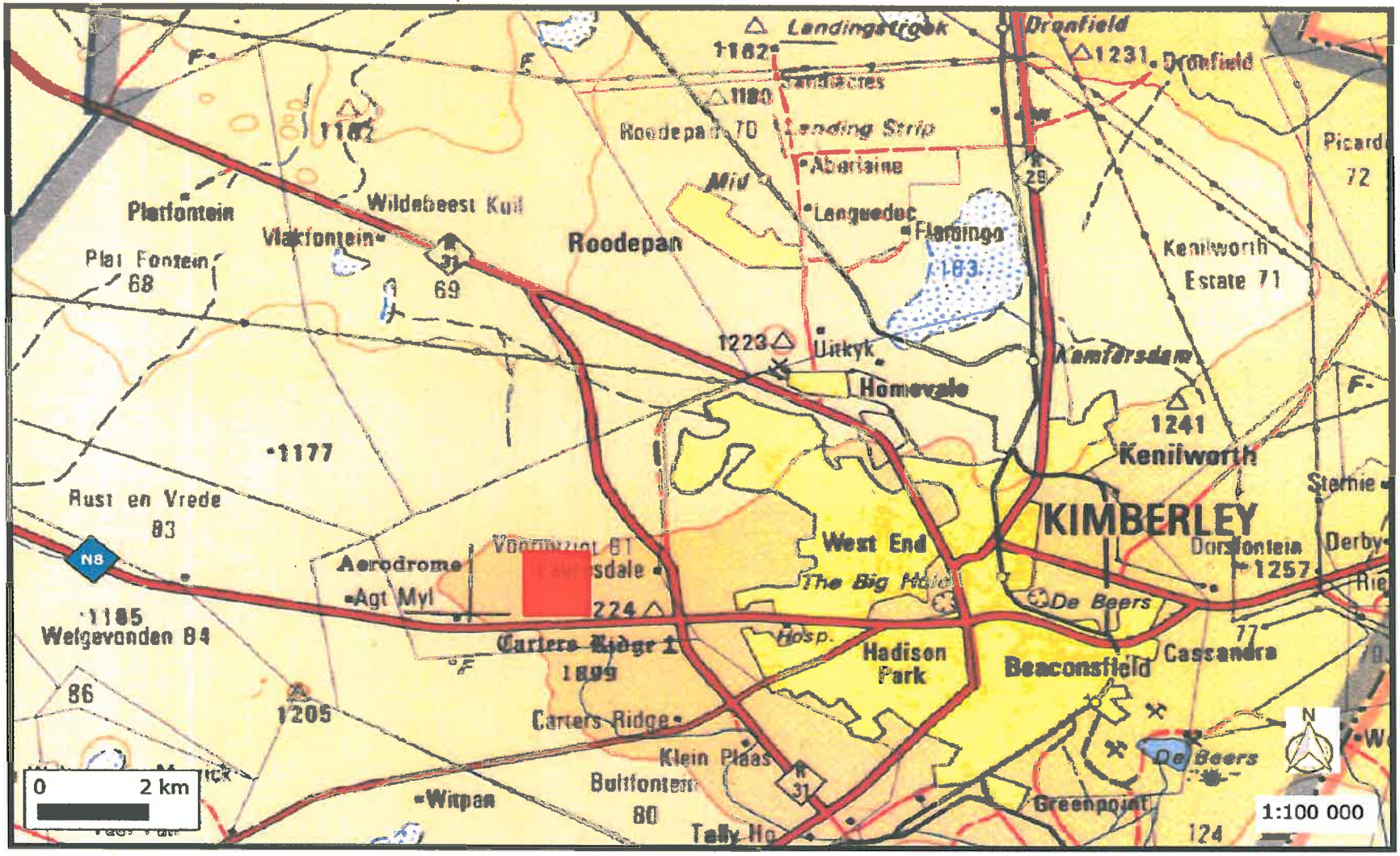


Figure 1. The Location of the Vooruitzight mining area is indicated in red (Map out of Ecological Report by Dr. B Milne August 2017).

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)

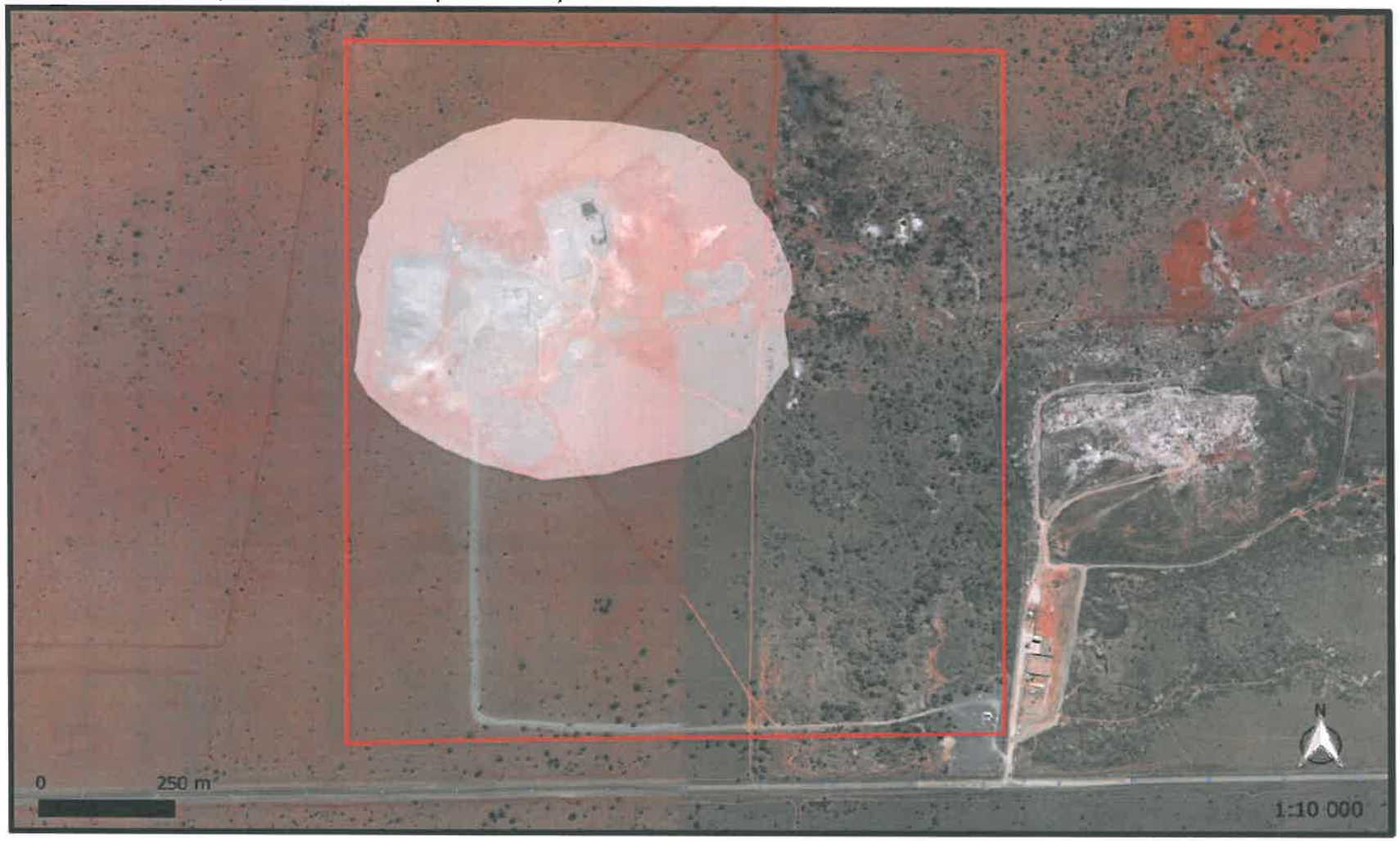
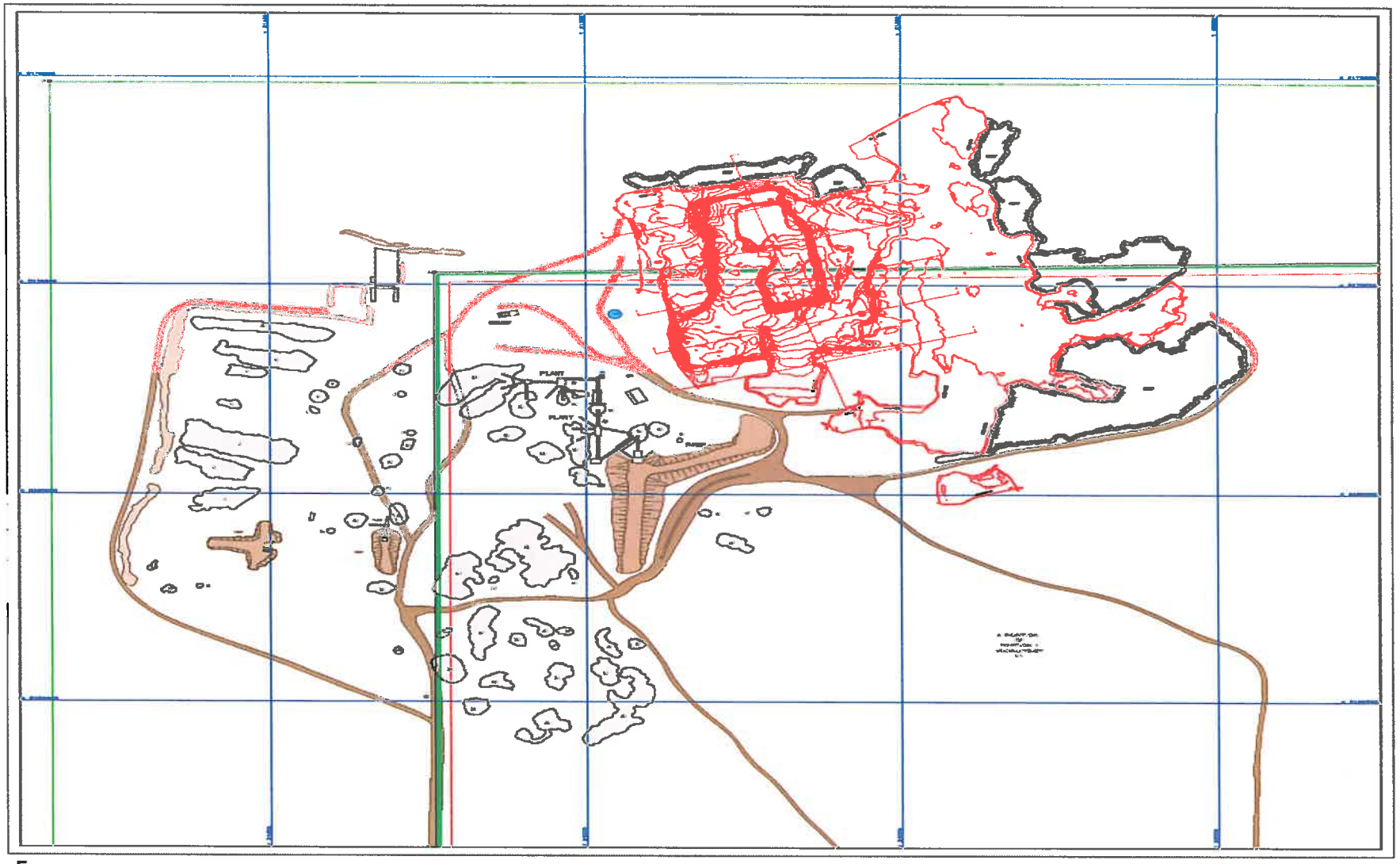


Figure 2A. Infrastructure site layout plan with proposed google overlay of core mining area and processing (Map above out of Ecological Report by Dr. B Milne August 2017)



F

Figure 2B. Infrastructure site layout plan with proposed google overlay of core mining area and processing (Map above out of Ecological Report by Dr. B Milne August 2017).

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 17 of Listing Notice 2) Any activity including the operation of that activity which requires a **mining right** as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, 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).	176.3574 ha application lodged for a surveyed portion or farm Voortuitzicht 81, Kimberley.	X	GNR984: Activity 17: "Any activity including the operation of that activity which requires a mining right [section 22 of MPRDA], including infrastructure, structures and earthworks, directly related to the extraction of a mineral resource …"	
(Activity 21 of listing Notice 2) Any activity including the operation of that activity associated with the primary **processing of a mineral resource** including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or	176.3574ha	X	GNR984: Activity 21: "Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the	

gasification of the mineral resource in which case activity 6 in this Notice applies. Activity 21 of listing Notice 2) ➢ Mining Area (Pit): The mining process will be initiated by drilling of blast holes. These holes will then be blasted where after the aggregate will be loaded from the open excavations and hauled to the crushing plant.			smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 **in** this Notice applies."	
Activity 24(iii) The development of haul roads 15m wide with no reserve	±10 000m²	X	NEMA LN1 (GNR983) GNR983 : Activity 24(ii): "The development of – (ii)a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."	
Activity 56(ii) The continuous lengthening (and rehabilitation) of haul roads 15m wide with no reserve	±10 000m²	X	NEMA LN1 (GNR983) GNR983: Activity 56(ii): "The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometer – (ii) where no reserve exists, where the existing road is wider than 8 meters..."	
Activity 15 The clearance of an area of more than 20 ha of indigenous vegetation	On the total hectares of the area a total of 15 hectares will be physically disturbed were the crushers 1 quarry and offices, weighbridge will be.	X	NEMA LN2 (GNR984) GNR984 : Activity 15: "The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) The undertaking of a linear activity; or	

			(ii) Maintenance purposes undertaken in accordance with a maintenance management plan."	
Activity 21 The operation directly relates to activities associated with the primary processing of a mineral resource.	±600m²	X	NEMA LN2 (GNR 984) GNR984: Activity 21: "Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies."	
Activity 10 The development of infrastructure for the storage and handling of dangerous goods (fuel) in containers with a combined capacity of between 30 and 80m³.	Concrete Bund walls and diesel Depots Fuel Storage facility (Diesel tanks): It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place. ±80m³	X	NEMA LN3 (GNR 985) GNR985 : Activity 10: "The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters."	
Activity 15	±500m²	X	NEMWA Category A (GNR 633)	X

The continuous establishment and reclamation of temporary stockpiles resulting from activities which require a mining right.			GNR984 : Activity 15: "The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) The undertaking of a linear activity; or (ii) Maintenance purposes undertaken in accordance with a maintenance management plan."	
Activity 11 The establishment of residue deposits resulting from activities which require a mining right.	To be confirmed by specialist	X	NEMWA:Category B GNR 632: Activity 11: "The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right ..."	X
OTHER ACTIVITIES (Associated infrastructure not considered to be listed activities) Temporary Workshop Facilities Storage Facilities Ablution Facilities Topsoil Stockpiles Overburden Stockpiles Weighbridge Control room	 ±300m² ±3000m² ±250m² ±25m² ±500m² ±500m² 127.27m²		NOT LISTED	

Parkhome offices	29.22m² 60m² pre-fabricated office blocks on concrete			

ii) Description of the activities to be undertaken

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

No Metallurgical testing of the aggregate has been performed. Currently the process route comprises stripping of overburden of red soil and weathered dolerite to access the competent dolerite. The weathered dolerite is hauled to a screen to screen the gravel to size Oversize weathered dolerite is crushed and screened. Screened gravel is stockpiled and sold to customers who either collect from site or it is delivered to the customer worksite.

Crushing Method:
Technique

After stripping the competent dolerite is drilled and blasted by blasting contractors. After blasting the dolerite is loaded and hauled to the crushing plant where the dolerite is crushed to various sizes of aggregate. The aggregate generated are ballast, crusher sand, crusher dust, 19mm, 13mm, 9.5mm and 6.7mm stone.

Technology

The equipment used is excavators, articulated dump trucks, tipper trucks, jaw crusher, cone crusher VSI crusher, conveyer belt systems and generators.

Production Rates:

The estimated production is calculated by using the following parameters:

- Extraction rate: 233.819 tons per hour (2 Crushers)
- Working days per month: 22 (Excluding maintenance days)
- Working months 11
- Working hours 12
  The calculation is as follows: - 264 hours p/m x 233.819 tons per hour x 22 working days x 11 months

Production tonnes of final product is therefore 550 000 tonnes per annum

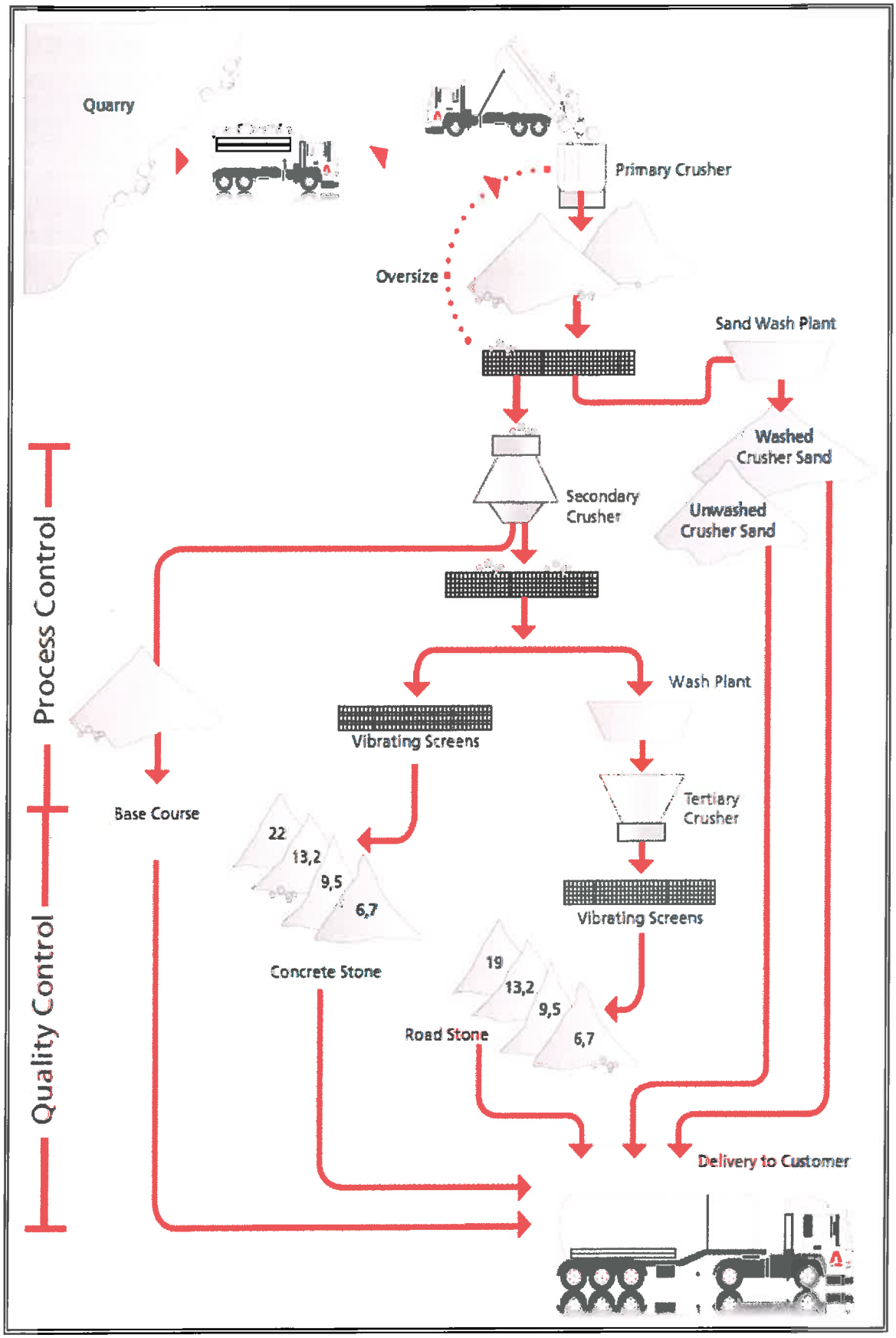


Figure 3. Conceptual schematic flow diagram of the plant.

e) Policy and Legislative Context

Applicable Legislation and Guidelines used to compile the report (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.)	Reference where applied	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g In terms of the National Water Act:-Water Use License has/has not been applied for).
Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations (CARA)	- 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)	- 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)	- 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	- This Act establishes a framework for the National,	

13 of 2005)	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 Right has been applied for ((NC) 30/5/1/2/2/10108 MR). - 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) - Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations)	- Control measures are to be implemented upon the approval of the EMPR.

	- Regulations GN R1147, published on 20 November 2015 in terms of NEMA (Financial Provision)	
National Environmental Management: Air Quality Act (Act 39 of 2004)	- 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)	- 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)	- 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. Commencement of Threatened or Protected Species Regulations 2007 : 1 June 2007 GNR 150/GG 29657/23-02-2007 Publication of lists of critically endangered,	- A permit application regarding protected plant species need to be lodged with DENC if any protected species is encountered. - Three plant communities were identified on site of which the open woodland communities in the west is included in the core mining area and considered to be of high sensitivity. The secondary woodland in the east is considered to be of medium sensitivity, while the transformed areas are of low sensitivity. The most profound impacts are expected to be related to the loss of indigenous vegetation, especially species of conservation concern.

	vulnerable and protected species GNR 151/GG 29657/23-02-2007 * Threatened or Protected Species Regulations GNR 152/GG 296547/23-02-2007 * - 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 fo 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)	- Species of conservation concern that are found in the earmarked habitat include **Vachellia erioloba, Harpagophytum procumbens, Pelargonium aridum and Babiana bainesii.** Similarly, the mining operation will result in the large-scale clearance of indigenous vegetation. Permit applications regarding protected flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation. - Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees. - Control measures are to be implemented upon the approval of the EMPR.
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	- Chapter 2 lists all protected areas.	- The proposed mining site does not fall within a Critical Biodiversity Area, any formally protected area, or within a National Protected Areas Expansion Strategy Focus Area. Furthermore, the broad-scale

natural biodiversity and its landscapes and seascapes.		vegetation unit of the study area (Kimberley Thornveld) is classified as least threatened and therefore no formal fine-scale conservation planning has been conducted. These vegetation units have however been identified as a medium conservation priority area within the Siyanda Environmental Management Framework, but the study area does not fall within a proposed conservation area for the District Municipality.
National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities - Regulations GN R634 published on 23 August 2013 in terms of NEM:WA (Waste Classification and Management Regulations) - 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	- To be implemented upon the approval of the EMPR.

	management activities list published under GN921)	
National Forest Act (Act 84 of 1998) and Regulations	- 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.	- A permit application regarding protected tree species need to be lodged with DAFF if necessary. - Species of conservation concern that are found in the earmarked habitat include Vachellia erioloba, Harpagophytum procumbens, Pelargonium aridum and Babiana bainesii. Similarly, the mining operation will result in the large-scale clearance of indigenous vegetation. Permit applications regarding protected flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation. - Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees. - Control measures are to be implemented upon the approval of the EMPR.
National Heritage Resources Act (Act	- Section 34: No person may alter or demolish any	- Control measures are to be

25 of 1999) and Regulations	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. - 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	implemented upon the approval of the EMPR. - Borrow pits have been operated on an eastern portion of the property as revealed by wide troughs of varying depths (P1), while on the southern part of this area excavations have been partially filled up with building debris (P2). Building debris is also found on the north-western edge of the excavated area. All the material appear to have been deposited within the last 20 years, while the borrow pits have been active up to a recent date. None of this material therefore carries heritage significance. - Elsewhere the surface appears to be sterile without material evidence of past human activity. Furthermore there is no evidence of the impact of the city on the property which carries heritage significance.
National Water Act (Act 36 of 1998) and regulations as amended, *inter alia* Government Notice No. 704 of 1999	- 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: (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a	- A water use application is in the final stages of preparation and will be lodged with Department of Water and Sanitation (DWS). - Control measures are to be implemented upon the approval of the EMPR.

	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 efficient continuation of an activity or for the safety of people; and; - 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))	

Nature Conservation Ordinance (Ord 19 of 1974)	- Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora.	- Control measures are to be implemented upon the approval of the EMPR.
Northern Cape Nature Conservation Act (Act 9 of 2009)	- Addresses protected species in the Northern Cape and the permit application process related thereto.	- A permit application regarding provincially protected plant species as well as for large-scale harvesting of indigenous flora need to be lodged with DENC if necessary. - Control measures are to be implemented upon the approval of the EMPR.
Occupational Health and Safety Act (Act 85 of 1993) and Regulations	- 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.	- 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.
Northern Cape Planning and Development Act (Act 7 of 1998)	- To control planning and development	- To be implemented upon the approval of the EMPR.
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	- To be implemented upon the approval of the EMPR.

	in terms of SPLUMA	
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.

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 high quality of the Kimcrush dolerite was discovered in 2007 by means of a few percussion boreholes.

A Prospecting Right in terms of Section 18(1) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), was granted on 2 August 2012 to Kimcrush Pty Ltd for Sand (General), Stone Aggregate and Clay on Portion 1 of the farm Vooruitzicht Magisterial District of Kimberley.

Fund raising for the plant (jaw crusher, cone crusher, three screens and conveyer belts) as well as for the excavators, front end loaders and articulated dump trucks were executed during the period since the prospecting right was granted and March 2014 the plant was commissioned.

Bulk sampling operations commenced in April 2014 and dolerite material were stockpiled as a series of stockpiles, referred to as "dumps" (Competent persons report on the Mineral Assets of Kimcrush (Pty) Ltd by Palaeo Rock Geological Consultants, 12 October 2015).

Need and desirability:

The Mining right covers a surface area of 176,3574hectares (ha). The majority of the physical assets are located on Portion 1 of the farm Vooruitzicht 81 and include stockpiles of sand, clay and different crushed sizes of dolerite material (from -5mm to -70mm).

Sampling of the stockpiles of ballast size material has past the durability test according to the S406 standard of Transnet.

- Roadstone is a high quality product with specific grading, shape and wearing properties for asphalt and road surfacing applications.
- Concrete aggregates include a wide range of stone sizes within target grading as well as washed and unwashed crusher sands for use in all on-site and ready mixed concrete applications.
- Road-layer works material includes the base and sub-base materials that provide the supporting, interlocking structure in road design. The different categories of graded material cater for varying load designs.
- Speciality aggregate include railway ballast, gabion and other larger sized crushed stone used in erosion protection, architectural and landscaping.

Local

The local market is determined by consumers from the Sol Plaatje Local Municipality and the Francis Baard District Municipality. The principle users in the local market are Spoornet, local building contractors requiring stone for construction purposes, cement producers and respective roads departments for new roads and repairs of existing road surfaces.

The operations will basically focus on two types of products as follows:

1. 60% of production is in the form of ballast material required and sold to spoornet
2. 40% of the product is in the form of 6.7 mm, 9.5 mm, 13.2 mm, and 19 mm stone used in construction and Infrastructure development. Crusher dust is also used for paving and filling material.

There are quite a number of active local Infrastructure Projects amongst others are the Sol Plaaje University, New Hart Hospital, and road maintenance projects.

There are also a number of Building Suppliers such as Vermeulens DIY and Northern Cape Building Materials that supply local building contractors especially the small and medium enterprises with smaller quantities of the various crushed stone materials which they procure from Crushing Operations such as Kimcrush. The operation will also ensure that clients (amongst government and parastatals) obtain market related prices for products as it will enhance competition in the market.

Regional

Regional users can be determined as those districts outside of the local market but still within the boundaries of the Northern Cape especially with regard to the Spoornet ballast material. These users would primarily be the same as above.

International

The company does not export or cater for international markets.

The product is principally consumed by the following users:

- Construction industry for mixing stone with concrete
- Roads industry for mixing stone with tar and under-surface stability
- Spoornet for ballast under the railway lines

Kimcrush has identified Transnet, ESKOM, Group Five and a Spanish consortium (planning to build wind generators on a wind farm close to Kathu) as their major consumers. Discussions with these parties are ongoing, signed off-take agreements with Transnet has been concluded.

- Benefits:

No	Description	Yes/No
1	Will the land use / development have any benefits for society in general?	Yes
2	Will the land use / development have any benefits for the local communities where it will be located?	Yes

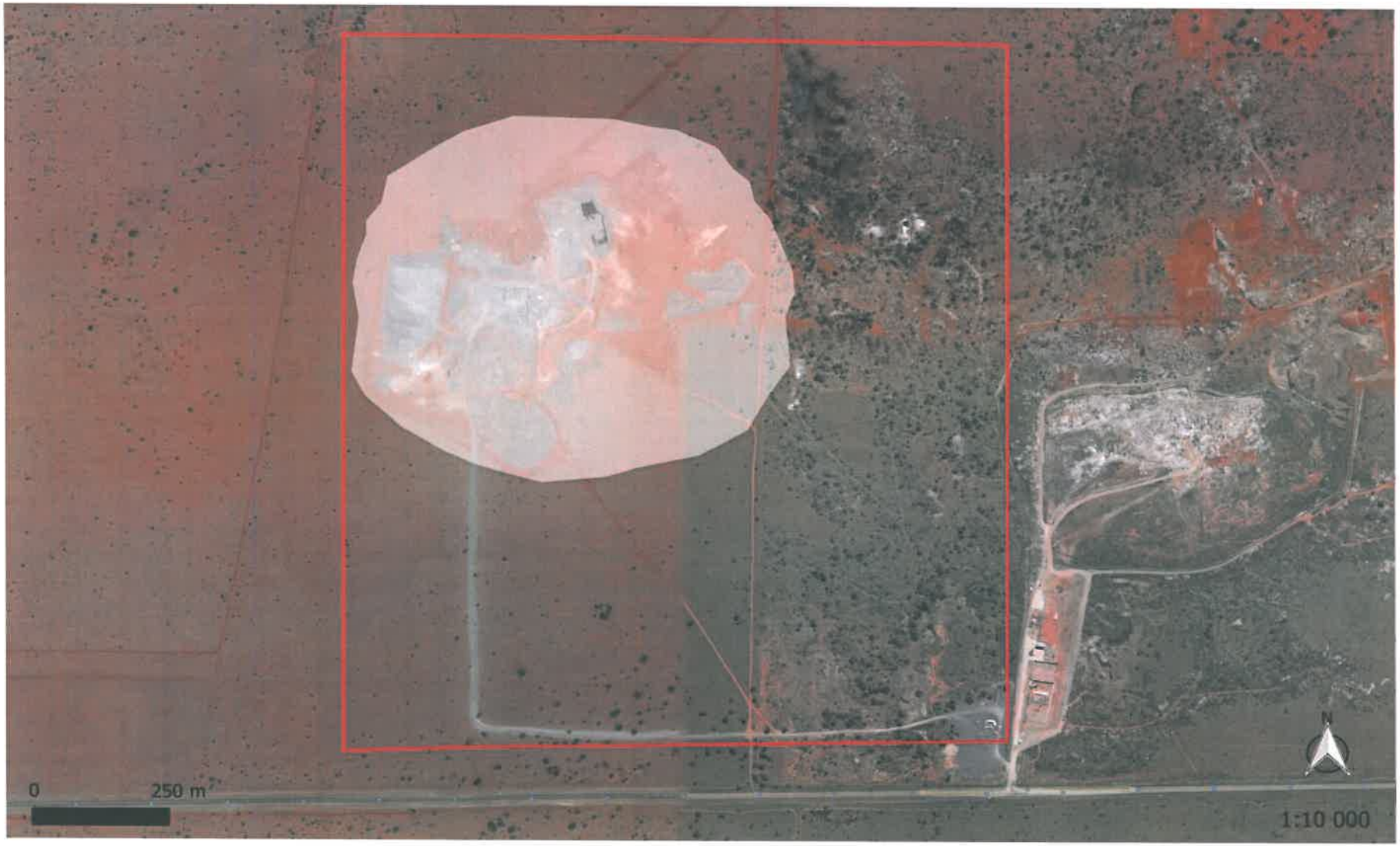


Figure 4. The core mining area is indicated in white, while the red line indicates the mining right area. (Map out of Ecological Study by Boscia Ecological).

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

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 high quality of the Kimcrush dolerite was discovered in 2007 by means of a few percussion boreholes. A Prospecting Right in terms of Section 18(1) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), was granted on 2 August 2012 to Kimcrush Pty Ltd for Sand (General), Stone Aggregate and Clay on Portion 1 of the farm Vooruitzicht Magisterial District of Kimberley.

Fund raising for the plant (jaw crusher, cone crusher, three screens and conveyer belts) as well as for the excavators, front end loaders and articulated dump trucks were executed during the period since the prospecting right was granted and March 2014 the plant was commissioned.

Bulk sampling operations commenced in April 2014 and dolerite material were stockpiled as a series of stockpiles, referred to as "dumps" (Competent persons report on the Mineral Assets of Kimcrush (Pty) Ltd by Palaeo Rock Geological Consultants, 12 October 2015).

From the drilling information and mapping of the side walls of the quarry, a Mineral Resource estimate was undertaken for the prospecting area by Palaeo Rock Consulting Engineers.

The prospecting area was divided in two areas according to the results from the percussion drilling.

Area 1 surrounds the existing pit and covers an area to the west of a line, between borehole KC 2 and half way between KC 4 and KC 5.

This area has been calculated to contain (14.8 Mt minus 323,455 Mt of mined dolerite) 14,53 Mt of Proven resource of good quality aggregate, 12.375 Mt of Indicated level of resource and 12.375 Mt of Inferred level of confidence of resource.

Area 2 covers the area to the east of the line between Borehole KC 2 and half way between KC 4 and KC 5.

This area has been calculated to contain 10.725 Mt of Proven resources, 8.25 Mt of Indicated level of resource and 4.125 of Inferred level of aggregate resource. Palaeo Rock Consulting Geologists classifies these Mineral Resources following the guidelines of the SAMREC (amended 2009) reporting code guidelines.

i) Details of the development footprint alternatives considered

With reference to the site plan provided as Figure 2 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.

(a) The property on which or location where it is proposed to undertake **the activity:**

The registered description of the land to which the mining right application relates:

Farm Name	Title Deed	In Extent
A Portion of Portion 1 and a Portion of Portion 351 of the farm Vooruitzicht 81	T4349/2001	176.3574ha

The property on which the Mining Right was granted is determined by the geological location of the mineral resource. Therefore, there are no alternatives for the location of the activity, except for not proceeding with the operation. This will however cause the underutilisation of a national economic resource.

The area has been bulk sampled by the applicant. It is situated close to the city of Kimberley.

The property is accessible via good roads from different directions.

Infrastructure in the area is well developed with good road and rail networks, electricity grid and water. Experienced labour is available in the area as is an extensive network of secondary industries geared towards small and large-scale mining. The mine is using gensets for power generation at the moment and an Eskom application had been lodged to obtain ESKOM power on site if there is capacity available on the grid for the site.

The only activity relating to the cost of water in the mining operations relates to dust suppression in the plant area and on the roads when hauling and transporting material to the plant, and doing controlled dumping as part of the rehabilitation process.

Kimcrush is awaiting response on its water usage licence application. There are three water tanks on site that have a total capacity of 30,000 litres that are storing water from the borehole located in a fault zone close to the mine office.

Alternatives considered:-

As there is a Prospecting Right granted over the said area, it would not be viable to consider an alternative site for the Mining Right application. Alternatives for land are thus not available, as the prospecting right was granted over this area.

Therefore there are no alternatives to the area.

(b) The type of activity to be undertaken:

Opencast Mining activities for Aggregate (RM); Sand General (QY); Sand Manufactured from Hardrock (QH); Stone Aggregate; Gravel (St); Clay General (Cy); Shale/Brick clay (CS).

Alternatives considered:-

The only alternative land use is further development of the waste disposal site which is next to the application area. However the applicant's main economic activity is mining and for this reason does not favour any other alternative land use.

Further, since a prospecting right had been granted, the option of amending the mining area or the type of activity is neither available nor considerable.

(c) 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 municipal waste dump, access roads, proximity to the areas earmarked for mining as well as limited additional impact on the environmental (wind direction) and discussions with the surface owner.
The following infrastructure will be established and will be associated with the mining operation:

- Crushing plant:
  The weathered dolerite is hauled to a screen to screen the gravel to size Oversize weathered dolerite is crushed and screened. Screened gravel is stockpiled and sold to customers who either collect from site or it is delivered to the customer worksite.

  After stripping the competent dolerite is drilled and blasted by blasting contractors. After blasting the dolerite is loaded and hauled to the crushing plant where the dolerite is crushed to various sizes of aggregate. The aggregate generated are ballast, crusher sand, crusher dust, 19mm, 13mm, 9.5mm and 6.7mm stone.

  The equipment used is excavators, articulated dump trucks, tipper trucks, jaw crusher, cone crusher VSI crusher, conveyer belt systems and generators.

- Explosive Magazine:
  The mine will need two magazines to store the different explosive products namely:
  - 200 case detonator ad accessories magazine (3 meter x 6 meter)
  - 200 case explosives magazine (3 meter x 6 meter)

  The magazine area will be fenced to comply with the guidelines set out by the Chief inspector of Explosives (CIE). The fence must be further than 10 meter away from the magazine.

The CIE determines the safety radius necessary, but the typical approved radiuses have been 90 meter for the inner radius & 180 for the outer radius.

No structures are allowed in the area contained by the inner radius and only structures approved by the CIE.

The construction of the magazines and the safety and security measures for the magazines and the magazine area are regulated by the Explosives Act.

- Ablution Facilities: A Park home or brick building 25m²
- Clean & Dirty water system:
  It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.
- Concrete Bund walls and diesel Depots 250m²
  Fuel Storage facility (Diesel tanks):
  It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.
- Re-fuel and lube station.
- Mining Area (Pit in mining area):
  The mining process will be initiated by drilling of blast holes. These holes will then be blasted where after the aggregate will be loaded from the open excavations and hauled to the crushing plant.
- Generator:
  The mine infrastructure plan made provision for a brick building that will house the generators for power generation on site.
- Park home offices (±60m²) and Office Parking Bay:
  It is anticipated that vegetation will be cleared in this area and superfine material will be used as groundcover for the parking.
- Roads (both access and haulage road on the mine site):
  Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 2 km of roads, with a width of 15 meters. The width of the road is based on an operating width of the haul trucks of 5 meters.
- Salvage yard (Storage and laydown area).
- Overburden Stockpiles
- Topsoil storage area (temporary): Topsoil dumps X3.
- Waste disposal site (domestic and industrial waste):

It is anticipated that the operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area:

- Small amounts of low level hazardous waste in suitable receptacles;.
- Domestic waste;.
- Industrial waste.

- Temporary Workshop and Wash Bay Facilities (300m²) and Storage Facilities (3000m²).

- Water distribution Pipeline.

- Water tank:
  It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

- Weighbridge.

- Weighbridge control room: – Mobile container.

Alternatives considered:-

Alternatives for fuel storage include surface storage, underground storage and the storage of fuel in mobile tanks with a metal bund wall. Underground storage has an adverse negative pollution potential, because it is not easy to monitor leakages. Remediation measures are also not as effective as compared to surface storage tanks. Mobile tanks are a viable option for infield screening activities, but the best viable long term option is the instalment of fuel tanks within a concrete bund wall. The final location of the fuel storage tanks will be determined based on proximity to site operations.

In terms of water use alternatives; the operation is not located near any perennial rivers and therefore groundwater is the best water source for domestic use. The operation does not use water for the crushing operation except for dust suppression. Alternatives include sourcing from service providers (Municipality), if available and feasible. Plastic pipelines are considered to be the best long term option for transferring water, due to their temporary nature which causes minimum environmental disturbances.

Therefore, a pipeline route will be designed based on the principle of minimum impacts to the environment.

In terms of power generation the options available was for ESKOM power or generators. In the light of the limited power available on the ESKOM grid it was decided to use generators with an option to apply to Eskom if there is available space on the grid later in the project.

In terms of sewage the decision was made to use park home ablution facilities which are bought ready to use or to build an ablution facility.

(d) The technology to be used in the activity:

- Technique
  No Metallurgical testing of the aggregate has been performed. Currently the process route comprises stripping of overburden of red soil and weathered dolerite to access the competent dolerite. The weathered dolerite is hauled to a screen to screen the gravel to size Oversize weathered dolerite is crushed and screened. Screened gravel is stockpiled and sold to customers who either collect from site or it is delivered to the customer worksite.

- Technology
  After stripping the competent dolerite is drilled and blasted by blasting contractors. After blasting the dolerite is loaded and hauled to the crushing plant where the dolerite is crushed to various sizes of aggregate. The aggregate generated are ballast, crusher sand, crusher dust, 19mm, 13mm, 9.5mm and 6.7mm stone.

  The equipment used is excavators, articulated dump trucks, tipper trucks, jaw crusher, cone crusher VSI crusher, conveyer belt systems and generators.

Alternatives considered:-
The planned mining activities include the excavation of pits with continued backfilling if possible. The operation is also associated with crushing techniques that make use of modern technologies. These are the most economic viable method currently being used by the stone crushing fraternity. There is no other feasible, alternative mining method for the mining and extraction of aggregate.

(e) The operational aspects of the activity:

After stripping the competent dolerite is drilled and blasted by blasting contractors. After blasting the dolerite is loaded and hauled to the crushing plant where the dolerite is crushed to various sizes of aggregate. The aggregate generated are ballast, crusher sand, crusher dust, 19mm, 13mm, 9.5mm and 6.7mm stone. The expected lifespan of the mine is 30 years.

Mining activities will primarily make use of existing roads created by previous prospecting activities, but additional roads will most likely be created. A crushing and screening plant will also be erected on site.

Alternatives considered:-
The conventional opencast drill-blast-load-haul-mining method has been proven to be the most economic viable method currently being used by the aggregate fraternity. There is no other feasible, alternative mining method for the mining and extraction of aggregate.

(f) The option of not implementing the activity:

Potential land use includes the expantion of the domestic municipal dump site. The majority of the area is classified to have low to moderate potential for grazing land and no suitability for crop yield. Apart from the aggregate deposits, there are also

potential for Sand General (QY); Sand Manuafactured from Hardrock (QH); Stone Aggregate; Gravel (St); Clay General (Cy); Shale/Brickclay (CS) mining on the property. Therefore, mining activities are believed to be the most economically beneficial option for the area.

The most significant impacts associated with the domestic waste site are leaching and pollution from the wind blowing plastic bags. These are not expected to have a serious impact on the existing groundwater features. Cumulative impacts associated with the dumping of domestic waste include surface- and ground water pollution caused by the waste dumped on the farm with the destruction of natural vegetation, but the cumulative effect of mining activities on the property are expected to outweigh any potential negative effects that the waste dump might have.

The Kimcrush Mining project aims to uplift the local community. If the operation does not continue it would hold back any potential employment for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a stagnant effect on the economy of South Africa and the aggregate industry as a whole. Substantial tax benefits to the State and Local Government will also be inhibited.

Mining forms an integrated part of the social and economic growth of South Africa and more specifically the Northern Cape Province.

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.

Identified interested and/or affected parties were notified of the development (Environmental Authorisation) for the proposed Mining Right as follows:

- A newspaper advert was placed in the 'Diamond Fields Advertiser' local newspaper on the 05 May 2017.
- Site notices were placed on the entrance next to the municipal dumping site and at the municipal library to notify any interested or affected parties of the proposed mining right application.
- Notification letters were sent to all identified interested and / or affected parties on the 05th of May 2017. Attached to each of these letters was a Background Information Document, containing information relating to the proposed mining right application and the Environmental Authorisation.
- The Scoping Report was send per registered post to all departments and identified interested and affected parties.

- The Scoping Report was also placed at the public Library on 22 May 2017 and notification letters send to all parties informing them of the document that can be viewed for comments.

- A letter and a Compact Disc with the report was send to all relevant Government Departments.

Proof of notification is attached as Appendix 'A'.

A public meeting was held on 18 October 2017, notices were placed at the Library and at the mine to make everyone aware of the meeting. The Agenda, minutes of the meeting and attendance register is part of Annexure A to the document.

Consultation process:

Proof of consultation (attendance registers, minutes of meetings and response forms) is attached as Annexure 'A'. The consultation process is still in process.

iii) Summary of issues raised by I&APs

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

Table 5: Consultation with 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 the issue of the I&AP
AFFECTED PARTIES				
Landowner/s	X			
Sol Plaatje Municipality Municipal Manager Private Bag X 5030 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	No Comments received yet.		
Lawful occupier/s of the land				
Kimcrush have an arrangement with the municipality for the area that they are prospecting on and are going to mine if the right is approved.				
Landowners or lawful occupiers on adjacent properties	X			
Mr. PA Els PO Box 77 Cartersridge Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping	No Comments received yet.		

	Report			
Mr. Frans Louw 12 Schreiner Street Hadisonpark 8301	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	No Comments received yet.		
Mr. AJ Steenkamp PO Box 224 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	24 June 2017	Letter returned unclaimed.	
Municipality	X			
Sol Plaatje Municipality Municipal Manager Private Bag X5030 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with	No Comments Received yet.	No Comments received yet.	

	Scoping Report			
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA, etc.)				
ESKOM HOLDINGS SOC LIMITED Northern Cape Operating Unit: Land Development PO Box 606 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	23 May 2017	ESKOM distribution will raise no objection to the proposed Mining operation. Conditions must be adhered to as stipulated in the letter.	
Eskom Environmental Division PO Box 356 Bloemfontein 9300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	19 June 2017 27 June 2017	Letter is returned unclaimed.	
Department of Water and Sanitation Northern Cape Private Bag X 6101 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered	No Comments received yet.		

	Letter 22 May 2017 with Scoping Report			
Department of Agriculture, Land Reform and Rural Development The Head of Department Private Bag X 5018 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	No Comments yet.		
Department of Agriculture, Forestry and Fisheries Directorate: Forestry Management PO Box 2782 Upington 8800	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	No Comments yet.		
Department of Environment and Nature Conservation The Head of Department Private Bag X6102 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered	No Comments yet.		

	Letter 22 May 2017 with Scoping Report			
South African Heritage Resources Agency	X Load Bid document onto SAHRA system Load Scoping Report onto SAHRIS system	14 July 2017	The recommendations in the heritage specialist reports and the following conditions must be incorporated into the draft and Final EIA report and Environmental Management Programme (EMPr) for the project: The Fossil Finds Procedure must be amended to address the issues raised above. The amended FFP must be submitted to SAHRA for approval; The Final Scoping, draft EIA, Final EIA and all appendices associated with the reports must be submitted to SAHRA for record purposes; If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/John Gribble 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), must be alerted immediately. A	Fossil finds procedure was re-submitted.

			professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA; and If the development receives an Environmental Authorisation (EA), SAHRA must be informed and all documents pertaining to the EA must be uploaded to the SAHRIS Case file. Further comments will be issued upon receipt of the above environmental reports.	
Communities				
Department of Land Affairs				
Department of Agriculture and Land Reform and Rural Development Private Bag X 5018 Kimberley 8300	X Registered Letter 05 May 2017 With BID. Registered Letter 22 May 2017 with Scoping Report	No Comments yet.		
Traditional Leaders				
Not applicable: There are no communities, with Traditional Leaders, in the immediate vicinity of the mining right application area.				

Department of Environmental Affairs				
The Department of Environmental Affairs is a competent authority in this Mining Right application process.				
Other Competent Authorities				
OTHER AFFECTED PARTIES				
INTERESTED PARTIES				
Craig Burne 0784673685		10 May 2017 via e-mail in response to advert Scoping Report was made available to Mr. Burne	My interest in the project is to gain a better understanding of how the application for environmental authorization process applies and proceeds – in this case via Scoping and full EIA. In addition please let me know where I can obtain copies of any related/applicable documentation (e.g. BID, Draft Scoping Report, Draft EIR's + any specialist studies) relating to the project as and when it progresses. Comments on the Scoping Report was the listed activities that had been changed in April 2017.	A registration form was send to Mr. Burne for completion to register. The EP responded to Mr. Burne on e-mail.

* Note: The contents of this table have been recorded up to 27 October 2017 the process of public participation is an ongoing process.

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)

- ***GEOLOGY:***

Rocks of Archaean age, the Ventersdorp Supergroup, the Griqualand West and Karoo Sequences, a variety of Senozoic sediments and intrusive rocks are found in the area.

The Archaean rocks, which crop out as windows in the area, comprise granite, gneiss, amphibolite and pegmatite.

The Ventersdorp Supergroup has a dominantly volcanic origin. It consist of quartz porphyry and quartz-feldspar porphyry of Makwassie Formation at the base, andesitic lava, volcanic breccia, tuff and chert of the Rietgat Formation, quartzite and conglomerate of the Bothaville Formation and andesite of the Allanridge Formation which forms the top of the sequence. The Pniel unconformity separates the Rietgat and the Bothaville Formations; otherwise the sequence is concordant. The supergroup is tectonically fairly undisturbed and the most conspicuous structure is an anticline southwest of Warrenton.

The Griqualand West Sequence follows unconformably on the Ventersdorp Supergroup. It comprises a concordant sequence which grades from the coarse-to fine-grained clastic rocks of the Vryburg Formation at the base through alternating stromatolitic dolomite, limestone, sandstone and shale of the Schmidtsdrift formation to limestone and dolomite of the Ghaapplato Formation.

The Karoo Sequence overlies the older formations unconformably. At the base the Dwyka Formation comprises glacial and fluvioglacial rocks which include tillite, varved shale, mudstone with pebbles and conglomerate. The Ecca Group, which follows concordantly on the Dwyka, consist almost exclusively of deep-water, fine grained clastic sediments and the lithological monotony of this sequence is only interrupted by the characteristic black, carbonaceous shale of the Whitehill Formation which is underlain and overlain respectively by dark-grey mudstone and shale of the Prins Albert and Tierberg Formation.

Dolerite occurs widely spread as dykes, sills and funnel-shaped bodies in the area. Early Jurassic age igneous intrusions are abundant in the area. The intrusions are generally referred to loosely as dolerite bu the actual rock type varies. They occur in the form of dykes and sills and are composed primarily of plagioclase feldspar and pyroxene. These rocks are highly durable and thus are often seen capping the sandstone and mudstone hills.

The quarry targets a dolerite sill, which is surrounded by silcrete or calcrete of the Kalahari group and sandy to loamy soils 0.6 to 1.2m deep. The dolerite shows little to no alteration and looks very resistant to weathering. There is one major fault/shear zone that runs across pit 1 and one close to the mine office. Both are less than 1m in thickness.

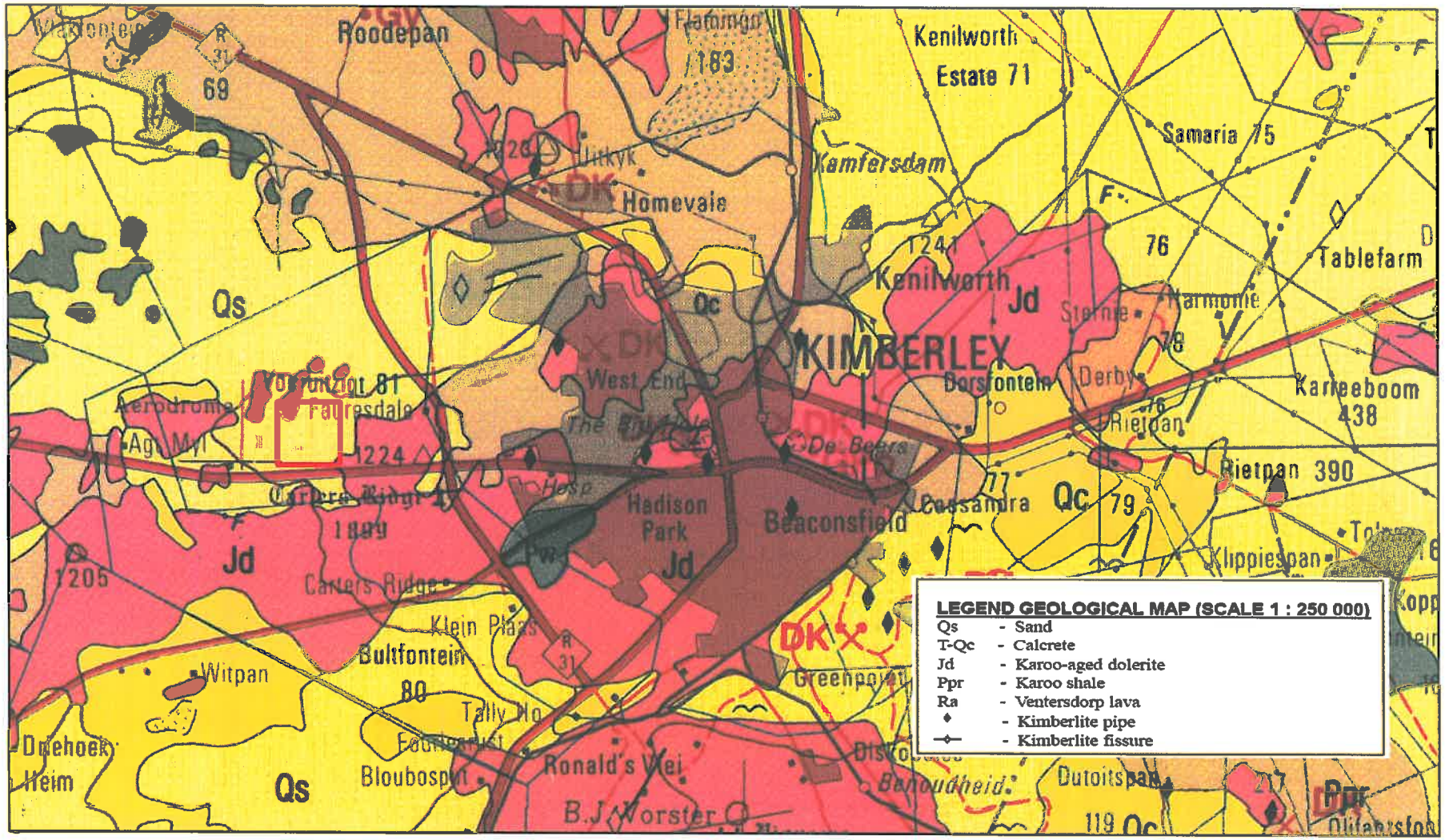


Figure 5. Geological Map Kimberley 2824 (1:250 000) Mining application area indicated in red.

CLIMATE:

Regional Climate:-

The Northern Cape is classified as a semi-dessert and is known to have summer rains with high temperatures in the Summer (as high as 38°C to 40°C) and cold Winters (temperatures ranging from -4°C to -6°C). The sun shines approximately 80% during Summer and approximately 70% during the Winter.

Average Annual Rainfall:-

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Ave rainfall (mm)	77	69	67	40	17	6	5	10	19	38	55	60	**463**
Ave rain days/month	6.5	5.7	6.2	4	1.6	0.9	0.8	1	1.6	3.5	5.2	5.9	**43**

Rainfall Intensity:-

Most of the rainfalls occur during thunderstorms in the Summer months as well as during cloud bursts where maximum rainfalls were measured of up to 112.5mm at a downpour of approximately 60 minutes.

Average Maximum and Minimum Temperatures:

The average maximum temperature measured during the Summer is 30.9°C and the minimum during the Winter months is 3.4°C.

Average Monthly Wind Direction and Speed:-

The prevailing wind direction in the area is mainly from the north to north-westerly with the strongest winds from the west-southwest to north-northwest that occurs between August and December. October and November month are common for high wind speeds of up to 4.85 metres per second.

Average Monthly Evaporation:-

It is estimated that the average annual evaporation rate is approximately 2365mm which indicates the dry climate conditions in this area.

Presence of Extreme Climatic Conditions:-

Hail:	October to March
Frost:	May to September
Strong Winds:	Occasional strong winds occur but not often
Droughts:	Normal for a dessert area – approximately 6 out of 10 years

- ***TOPOGRAPHY:***

The area is generally flat, characterised by plains with open low hills or ridges. Altitudes are around 1 209 m above sea level. The terrain is indicated by a very gentle slope of less than 1 % running south-east. The site is closely associated with unit 3 of the Ae45 landtype. Here, red, freely drained soils with a high base status and a depth of more than 300 mm are found. Soils of the study areas predominantly constitute the Hutton form. (ECOLOGICAL ASSESSMENT REPORT KIMCRUSH (Pty) Ltd Vooruitzigt Dolerite Mine, Boscia Ecological Consulting August 2017).

- **VISUAL**

The Kimcrush operation will be visible from the N8 to Griekwastad. The operation is also visible from the municipal dumping area.
The mining operation will be visible from the municipal domestic waste dumps and possibly to some extent from the N8.

The aggregate footprint (Pit) areas will be rehabilitated (made safe) and backfilled as far as practically possible and will blend in with the surrounding landscape.

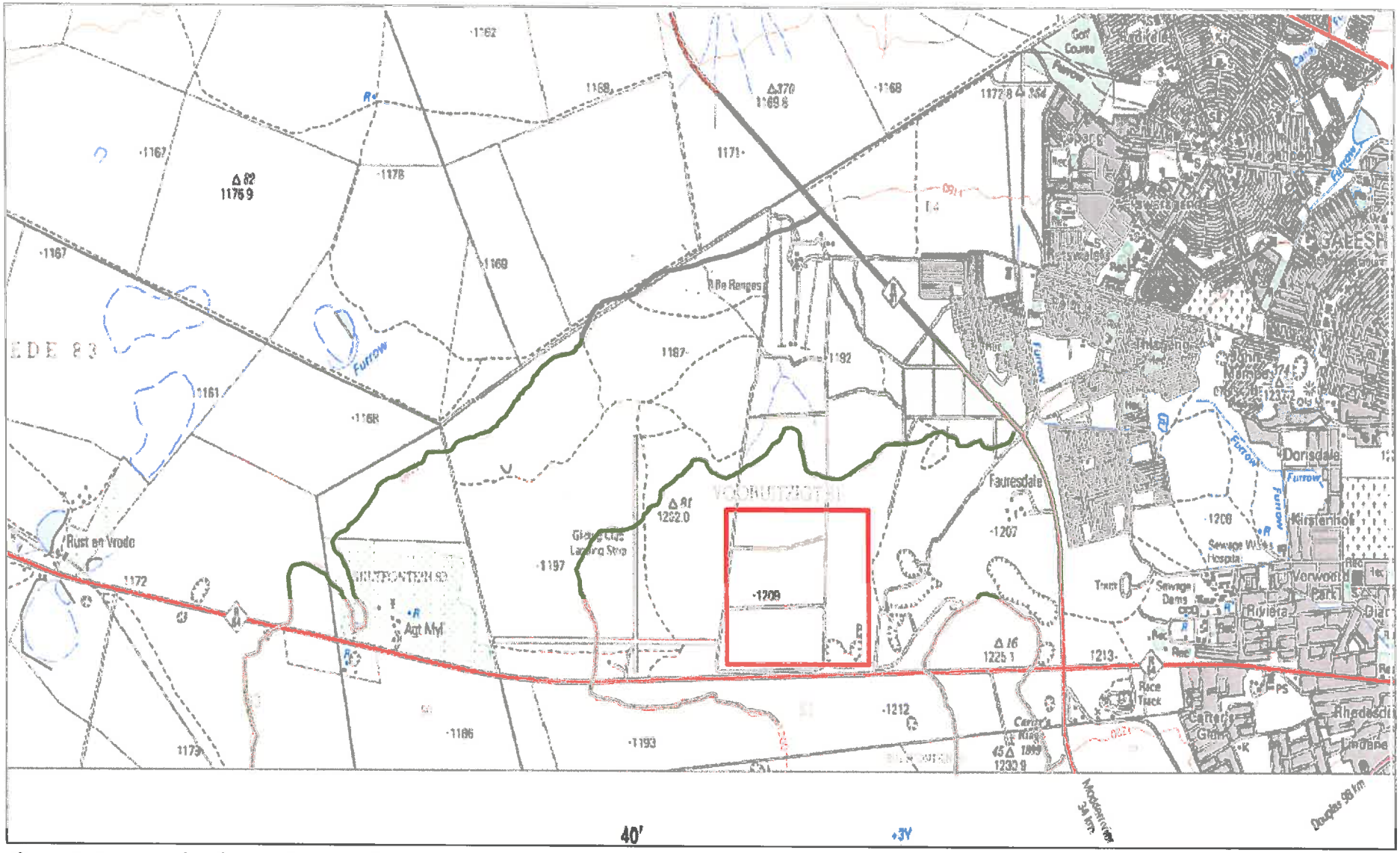


Figure 6. Topographical map of the application area. Topographical lines indicated in green.

- ***SOILS:***

Boscia Ecological Consulting Pty Ltd has been appointed by Wadala Mining to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area, and to determine the possible impact of mining on the diversity and ecological status of fauna and flora, soil was described and included in this report as part of the flora study.

Scope of study

The specific terms of reference for the study include the following:

- conduct a desktop study and field investigation in order to identify and describe different ecological habitats and provide an inventory of communities/species/taxa and associated species of conservation concern within the environment that may be affected by the proposed activity;
- identify the relative ecological sensitivity of the project area;
- produce an assessment report that:
  - indicates identified habitats and fauna and flora species,
  - indicates the ecological sensitivity of habitats and conservation values of species,
  - determines the potential impacts of the project on the ecological integrity,
  - provides mitigation measures and recommendations to limit project impacts,
  - indicate ecological responsibilities pertaining to relevant conservation legislation

This ecological assessment report attached as Annexure B describes the ecological characteristics of the proposed mining area, identifies the source of impacts from mining operation, and assesses the impacts, as well as the residual impacts after closure.

The Soils of the study area have been described by Dr. Milne as according to CDSLI (1993) the geological features on Vooruitzigt mainly comprise quaternary deposits, where red windblown sand covers almost the entire surface. However, Dolerite from the Early Jurassic Period protrudes in the north-west and south-east corners of the study site (Figure 7). The mining operation is primarily based on a dolerite sill, which comprises highly durable

igneous rocks cks from the Early Jur
24 m deep. This . This intrusion occurs
property.
The area is gen generally flat, charact
hills or ridges. es. Altitudes are aroun
terrain is indic ndicated by a very g
running south- uth-east. The site is clo
the Ae45 landty ndtype (Figure 7). Here
a high base sta status and a depth of
Soils of the st study areas predomi
form. (ECOLOG OGICAL ASSESSMENT
Vooruitzigt Dol Dolerite Mine, Boscia
2017).

To conclude, Dr , Dr. Milne stated that i
of the within t n the mining area is in
the impacts wi will be affected by th
measures imple plemented and the re
the mining area ea.

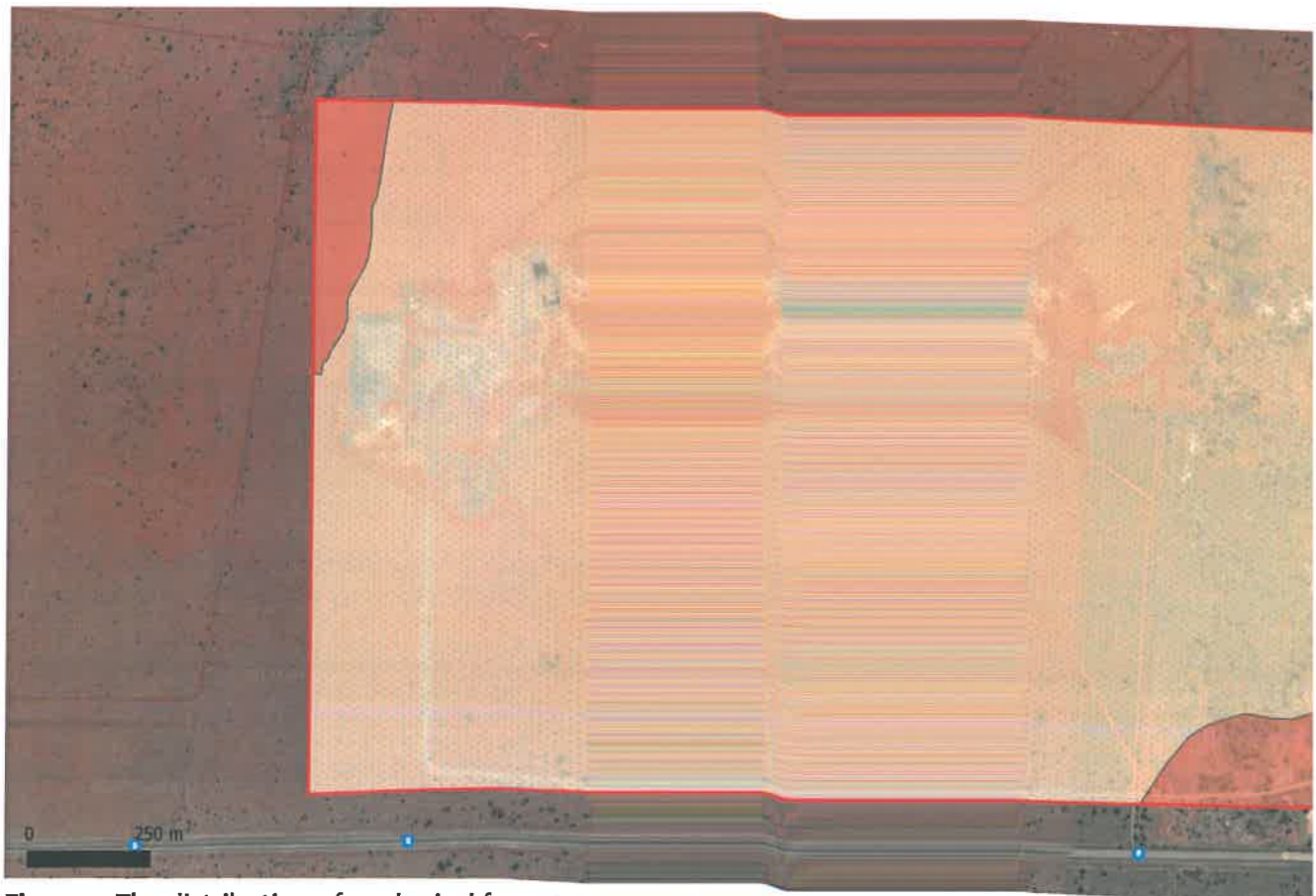


Figure 7. The distribution of geological feature s in the study area. (Ma

igneous rocks from the Early Jurassic Period that occurs up to 24 m deep. This intrusion occurs mainly in the north-west of the property.

The area is generally flat, characterised by plains with open low hills or ridges. Altitudes are around 1 209 m above sea level. The terrain is indicated by a very gentle slope of less than 1 % running south-east. The site is closely associated with unit 3 of the Ae45 landtype (Figure 7). Here, red, freely drained soils with a high base status and a depth of more than 300 mm are found. Soils of the study areas predominantly constitute the Hutton form. (ECOLOGICAL ASSESSMENT REPORT KIMCRUSH (Pty) Ltd Vooruitzigt Dolerite Mine, Boscia Ecological Consulting August 2017).

To conclude, Dr. Milne stated that it is clear that the destruction of the within the mining area is inevitable. The significance of the impacts will be affected by the success of the mitigation measures implemented and the rehabilitation programme for the mining area.

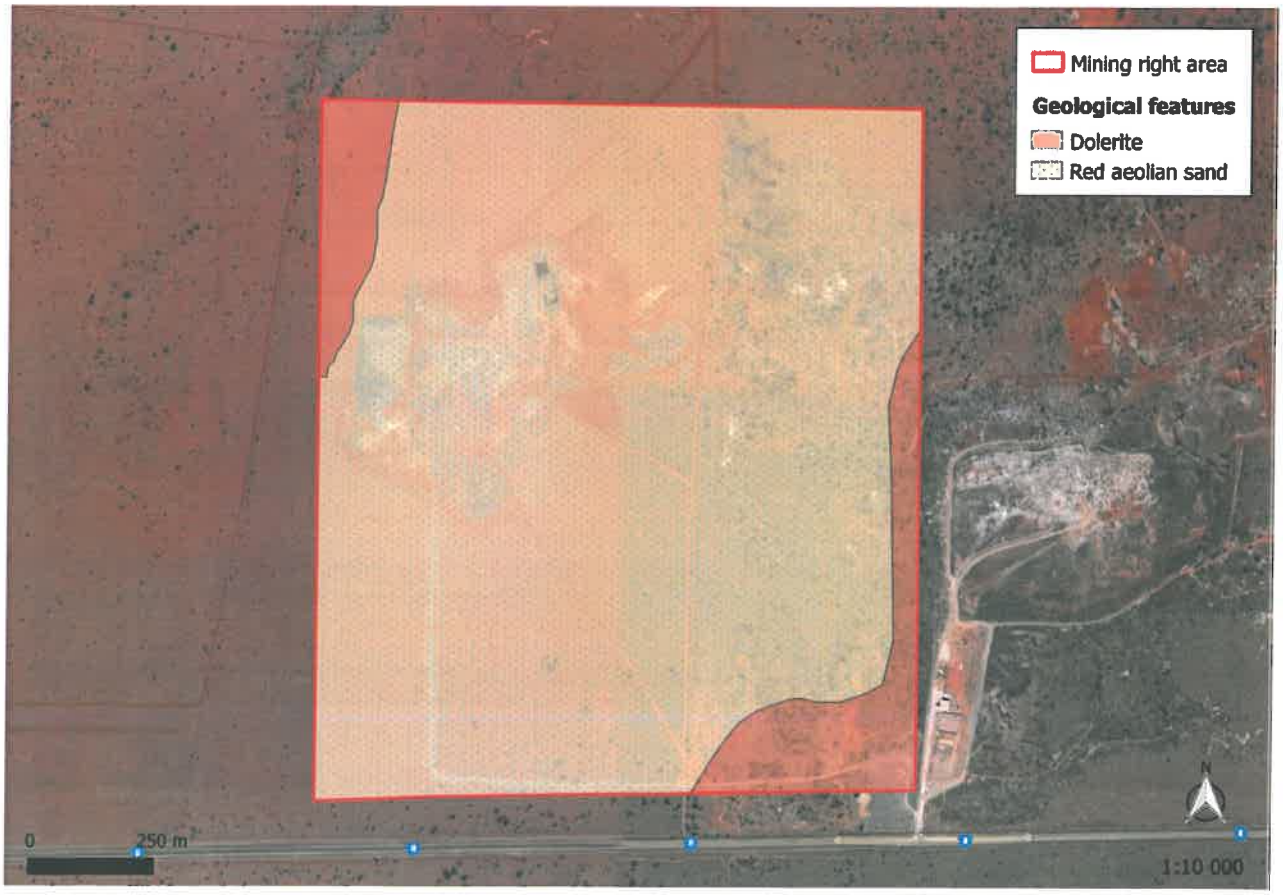


Figure 7. The distribution of geological features in the study area. (Map by Dr. B Milne, 2017).

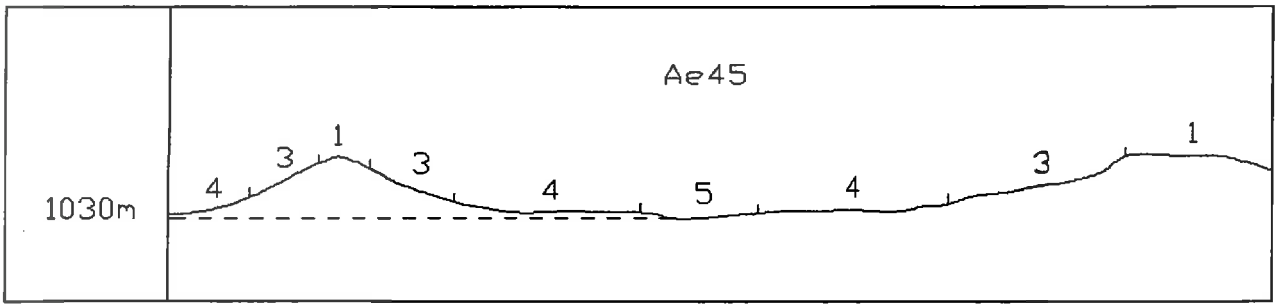


Figure 8. Land type associated with the study area. (Map by Dr. B Milne, 2017)

- ***LAND CAPABILITY AND LAND USE:***

Currently, the major land uses in the area are activities related to urbanisation, such as municipal waste facilities, residential buildings and commercial properties. According to AGIS, the land capability for the study site is non-arable with moderate potential grazing land. The grazing capacity is between 9 and 13 ha/AU, with the agricultural region being demarcated for cattle farming. The area is categorised to have no suitability for crop production.

Vooruitzigt is mainly used for the current KIMCRUSH operation, but hunting dogs were seen crossing the property during the site visit. This could suggest that illegal hunting of resident wildlife occurs here. The property does not seem to be fenced-off in the north and west and therefore reasonably accessible from these directions. (ECOLOGICAL ASSESSMENT REPORT KIMCRUSH (Pty) Ltd Vooruitzigt Dolerite Mine, Boscia Ecological Consulting August 2017).

- ***SURFACE WATER AND DRAINAGE:***

The area falls within the Lower Vaal water management area which is located in the quaternary catchment region C91E and C51L, Lower Vaal Catchment of the DWS. The Vaal River lies further to the north and the Modder River further south of the study area.

Due to its flat topography about zero runoff from this local drainage region contributes to the Modder River running ±10km south of the site.

The surface water drainage direction from the dolerite mine is primarily into a north and north westerly direction. No important water course is located in the immediate vicinity of the Dolerite mine. The nearest down-gradient non-perennial stream is situated approximately 0.7 km and 3.7 km from the site. The streams are not utilised as a water source for human domestic uses. (Geohydrological study by GHT CONSULTING PROJECT TEAM L.J van Niekerk & D.C. Moolman Project No.: 369-26-GHD.804, October 2017).

The catchment area

The quaternary catchment is C91E and C51L. The gross area of the catchment is 1 509 km², the net area of the catchment is 1 066 km², and 13.2 km² of the catchment is under irrigation.

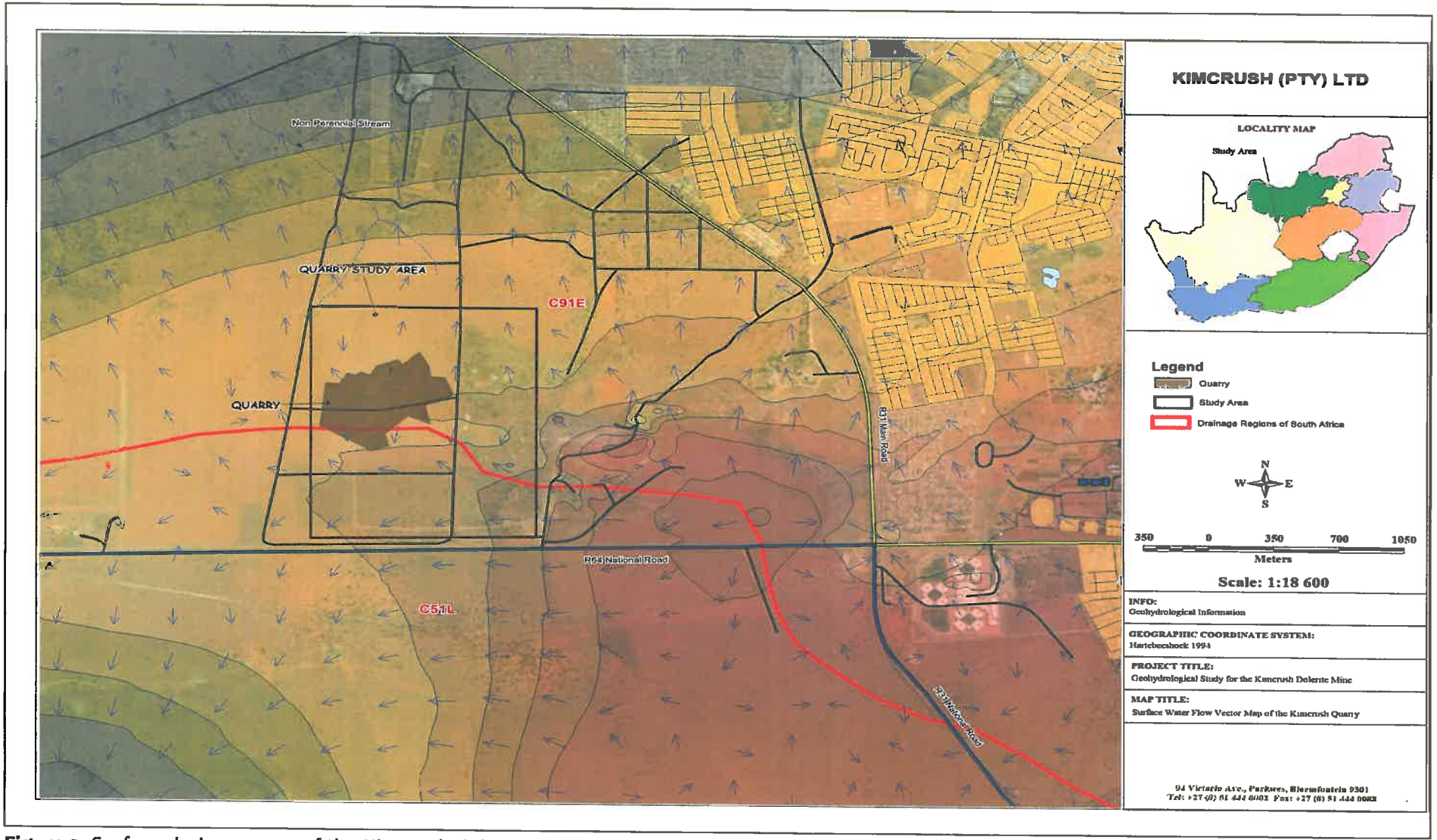


Figure 2. Surface drainage map of the Kimcrush dolerite mine. Note the blue drainage vector arrows, which indicate the drainage patterns. (Map from Geohydrological study by GHT CONSULTING PROJECT TEAM L.J van Niekerk & D.C. Moolman Project No.: 369-26-GHD.804, October 2017).

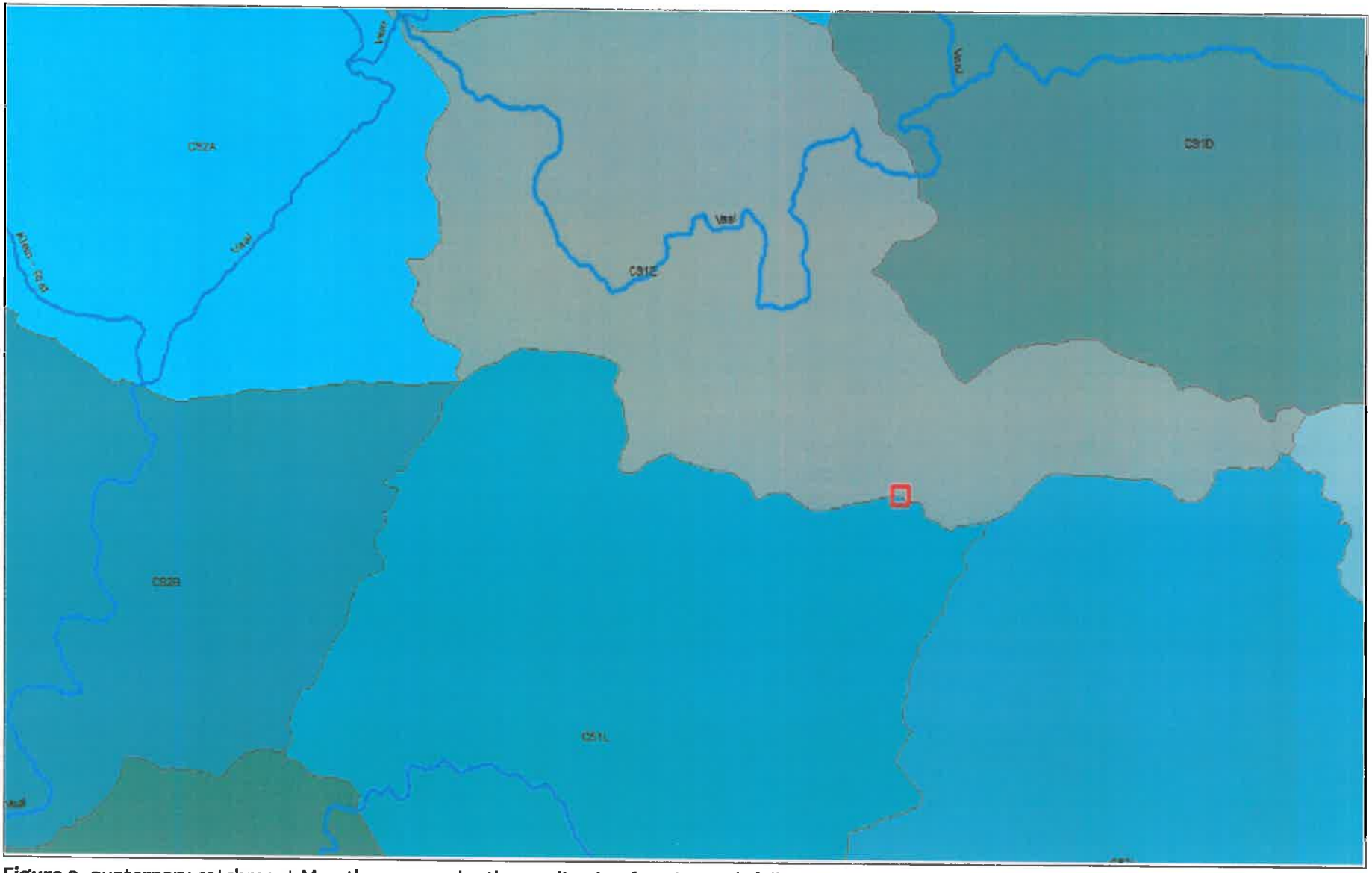


Figure 9. quaternary catchment Map the area under the application for Kimcrush falls into C91E and C51L.

GROUND WATER:

GHT has been appointed by Wadala Mining to provide a Geohydrological study in order to highlight the groundwater characteristics of the proposed mining area, and to determine the possible impact of mining on the groundwater status of the mining area. (Geohydrological study by GHT CONSULTING PROJECT TEAM L.J van Niekerk & D.C. Moolman Project No.: 369-26-GHD.804, October 2017) this report is attached as Annexure F to the report.

GEOHYDROLOGICAL BACKGROUND INFORMATION
The geohydrological background information are as follows.

Catchment and Groundwater Management Unit
The Kimcrush dolerite mine site of is located in western part of the Northern Cape Province approximately 160 kilometres to the north west of Bloemfontein. The study area is located in Drainage Area C, Quaternary sub-catchment C91E (Surface Water Resources of South Africa, First Edition, 1994).

General Aquifer Information of the Kimberly District
The following section is based on the Groundwater Resources of South Africa Maps, DWA, 1995 as well as existing information gathered from varies geohydrological-, hydrological- and civil engineering reports when available.

Groundwater Table Depth
The groundwater depth in the study area is approximately 10 - 20 mbgl according to the DWA map, refer to Figure 9. However actual measured values by GHT consulting during a geohydrological investigation at the Kimberley landfill site suggests that static water level is between 6.43 – 16.14 mbgl (GHT Consulting Scientists Report no RVN730.1/1570)

Aquifer Classification
The aquifer of the dolerite mine site area is classified as a minor aquifer according to the Aquifer Classification Map of South Africa (refer to Figure 10 on page 15 of the geohydrological report).

Recharge to Aquifer
The mean annual recharge of the area is between 15 - 25 mm/a and on average 20 mm/a (refer to Figure 11 on page 16 of the geohydrological report). The Vegter recharge maps estimates the recharge as 20 mm/a (Vegter, 1995, refer to Figure 12 on page 17 of the geohydrological report). The DWA and Vegter data estimates the recharge percentage as 4.68% of MAP for the Kimberly district.

Drilling Depths and Success Rates

In general the recommended drilling depths below water level are < 20 meters for the study area. Fractures restricted principally to a zone directly below groundwater level that consist of compacted sedimentary rocks intruded by Jurassic Jura age intrusive dolerite sills and to a lesser extent dykes structure. Storage coefficient in order of magnitude for the study area is < 0.001 for the sedimentary rocks. The qualitative indication of spatial distribution of storage media based on drilling success rate for the area is 40 - 60%. (Groundwater Resources of South Africa Maps, DWA, 1995).

It can be concluded that the surface water sites S01 and S02 located in the northern and southern pit respectively is groundwater seeping into the pit areas as the groundwater levels are between 6 and 16mbgl. It is recommended that at least 2 monitoring boreholes (upstream and downstream) must be drilled to evaluate the potential yield of the local aquifer, geological permeabilities and the effect the dewatering of the pits may have on the local water level and aquifer. Water quality monitoring can also be done at these boreholes.

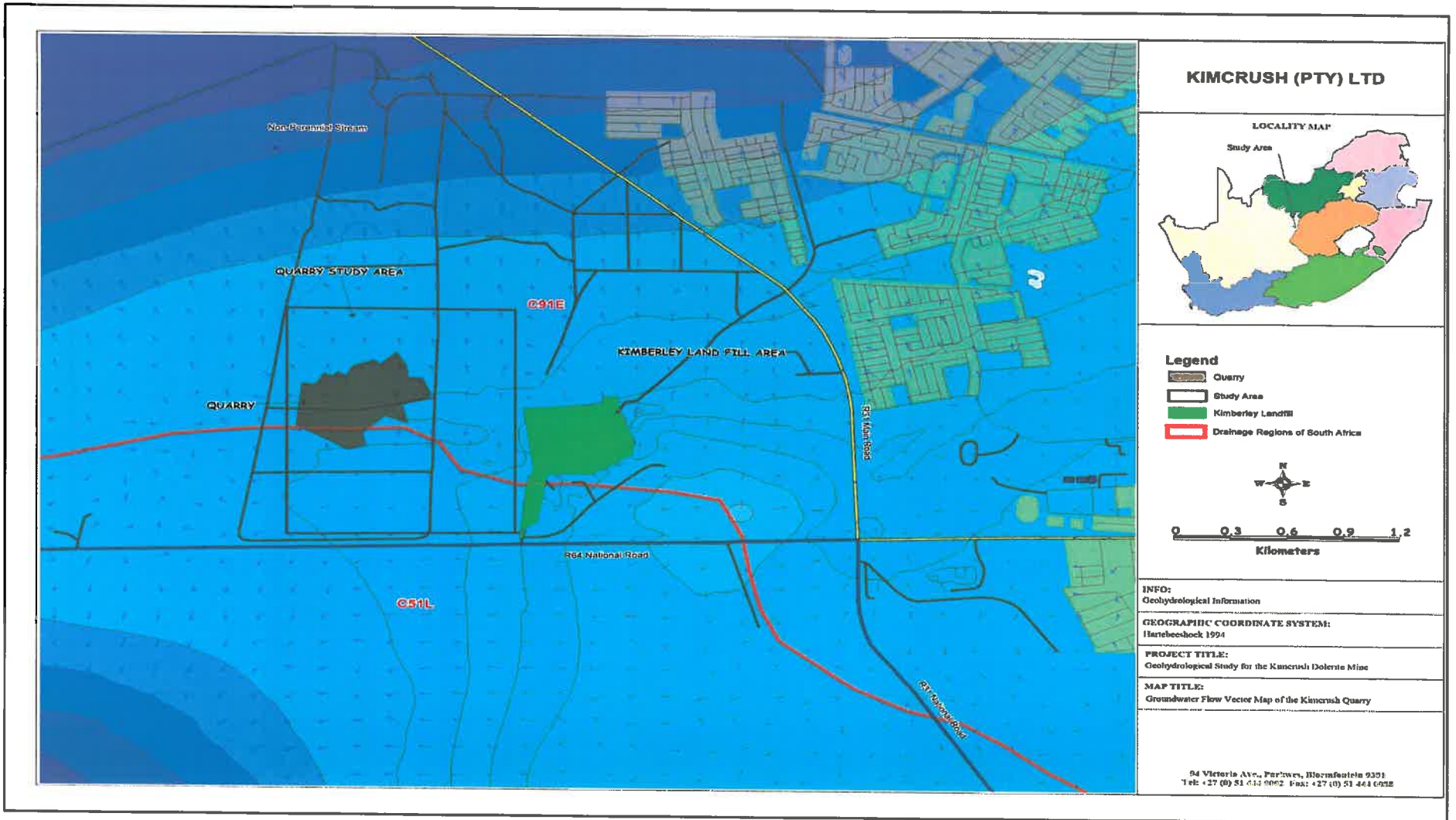


Figure 22. Groundwater flow vector map of the immediate area of the Kimcrush dolerite mine site. The general groundwater flow direction from the disposal area is towards the north, North West direction. ((Geohydrological study by GHT CONSULTING PROJECT TEAM L.J van Niekerk & D.C. Moolman Project No.: 369-26-GHD.804, October 2017)

- **AIR QUALITY:**

Currently there are constant burning on the municipal waste site which can have an impact on the air quality of the surrounding areas. Dust and smoke can thus be currently a nuisance to the residential area.

No other sources of particulate or gaseous emissions other than the dust generated from the blasting and hauling operation and gravel roads are expected to have an influence on the background air quality status of this region. The main sources of dust emission contributions will be wind-blown dust from vehicles travelling on gravel roads and the mining (excavating) of aggregate and crushing facilities. From the wind-blown dust sources, the aggregate dumps will be the main source of emissions and mitigation concerns. Wind-blown dust typically impacts down-wind from the direction where the highest velocity winds occur.

The trucks involved in the transport would potentially be an insignificant source of re-suspension of soil on the gravel roads and the vehicle entrained dust will be bounded near the road where it is generated from. Regardless fall-out dust buckets will be placed strategic points along the gravel road. These buckets would be used to assess the dust fall-out from the trucks travelling along the gravel roads (source) and mitigation strategies would be implemented if guideline values for the dust fall-out monitoring programme require so.

No impact of dust is anticipated beyond the 500 meter guideline and therefore most fall-out dust buckets for managing and mitigating fall-out dust would be placed 500 meters from the crushing facility in the predominant wind directions. Extensive dust monitoring would be done at selected sites with potential significant environmental and health impacts and mitigation of mining methods and activities pertaining to the aggregate source would be managed accordingly.

A complain register for surrounding home owners will be kept on site and the management of dust would be guided by these additionally comments of public.

NOISE

Noise will be generated during the hauling and crushing operation (excavating, loading, hauling and transportation). Noise will be a nuisance factor.

Residential areas is located on the eastern boundary (5km away). The impact would be of more importance regarding the direct worker environment that should adhere to the requirements in terms of the Mine Health and Safety Act. Loading will take place during day time hours.

Noise is normally encountered during the normal operation hours at the crushing plant. Crushing plant noise and mine vehicles are limited between 7am and 5pm every day during the week. Noise levels are monitored on the mining area and where necessary, protective equipment is used in certain areas where machinery is used.

- ***NATURAL VEGETATION:***

Boscia Ecological Consulting cc has been appointed by Wadala Mining to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area, and to determine the possible impact of mining on the diversity and ecological status of the area.

Scope of study

The specific terms of reference for the study include the following:

- conduct a desktop study and field investigation in order to identify and describe different ecological habitats and provide an inventory of communities/species/taxa and associated species of conservation concern within the environment that may be affected by the proposed activity;
- identify the relative ecological sensitivity of the project area;
- produce an assessment report that:
  - indicates identified habitats and fauna and flora species,
  - indicates the ecological sensitivity of habitats and conservation values of species,
  - determines the potential impacts of the project on the ecological integrity,
  - provides mitigation measures and recommendations to limit project impacts,
  - indicate ecological responsibilities pertaining to relevant conservation legislation.

This ecological report is attached as Annexure **B** describes the ecological characteristics of the proposed mining area, identifies the source of impacts from mining operation, and assesses the impacts, as well as the residual impacts after closure.

Data collection

The study comprised a combination of field and desktop surveys for data collection on fauna and flora in order to obtain the most comprehensive data set for the assessment. The fieldwork component was conducted on 15 July 2017 and most data for the desktop component was obtained from the quarter degree square that include the study area (2824DA).

Field survey

For the field work component, satellite images were used to identify homogenous vegetation units within the proposed mining area. Representative sampling plots were allocated in these units and sampled with the aid of a GPS in order to characterise the species composition. The following quantitative data was collected:

- Species composition
- Species percentage cover
- Amount of bare soil and rock cover
- Presence of biotic and anthropogenic disturbances

Additional checklists of plant species were compiled during the surveys by traversing a linear route and recording species as they were encountered in each unit.

Desktop survey

For the desktop component, the South African National Vegetation Map (Mucina and Rutherford 2006) was used to obtain data on broad scale vegetation types and their conservation status. The South African National Biodiversity Institute's (SANBI) BGIS database was also consulted to obtain information on biodiversity information for the Sol Plaatje Local Municipality (NC091), in which the study area falls.

Further searches were undertaken specifically for Red List plant species within the current study area. Historical occurrences of Red List plant species were obtained from the SANBI: POSA database for the quarter degree squares that include the study area. The IUCN conservation status of plants in the species list was also extracted from the SANBI database and is based on the Threatened Species Programme (SANBI 2017).

Broad-scale vegetation patterns

The study area falls within the Savanna Biome (Mucina and Rutherford 2006) and according to the vegetation map of Mucina and Rutherford (2012), the entire site is represented by Kimberley Thornveld (Figure 9). Kimberley Thornveld is distributed in the North-West, Free State and Northern Cape Provinces at altitudes between 1 050 and 1 400 m. It is found in the Kimberley, Hartswater, Bloemhof and Hoopstad Districts,

but is also within the Warrenton, Christiana, Taung, Boshof and Barkly West Districts. The unit is typically presented as slightly undulating sandy plains with a well-developed tree and shrub layer and an open grass layer. Andesitic lavas of the Allanridge Formation occur in the north and west, while fine-grained sediments of the Karoo Supergroup are found in the south and east. Soils are deep, sandy to loamy, and of the Hutton form. The most common land types are Ae and Ah. The unit is classified as being least threatened, but 18 % has already been transformed, predominantly by cultivation. Only 2 % is currently conserved in statutory reserves and no endemic species are known from this unit. It is specifically prone to Senegalia mellifera encroachment following overgrazing, but the occurrence and risk of erosion is very low.

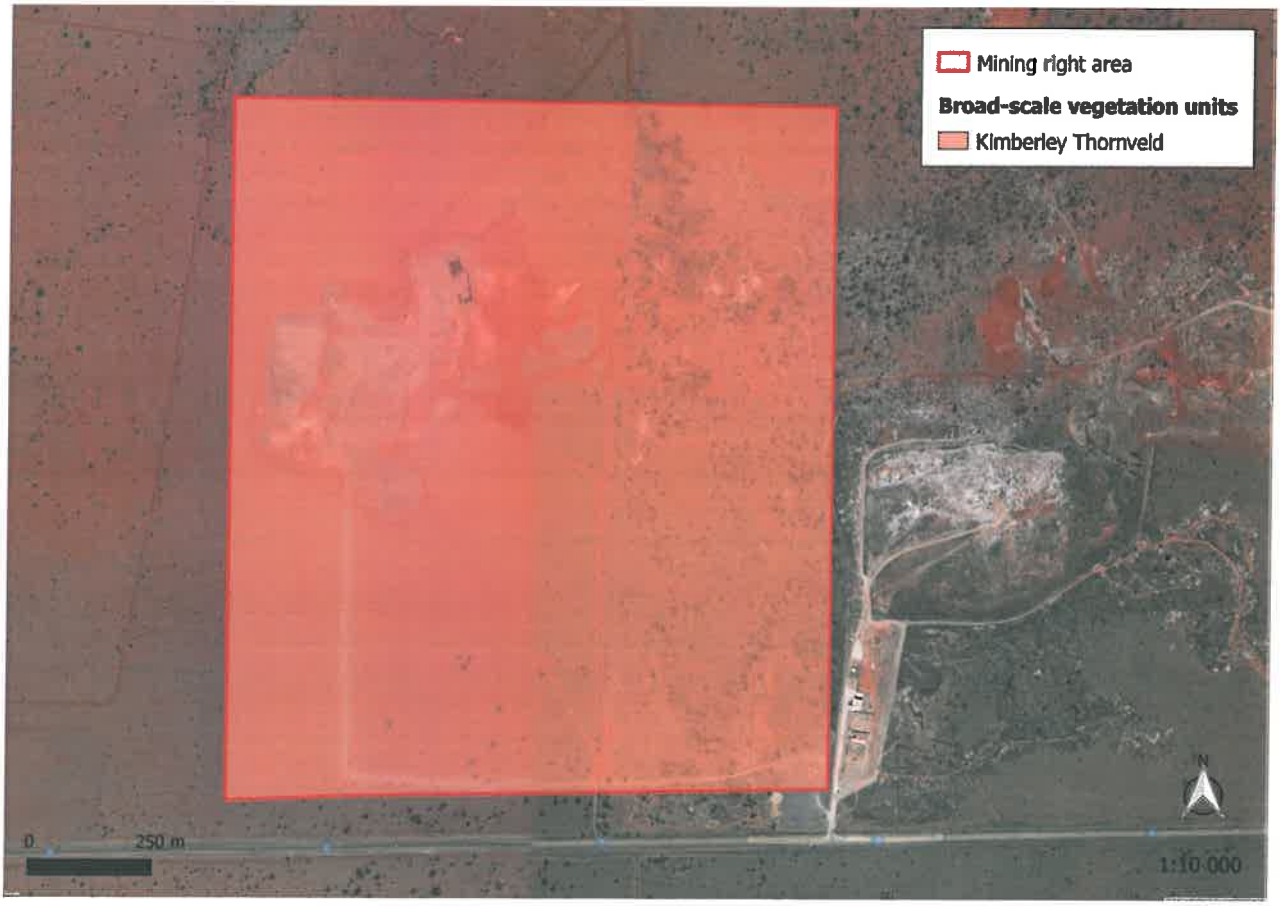


Figure 9. The distribution of broad-scale vegetation units (Mucina et al. 2005) that is present in the study area. (Dr. Betsie Milne, August 2017).

Fine-scale vegetation patterns

Plant communities in the study area are delineated according to plant species correspondences, change in soil structure and disturbance regimes. They can be divided into three distinct units (Figure 10), which are described below. These descriptions include unique characteristics and the dominant species found in each unit. A complete plant species list, including those species likely to occur here is presented in Appendix 1.

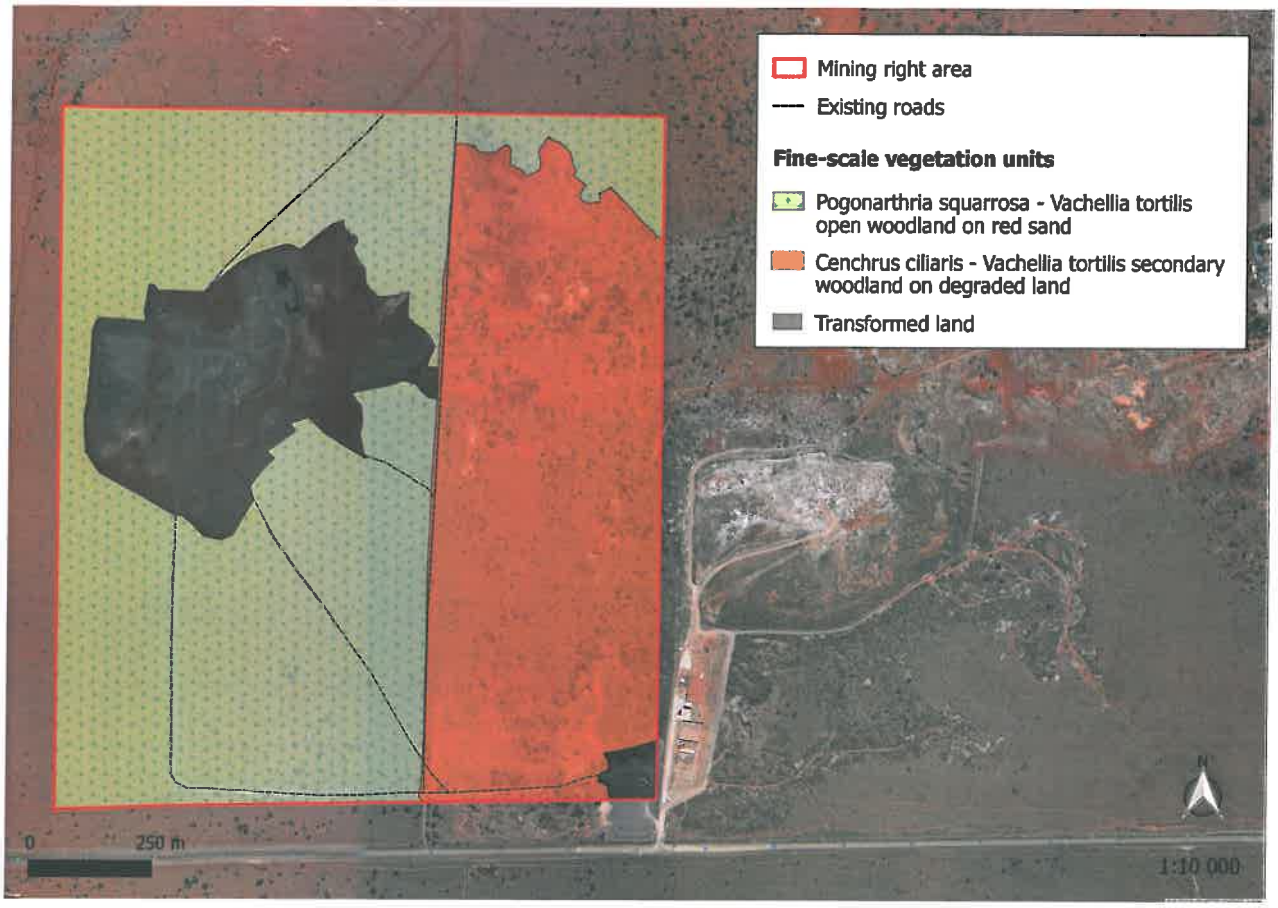


Figure 10. The distribution of fine-scale vegetation units in the study area. (Dr. Betsie Milne, August 2017)

Conclusion

Three plant communities were identified on site of which the open woodland communities in the west is included in the core mining area and considered to be of high sensitivity. The secondary woodland in the east is considered to be of medium sensitivity, while the transformed areas are of low sensitivity. The most profound impacts are expected to be related to the loss of indigenous vegetation, especially species of conservation concern.

Species of conservation concern that are found in the earmarked habitat include Vachellia erioloba, Harpagophytum procumbens, Pelargonium aridum and Babiana bainesii. Similarly, the mining operation will result in the large-scale clearance of indigenous vegetation. Permit applications regarding protected flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation.

Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees.

To conclude, it is clear that the destruction of the natural habitat within the study area is inevitable. The significance of the impacts will be affected by the

success of the mitigation measures implemented and the rehabilitation programme for the mining area. In my opinion, authorisation can be granted if the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures.

- **NATURAL FAUNA:**

Boscia Ecological Consulting CC has been appointed by Wadala Mining to provide an ecological assessment in order to highlight the ecological characteristics of the proposed mining area, and to determine the possible impact of mining on the diversity and ecological status of the area attached as Annexure B.

Scope of study

The specific terms of reference for the study include the following:

- conduct a desktop study and field investigation in order to identify and describe different ecological habitats and provide an inventory of communities/species/taxa and associated species of conservation concern within the environment that may be affected by the proposed activity;
- identify the relative ecological sensitivity of the project area;
- produce an assessment report that:
  - indicates identified habitats and fauna and flora species,
  - indicates the ecological sensitivity of habitats and conservation values of species,
  - determines the potential impacts of the project on the ecological integrity,
  - provides mitigation measures and recommendations to limit project impacts,
  - indicate ecological responsibilities pertaining to relevant conservation legislation.

This ecological report is attached as Annexure **B** describes the ecological characteristics of the proposed mining area, identifies the source of impacts from mining operation, and assesses the impacts, as well as the residual impacts after closure.

Desktop survey

A desktop survey was undertaken to obtain lists of mammals, reptiles, amphibians and birds which are likely to occur in the study area. These were derived based on distribution records from the literature, including Friedmann and Daly (2004) and Stuart and Stuart (2015) for mammals, Alexander and Marais (2007) and Bates et al. (2014) for reptiles, Du Preez and Carruthers (2009) for amphibians and Gibbon (2006) for birds.

Additional information on faunal distribution was extracted from the various databases hosted by the ADU web portal, http://adu.org.za. A map of important bird areas (BirdLifeSA 2015) was also consulted. The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.
The likelihood of Red Data species occurring on site has been determined using the distribution maps in the Red Data reference books (Friedmann and Daly 2004; Bates et al. 2014; Taylor et al. 2015; ADU 2016) and comparing their habitat preferences with the habitat described from the field survey. The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria (IUCN 2015) and/or the various red data books for the respective taxa.

Field survey

The faunal field survey was conducted concurrent with the vegetation survey. Habitats on site were assessed to compare with the habitat requirements of Red Data species. The presence of faunal species was determined using the following methods:

- Identification by visual observation,
- Identification of bird and mammal calls,
- Identification of signs (spoor, faeces, burrows and nests).

Faunal communities

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 any means 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.
The landscape features, i.e. plains and degraded land, does not provide diverse habitat opportunities to faunal communities. However, the micro-habitats provided by the pristine vegetation are likely to host a variety of small mammals, while the trees (exotic and indigenous) provide important nesting sites for birds. The overgrown piles of rocks and boulders could also potentially be important refugia for reptiles.

Mammals

As many as 50 terrestrial mammals and nine bat species have been recorded in the region (see Appendix 2), of which Steenbok were encountered during the site visit.
Nine listed terrestrial mammal species and four listed bat species potentially occur in the area (Table 7). The African Straw-coloured Fruit-

bat and Geoffroy's Horseshoe Bat have a high chance of occurring on site, given their wide habitat tolerances. The Dent's Horseshoe Bat, Darling's Horseshoe Bat and Bushveld Gerbil have a moderate potential of occurring on site. Although their habitat preference is similar to what is found on site, the natural vegetation has already been transformed to a large extent.

The Sclater's Golden Mole, Ground Pangolin, Lesser Dwarf Shrew, South African Hedgehog, Black-footed cat, Brown Hyena, African Striped Weasel and Honey Badger all have a low potential of occurring on site due to the proximity of the site to residential and industrial development. Many of these are rather skittish and therefore they will most likely not occur here.

Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). Those that are specially protected, and not yet mentioned as listed, include Aardvark, Aardwolf, African Wild Cat, Cape Fox and Striped Polecat. These all have a low potential to occur on site due the proximity to residential areas. Problem animals (Schedule 4) include Black-backed Jackal, Vervet Monkey, Chacma Baboon and Caracal, of which Vervet Monkey is most likely to occur on site.

The core mining activities are associated with the existing project site and the open woodland community in the north-west of the property. Listed mammals that are most likely to be impacted in the form of species- and/or habitat loss resulting from the mining activities include bats and small mammal species that are associated with these habitats.

Reptiles

The site lies within the distribution range of at least 55 reptile species (see Appendix 2), of which none are of international or national conservation concern. Three species are endemic to South Africa, i.e. Homopus femoralis (Greater Padloper), Pachydactylus mariquensis (Common Banded Gecko) and Agama aculeata distanti (Eastern Ground Agama) and most area are protected either according to Schedule 1, 2 or 3 of NCNCA, except for agamas, geckos and skinks (see Appendix 2). Specially protected species include Karusasaurus polyzonus (Southern Karusa Lizard) and Chamaeleo dilepis dilepis (Namaqua Chamaeleon).

The habitat diversity for reptiles in the study area is not high, but the open woodland community as well as rocks and boulders are considered to be the most important habitat for reptiles at the site. It is however not foreseen that the mining activities will cause significant habitat loss for the local reptile population. In general, impacts by the proposed mining operations on reptiles are likely to be low.

Amphibians

Fifteen amphibian species are known from the region (Appendix 2). Low amphibian diversity is normal for an arid area, but is likely to increase within areas where water collects after rain. As a result, higher amphibian diversity is most likely to be found in these micro-habitats. Pyxicephalus adspersus (Giant Bull Frog) is the amphibian species of conservation concern that potentially occur in the study area. It is listed as Near Threatened in terms of the Red Data Book of Frogs and is protected according to Schedule 1 of the NCNCA. All other amphibians of the study area are protected according to Schedule 2 of NCNCA (see Appendix 2). Impacts on amphibians are likely to be low.

Avifauna

The study site does not fall within any of the Important Bird Areas (IBA) defined by Birdlife South Africa, but lies close to Kamfers Dam (7 km), Dronfield (11 km) and Benfontein (14 km) as depicted on Figure 11.

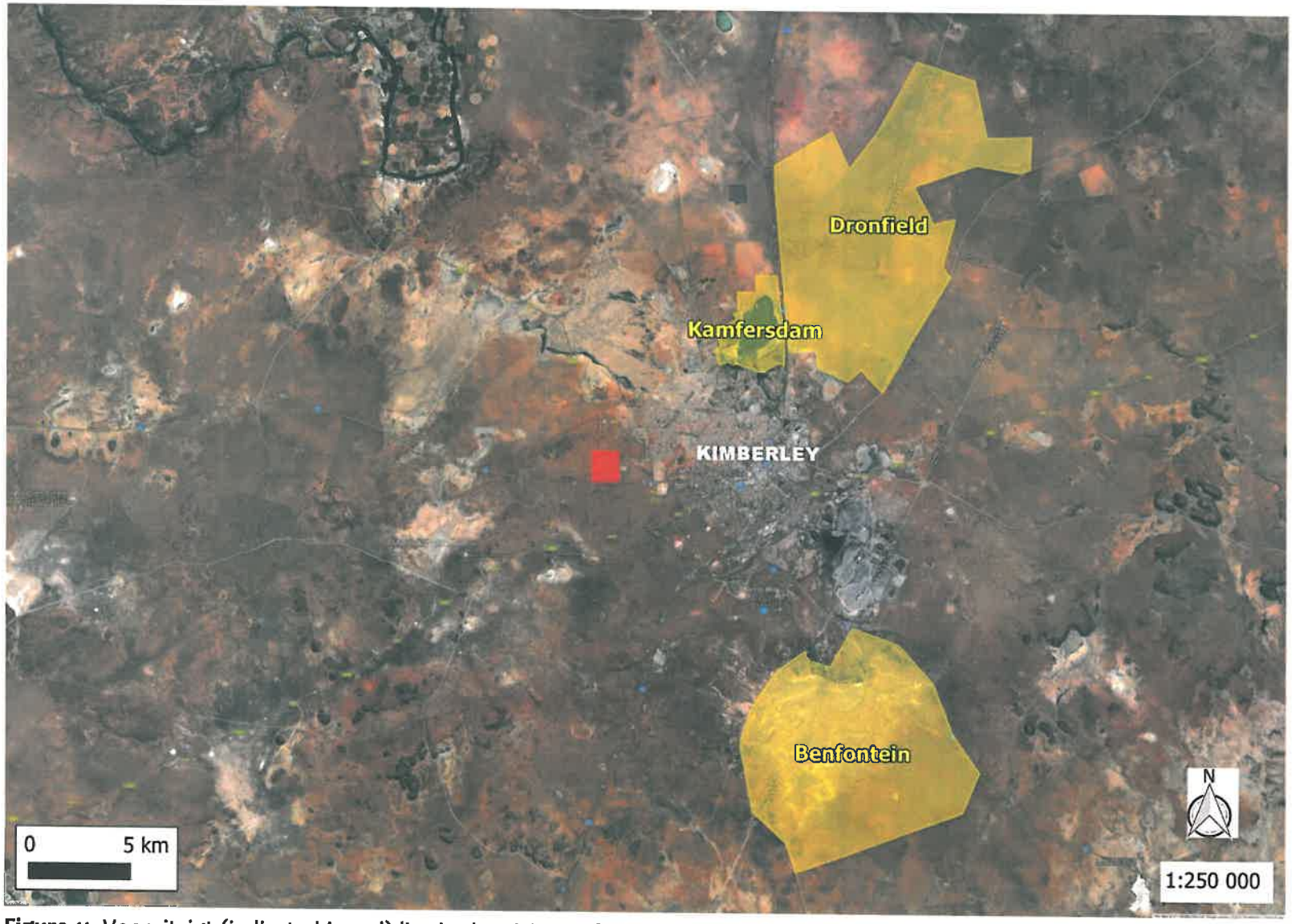


Figure 11. Vooruitzigt (indicated in red) lies in the vicinity of three Important Bird Areas (BirdLifeSA 2015), i.e. Kamfersdam and the Dronfield- and Benfontein Nature Reserves (indicated in yellow). Map out of the Ecological study by Boscia Ecological Consulting CC.

Kamfersdam is an endorheic pan that has been transformed into a permanent wetland over the past decade due to an increase in sewage effluent inflow. Hence, it has become an important habitat for birds, especially the Greater- and Lesser Flamingos. The dam supports the largest permanent population of Lesser Flamingos in southern Africa. The most significant threats to Kamfersdam are poor water quality, flooding and expansion of urban development, while threats to the bird population include illegal hunting of water birds and the collisions and mortality of flamingos and other water birds caused by power lines and the electrical transmission lines along the railway.

Dronfield supports large numbers of breeding White-backed Vulture, which comprises 41 % of the breeding pairs in the Kimberley region. These birds forage over wide areas and a pair was encountered soaring over the study area during the site visit. The use of poisons in farming areas to combat mammalian predators still poses a threat to scavenging raptors, and hundreds of vultures can be killed in a single poisoning incident. Collisions with transmission power lines and electrocutions on reticulation and distribution power lines also pose an ongoing threat to vultures and other trigger species.

Benfontein is a Nature Reserve owned by De Beers Consolidated Mines since 1891 and there has been significant investment by research groups over the years. The farm supports small numbers of breeding White-backed Vulture, Blue Crane and Blue Korhaan. The farm also holds several biome-restricted assemblage species and congregatory species, including Lesser Flamingo. More than 1 700 water birds are present during years of high rainfall on the ephemeral Benfontein Pan, and 65 water bird species have been recorded on the pan. There are presently few threats to this IBA as it is being well conserved. The invasive mesquite Prosopis glandulosa, currently present in the north-eastern section and spreading along the N8 on the eastern boundary, could become a significant threat if not controlled. Collisions with the power line transecting the eastern side of Benfontein are a threat to the White-backed Vultures and large terrestrial birds such as Blue Crane and Ludwig's Bustard. Anglo American has recently bought De Beers and this change of ownership may lead to a change in land use or the sale of the property.

A total number of 299 bird species have been recorded from the region and all of these species are protected either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2 of the Ecological Report as Annexure C). Twenty-five listed bird species are known from the region, all of which are classified as Vulnerable, Near Threatened or Endangered (Table 7 in the Ecological Report as Annexure C). Although none of these species

were observed to reside on site, they are expected to potentially occur on site either by occasionally passing over the area or by frequently foraging in the various habitats.

In general, bird species of the study area are likely to experience the most disturbances among all fauna as a result of the Vooruitzigt mining activities. During the site visit it became evident that the abundance of trees and the grassy woodland matrix host rich bird diversity and are important for breeding, nesting and foraging. The most significant impacts are expected to be in the form of habitat destruction. This will especially impact the open woodland community in the west of the property.

Apart from general disturbances and habitat loss, other potential impacts would come from the accidental or intentional killing of birds. Many of the raptors, including vultures and owls, are susceptible to intentional killing due to cultural beliefs. Monitoring during the mining operation would be vital in order to ensure no or low impact.

Critical biodiversity areas and broad-scale processes

The proposed mine falls within close proximity to an urban development zone and has also not been identified as important for long-term maintenance of broad-scale ecological processes within the Sol Plaatje Municipality (Kotze et al. 2009). The mining operation itself is not expected to cause severe habitat transformation and due to the high degree of transformation through previous mining activities on site it is not expected to contribute to severe cumulative habitat loss or the disruption of the broad-scale landscape connectivity in the region. However, it is advisable that the mining activities are restricted to the earmarked application area. (Ecological study by Boscia Ecological Consulting, August 2017).

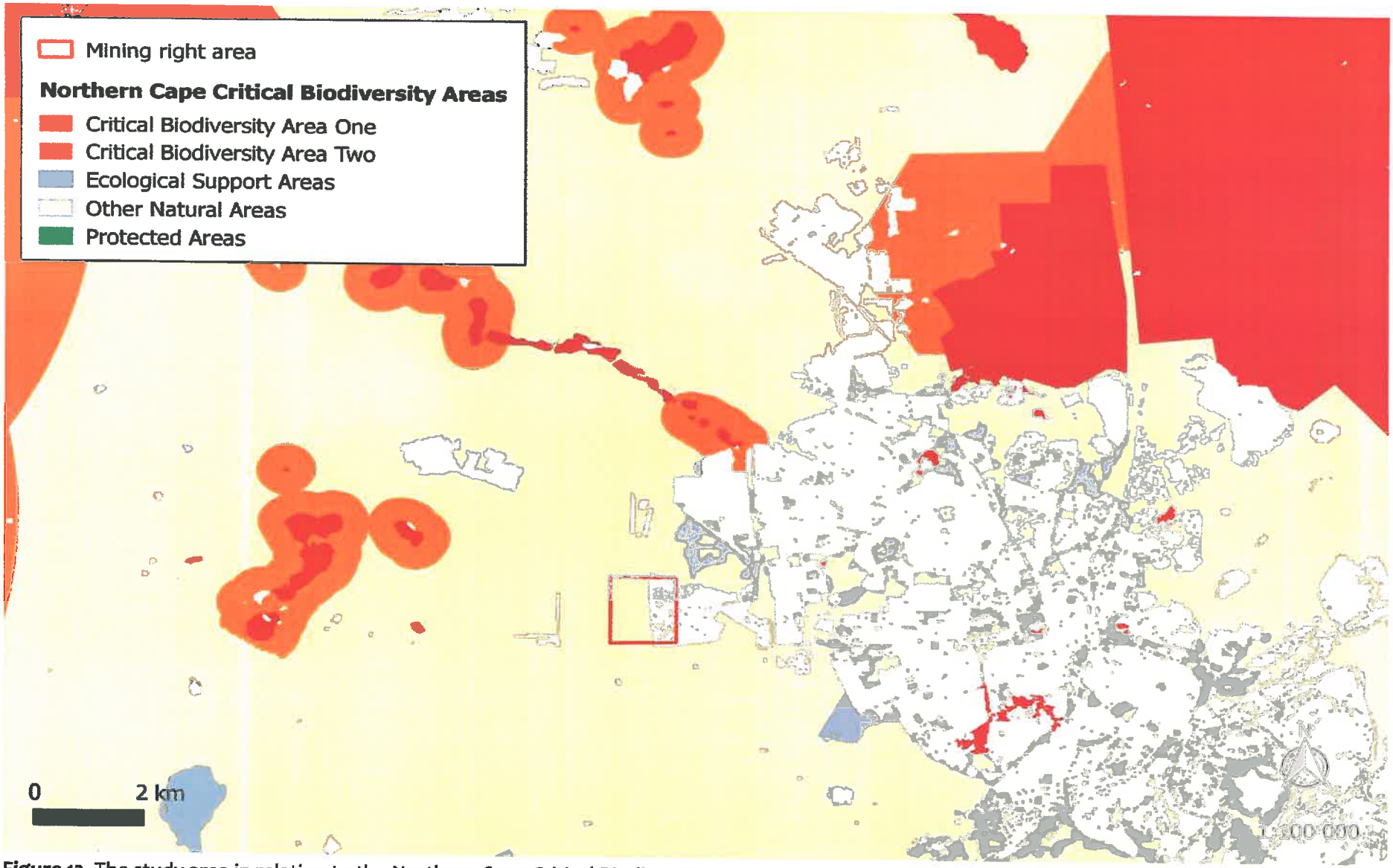


Figure 12. The study area in relation to the Northern Cape Critical Biodiversity areas.

- **SOCIO-ECONOMIC STRUCTURE OF THE REGION:**

(a) *Population Density, Growth and Location:-*

According to the 2011 Census, the population of Kimberley was 96,977, while the townships Galeshewe and Roodepan had populations of 107,920 and 20,263 respectively. This gives the urban area a total population of 225,160. Of this population, 63.1% identified themselves as "Black African", 26.8% as "Coloured", 8.0% as "White" and 1.2% as "Indian or Asian". 43.2% of the population spoke Afrikaans as their first language, 35.8% spoke Setswana, 8.7% spoke English, 6.0% spoke isiXhosa and 2.7% spoke Sesotho.

Kimberley is the capital of the Northern Cape Province. It is located approximately 110km east of the confluence of the Vaal and Orange Rivers. The city has considerable historical significance due to its diamond mining past.

The Sol Plaatjie Local Municipality comprises of a large urban node in the form of Kimberley, and villages and farms. Kimberley is the administrative centre of the municipality. The economic activities consist of retailers, industries as well as mining and farming.

The SPLM accommodates approximately 247 000 people and is also a major contributor to the economy of the Province accounting for 28.9% and 82.1% of provincial and District GDP in 2009 respectively, Sol Plaatjie LM certainly is encumbered with ensuring that the Province as a whole reaches its accelerated growth objectives.

Table 1: Sol Plaatjie Municipality: Population by Population Group

Persons	2001	1996	Change over 5 years		Annual ave % change	% Composition 2001
			Number	percent		
African	109,714	105,838	3,876	4%	0.7%	54%
Coloured	63,918	63,655	263	0%	0.1%	32%
Indian	1,612	1,809	-197	-11%	-2.3%	1%
White	26,220	29,587	-3,367	-11%	-2.4%	13%
Total Population	**201,484**	**204,263**	**-2.799**	**-1%**	**-0.3%**	**100%**

Gender	People	Percentage
Female	49 550	51.09%
Male	47 427	48.91%

Population Group	People	Percentage
Black African	40 218	41.47%
Coloured	35 590	36.70%
White	17 841	18.40%
Indian or Asian	2 226	2.30%
Other	1 102	1.14%

First Language	People	Percentage
Afrikaans	52 161	55.48%
Setswana	17 621	18.74%
English	14 626	15.56%
isiXhosa	4 328	4.60%
Sesotho	2 174	2.31%
isiZulu	901	0.96%
Other	836	0.89%
isiNdebele	418	0.44%
Sign Language	301	0.32%
Sepedi	275	0.29%
Tshivenda	175	0.19%
Xitsonga	153	0.16%
SiSwati	57	0.06%
Not Applicable	2 952	

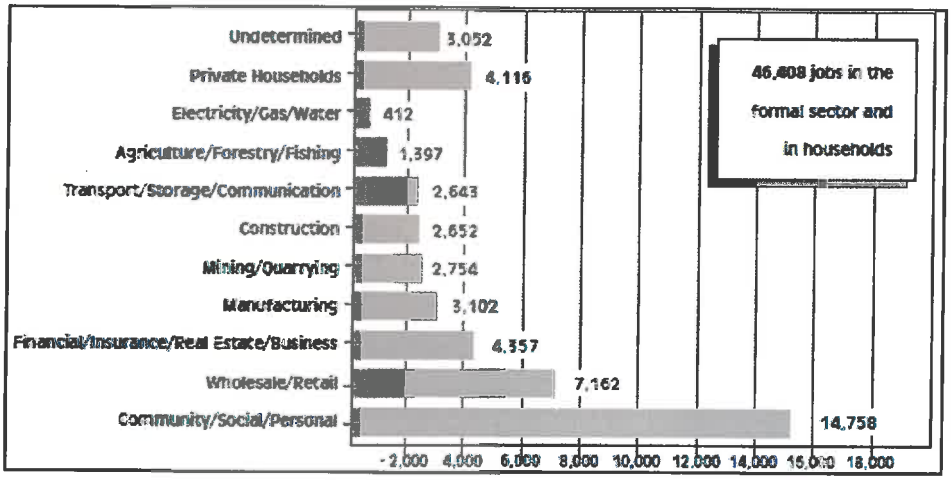
(b) *Major Economic Activities and Sources of Employment:-*

The population of Sol Plaatjie shows a declining trend – in common with the Northern Cape Province as a whole. One third of the employed citizens in Sol Plaatjie work for the public sector. The number of economically active people barely grew between 1996 and 2001. However, the number of people with employment decreased, with the result that the rate of unemployment increased markedly, from 34% to 42%.

Persons	2001	1996	2001	1996	Change over 5 years	
			Percent	Percent	Number	Percent
Employed	46,412	51,643	58.5%	65.7%	-5.231	-10%
Unemployed	32,928	26,979	41.5%	34.3%	5,949	22%
Total Labour Force	79,340	78,622	100.0%	100.0%	718	1%
Not Economically Active	54,218	49,889			4,329	9%
Population 15 – 65	133,558	128,511			5,047	4%
Total Population	**201,484**	**204,263**			**-2,799**	**-1%**

In the past, the local economy of Sol Plaatjie was heavily dependent on the De Beers Diamond Mines in and near SPM. In addition, the military maintained large bases of men and equipment in and around the region. However, since the major mines, have downscaled and closed over the last 15 years and the military establishments have shrunk since 1994, the local economy has changed without diversifying. The public secotr is the single largest source of employment, as the city is home to the regional and head offices of three spheres of government. The figure below illustrates that in 2001 the majority of the population were employed in the service sector.

Diagram 1: Employment pattern in Sol Plaatjie, 2001 Census Data



Other major employment areas are retail distribution and services. Tourism is a useful contributor to the economy, but it is not large enough to be defined as a driver of the economy in its own right. Employment in the manufacturing sector has experienced slow decline between 2000 and 2003.

Since the manufacturing sector is slowly losing the limited critical mass that it had, it no longer provides a viable economic sector for SPM on which to focus over the longer term within the ambit of a city development strategy. With regard to other economic sectors, the following picture emerges:

- Mining is in closure mode within the city;
- Construction depends on government decisions;
- Retail is a driver of the local economy as the trading centre for the region;
- Tourism is a supporter of economic growth, but will rely on improved human capital;
- Transport depends on major state infrastructural investment in road and rail upgrading.

Table 2: Positive and negative forces in the economy

	Positive	Negative
Main Forces	**Drivers of the economy** Government (Provincial, District & Local) Retail and service economy for the city and the region	**Underminers of the economy** Decline of the mining and manufacturing sectors Growing strength of Mangaung as the principal urban centre in the region
Important Supplements	**Boosters** The Diamond Hub Project The Urban Renewal Projects	**Obstacles / Barriers** Deteriorating state of the N12
	Complementers Tourism and tourism development Blue Train Appropriate improvers of the retail and recreation environment	**Caps** Capacity of the SPM as an institution to drive the strategic agenda Poor state of maintenance on municipal services Infrastructure supporting economic activity Loss of municipal tax revenue through decline of CBD
	Supporters De Beers "Big Hole" redevelopment – conference centre, hotel, museum Education institutions	**Diversions** Decentralised shopping malls
	Sustainers The N23 in its present poor state	
	Defenders Social grants	
Alternatives	**Rescuers** The new prison and mental facility Regional health facilities The N12 upgraded The military Relocation of a national department to Sol Plaatjie	

(c) *Estimated Unemployment:-*

The education level of persons in the area where only 10% have post-matric and 90% matric or less with an unemployment rate of 33% which is mainly in the category of persons with matric or less, a need exist for innovative ways to diversify the economy. The main job creating

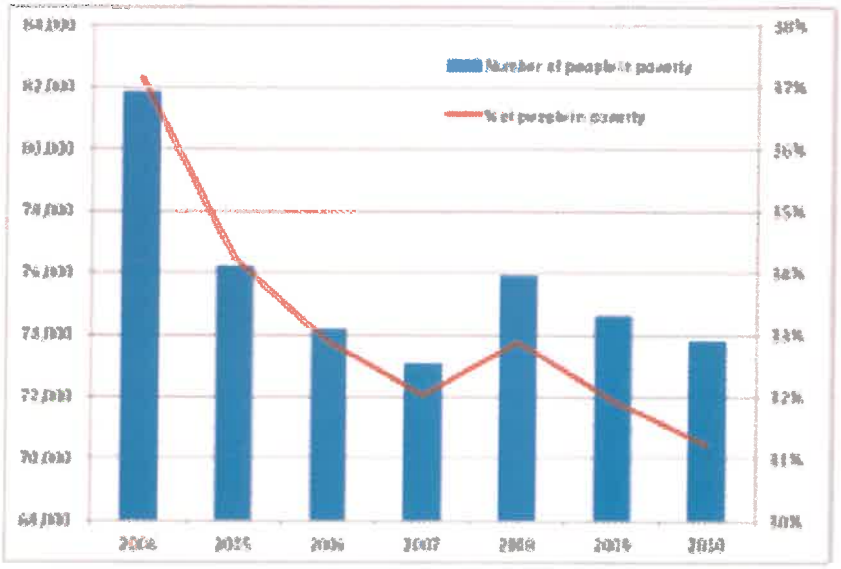
sectors are the primary and secondary sectors which employ the most unskilled workers.

Table 3: Labour Market and Education Statistics 2011 compared to 2001

Labour Market				Education (aged 20+)					
Unemployment Rate (official)		Youth Unemployment Rate (official) 15 – 34 years		No Schooling		Matric		Higher Education	
2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
41,3%	31,9%	51,5%	41,7%	11,3%	7,1%	21,9%	29,2%	8,7%	10,4%

Linked to the unemployment rate the chart below indicates the people living in poverty in the Sol Plaatjie Municipality.

Chart 1: Number and percentage of people livening in poverty, Sol Plaatjie Local Municipality 2004 – 2010



According to the chart above the number of people living in poverty decreased dramatically to 31,2%. This is well below the national average of 39,9% as well as the provincial and district averages of 43,4% and 39,1% respectively. The NDP's target is to reduce the number of people living in poverty to 39% by 2030.

(d) *Housing Demand and Availability:-*

Table 4: Access to Household Services (higher level) 2011 compared to 2001

Level of Service	2001 %	2011 %
Piped water inside dwelling	51,2	61,9
Flush toilet connected to sewer	83,4	82,8
Electricity for lighting	82,4	84,9
Weekly refuse removal	90,8	84,3

SPM was able to provide more households with a higher standard of service in terms of water and electricity during the period 2001 to 2011 which was however not the case with sanitation and refuse removal. In the case of sanitation the main reason is that until 2009/10 SPM's bulk sewer treatment works ran out of capacity which led to a moratorium on development as new development – also housing development – could not be connected to the sewer network. The capacity problems have since been resolved and the moratorium has been lifted and enough capacity has been created for the next 20 years. Refuse removal also lagged behind mainly due to the increase of informal settlements – which is not accessible to deliver a waste removal service. This is still the case today.

The infrastructure diamond below depicts the four household infrastructure measures on a single diamond shaped chart. The larger the diamond, the better serviced the area is in terms of refuse removal, electricity, water and sanitation access. The dotted blue line shows the national average as a means of comparison, the light dotted blue line is the provincial comparison, whilst the green line shows the SPM's measure. The dotted blue line falls inside the green line indicating that SPM is performing better than the national and provincial average.

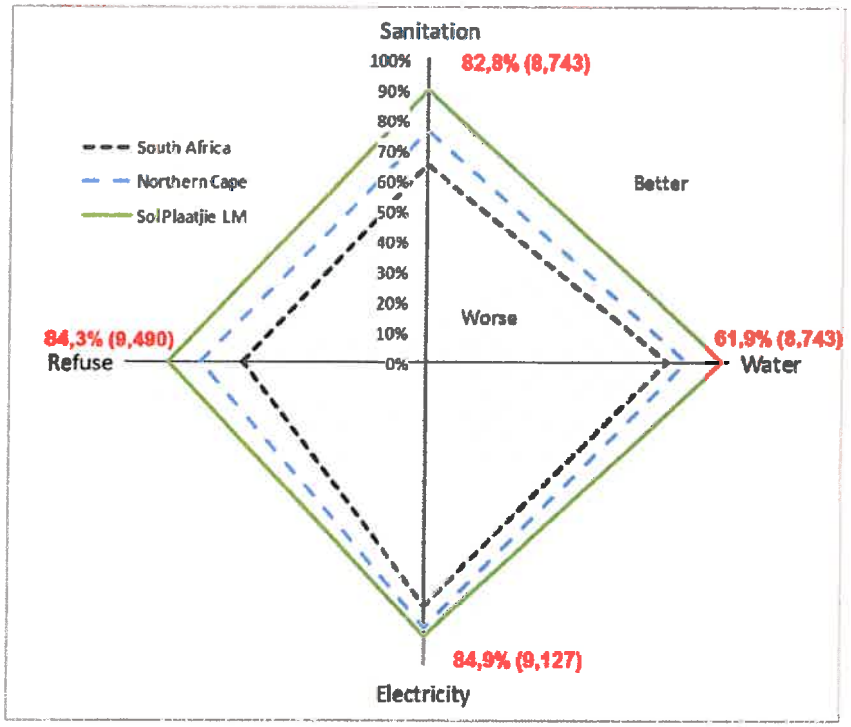


Figure 13: SPM Infrastructure Diamond: Basic Services: 2011

Although SPM does well in providing services to its communities the tables below indicate the backlogs and needs that still exist in terms of service delivery.

The table below indicate the number of informal settlements in SPM as well as the stage of development in each informal settlement.

Table 5: No. and Status of Informal Settlements

Description	No. of Areas	H/H
Planning not commenced	9	5 172
Planning in process	11	2 167
Planning completed – await registration	5	1 526
Install services	2	996
Housing	1	3 500
TOTAL	**28**	**13 361**

Table 6 below indicates the present backlogs/need for basic household services according to Census 2011, the provision of services since the 2012/2013 financial year as well as the planned provision for the financial year 2014/2015. It also include the growth of informal households since the 2011 Census and the survey done through the NUSP process.

Table 6: Basic Household Services Backlog and Need 2011

Service	Backlog Census 2011	Provision up to 30 Jun 2014	2014/2015 Targets	TOTAL	Balance	PLUS Growth 2011 to 2013
New Houses (subsidised)	7 846	1 293	375	1 668	6 178	11 693
New Erven Planned and Surveyed	7 846	1 163	1 272	2 435	5 411	10 927
Houses connected to water	8 743	2 521	892	3 413	5 330	10 846
Houses connected to sanitation	9 343	3 552	892	4 444	4 899	10 415
Houses connected to electricity	9 127	2 335	214	2 549	6 578	12 094
Houses provided with waste removal	9 490	2 000	600	2 600	6 890	12 406
Roads Rehabilitation/ Paving	297km	25,7km	2,5km	31,7km	265,3km	-

(e) *Social Infrastructure:-*

The city of Kimberley have formal instructure such as schools, university, hospitals, sport- and recreation facilities and shops.

(f) *Water Supply:-*

Water is available to almost 50% of the population in the Northern Cape in the form of water piped to their dwelling. The next most used source of water supply is piped water on-site or in yards, which is available to around 33% of the population.

Surface water from the Riet-, Vaal- and Orange River is the major source of water in the region, although some smaller communities are totally dependent on groundwater for supply.

- ***ARCHAEOLOGICAL***

This Heritage Impact Assessment (HIA) report has been prepared in compliance with Section 38 of the National Heritage Resources Act (No 25/1999). The Client, Kimcrush (Pty) Ltd, intends to lodge an application for a Mining Right on a Portion of Portion 1 & Portion of Portion 351 of the Farm Vooruitzigt 81, Kimberley District, Northern Cape Province. The HIA forms an integral component of an Environmental Impact Assessment to be conducted as a prerequisite for the authorisation of the project.

The proposed mining will be undertaken by open cast methods. The target mineral is dolerite which will be crushed at the site to obtain various grades of stone for civil works: ballast stone, crusher sand, crusher dust, paving gravel, building concrete stone, and other grades of concrete stone for roadworks and

rail installation. As the foot print of the mine will be extended new service roads will be opened and other support infrastructure developed. These physical works may result in the disturbance or destruction of heritage resources if they exist. For this reason an HIA is necessary to prepare a heritage impact statement showing what is present or what is likely to occur at the site.

A Heritage Impact Assessment (HIA) is a study to evaluate the impact a proposed development or site alteration will have on the cultural heritage resources and to recommend an overall approach to the conservation of the resources. An HIA is based on an understanding of heritage and its significance, and if heritage is found in the area of the proposed development mitigation options are considered and recommendations made on a conservation strategy that best conserves the resource(s) within the context of the proposed development.

Findings of the survey

Borrow pits have been operated on an eastern portion of the property as revealed by wide troughs of varying depths (P1), while on the southern part of this area excavations have been partially filled up with building debris (P2). Building debris is also found on the north-western edge of the excavated area. All the material appear to have been deposited within the last 20 years, while the borrow pits have been active up to a recent date. None of this material therefore carries heritage significance. Elsewhere the surface appears to be sterile without material evidence of past human activity. Furthermore there is no evidence of the impact of the city on the property which carries heritage significance.

Recommendations and conclusions

No heritage resources were found during the survey. This gives the project a green light to go ahead. If heritage resources were to be found during the prospecting or mining phases, the procedure is to approach the relevant heritage authorities (SAHRA and/or the Provincial Heritage Resources Authority). (HIA by Dr. Edward Matenga, 2017 Annexure C).

Palaentological

This desktop palaeontological assessment (PIA) has been conducted in the context of an application by Kimcrush (Pty Ltd) for a Mining Right on a Portion of Portion 1 & Portion of Portion 351 of the Farm Vooruitzigt 81, Kimberley District, Northern Cape Province.

The proposed mining will be undertaken by open-cast methods. The target mineral is dolerite which will be crushed at the site to obtain various grades of stone for civil works: ballast stone, crusher sand, crusher dust, paving gravel, building concrete stone, and other grades of concrete stone for roadworks and rail installation. As the footprint of the mine will be extended new service roads will be opened and other support infrastructure developed. These physical

works may result in the disturbance or destruction of heritage resources if they exist. For this reason an HIA is necessary to prepare a heritage impact statement showing what is present or what is likely to occur at the site.
In this desk study, the underlying rock units in the area of the proposed development have been identified from the 1: 250 000 geology map 2824 Kimberley (Council for Geosciences, Pretoria), scientific literature and previous palaeontological impact assessments that have been conducted in the broader area by various scholars.

The following is a summary of the findings:
The proposed mining intends to exploit the unfossiliferous Karoo dolerite rock which underlies the project area under a cover of Gordonia Formation sandy red soils. It is unlikely that fossiliferous Dwyka or Ecca formations will be affected. The affected Gordonia Formation is of low palaeontological sensitivity.
Overall, the impact of the proposed development on fossil resources is expected to be minimal. However, it is still recommended that the Environmental Control Officer (Eco) puts in place a contingency plan to rescue chance finds and where possible preserve them in situ. A standard Fossil Finds Procedure (FFP) has been drafted by Heritage Western Cape and is attached to this report to provide field guidance to the ECO (Annexure E). The recommendations made here should also be incorporated into the Environmental Management Plan for the proposed mining operations.
(PALAEONTOLOGICAL ASSESSMENT (DESKTOP) REQUESTED IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR A MINING RIGHT ON A PORTION OF PORTION 1 & PORTION OF PORTION 351 OF FARM VOORUITZIGT 81 KIMBERLEY DISTRICT, NORTHERN CAPE PROVINCE Prepared by Joseph Chikumbirike (PhD Palaeontology, University of the Witwatersrand) July 2017) (Annexure D).

(b) Description of the current land uses

Currently, the major land uses in the area are activities related to urbanisation, such as municipal waste facilities, residential buildings and commercial properties. According to AGIS, the land capability for the study site is non-arable with moderate potential grazing land. The grazing capacity is between 9 and 13 ha/AU, with the agricultural region being demarcated for cattle farming. The area is categorised to have no suitability for crop production. (Ecological study by Boscia Ecological Consulting p11, August 2017).

Vooruitzigt is mainly used for the current KIMCRUSH operation, but hunting dogs were seen crossing the property during the site visit. This could suggest that illegal hunting of resident wildlife occurs here. The property does not

seem to be fenced-off in the north and west and therefore reasonably accessible from these directions.

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

The infrastructure on site is comprehensively discussed in section d(ii) as part of the mining methodology discussion, as well as in section g as part of the mine footprint description. Furthermore, a comprehensive description of the environment was presented in section g (iv) (A) as part of the baseline report.

(d) Environmental and current land use map (Show all environmental, and current land use features)

Figure 14. Environmental and current land use map

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	Sterilisation of mineral resources	Very low	Highly unlikely	Operational and Decommissioning	insignificant Local	Ensure that optimal use is made of the available mineral resource.
Topography	Changes to surface topography Development of infrastructure; and residue deposits.	Medium	Certain	Construction and Operational	Low Local	• Rehabilitation of . and backfilling when possible continuously, if possible and does not influence mining and safety requirements. • Employ effective rehabilitation strategies to restore surface topography of dumps and plant site. • All temporary infrastructures should be demolished during closure.
Soils	Soil Erosion Construction of infrastructure; topsoil removal; potential runoff.	Medium	Probable	Construction and Operational	Low Local	• 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 minimised in terms of the surface area and duration, wherever possible. • The soil that is stockpiled during construction 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. • 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 the eroded areas, must occur. • Rehabilitation of the erosion channels and gullies. • Dust suppression must take place. • 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.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Loss of soil fertility During the removal of topsoil; stockpiling.	Medium-High	Certain	Construction Operational Decommissioning	Low Local	• 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
	Soil pollution Spillage of hazardous material; runoff.	Medium	Probable	Construction and Operational	Low Local	• 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.
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	Very low	Probable	Short term	Minimal Local	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.

	ineffective rehabilitation					
Ground Water Quantity	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from construction vehicles and fuel storage areas may contaminate the groundwater resource locally	Medium	Probable	Construction 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	• Ground works and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt. • Transport of construction materials to and from site.	Medium to Low	Possible	Construction	Low Local	Water Quality deterioration: change in water quality is caused by a change in natural conditions and/or an enhancement of pollution from sources. Dirty storm water trenches should be inspected regularly (once before the rainy season and after each occurrence of a storm) to clean the trench from excess soil particles to prevent overtopping of the channel wall during a sudden storm which will result in mixing of the dirty and clean

	Significant levels of dust may emanate from the use of heavy construction vehicles which in turn will impact on runoff water quality. • Materials used during construction may impact negatively on the runoff water quality.					water systems. Mitigation measures (or safety precautions) that are taken in order to eliminate any risk the 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. construction, operational and post closure to minimize the impacts are as follows: • Only environmental friendly materials must be used during the construction phase to minimize pollution of surface water runoff and/or underground water resources. • Pipe leakages should be minimized. • 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
	• Spillages that may occur on access and haul roads may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces.	High	Possible	Operational	Low to Moderate Local	

	• 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 construction vehicles.	Moderate to High	Possible	Closure	Low Local	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.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** Construction of roads, plant site, as well as other necessary infrastructure; placement of stockpiles; and the	Low	Definite	Construction and operational	Low to Medium Local	• 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.

	clearing of vegetation for mining, materials storage and topsoil stockpiles; vehicular movement.					
	Loss of flora with conservation concern Removal of listed or protected plant species; during Construction of roads, plant site, as well as other necessary infrastructure; the placement of stockpiles; and clearing of vegetation for mining.	High	Certain	Construction and Operational	Low to Medium Local	• 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.
	Proliferation of alien vegetation Clearing of vegetation; mining	Medium-High	Certain	Construction and Operational	Low Regional	• Minimise the footprint of transformation. • Encourage proper rehabilitation of mined areas. • Encourage the growth of

	activities					natural plant species. • Mechanical methods (hand pulling) of control to be implemented extensively. • Annual follow-up operations to be implemented.
	Encouragement of bush encroachment Clearing of vegetation; disturbance through mining activities.	High	Probable	Construction and Operational	Low Local	• 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	**Loss, damage and fragmentation of natural habitats** Clearance of vegetation; mining activities	High	Probable	Construction and Operational	Low-Medium Local	• 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). No construction personnel or

						vehicles may leave the demarcated area except those authorised to do so.
	Disturbance, displacement and killing of fauna Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from mining activities.	**Medium**	Probable	Construction and Operational	Low Local	• 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 extent of the proposed mine should be demarcated on site layout plans, and no construction personnel or vehicles may leave the demarcated area except those authorised to do so. Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors. • 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 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. • Employ measures that ensure adherence to the speed limit.
Air Quality	Sources of atmospheric emission associated with the mining	Low	Certain	Decommissioning	Low Local	Effective soil management; identification of the required control efficiencies in order to maintain dust generation within

	operation are likely to include fugitive dust from materials handling operations, wind erosion of stockpiles, and vehicle entrainment of dust road.					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 Noise increase at the boundary of the mine footprint and at the abutting residential areas	Medium	Possible	Pre- Construction and Construction	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.
	Civil construction activities Noise increase at the boundary of the mine footprint and at the abutting residential areas.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Civil construction activities should be limited to daytime only.
	Construction of internal Roads	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels

						Construction of internal roads should be limited to daytime only.
	Construction of the overland conveyer Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre-Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels
	Assembly of crusher and plant equipment Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Assembly of mine foot print activities should be limited to daytime only. Noise survey to be carried out to monitor the noise levels during these activities.
	Building activities Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Building activities at the mine foot print and along the conveyer belt should be limited to daytime only.
	Hauling of building material to and from the specific areas. Noise increase at the boundary of the	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturers specifications on acceptable noise levels Hauling of material should be

	mine footprint and at the abutting residential areas.					limited to daytime only. Noise survey to be carried out to monitor the noise levels during these activities.
	Construction of the Mine Residue dump, soil stock pile and material stock pile. Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	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.
	Diesel emergency generators Noise increase at the boundary of the mine footprint.	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.
	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 different sites.	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 Noise increase at the boundary of the mine footprint and at the residents living close.	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 infra-structure	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 on N8	Medium Regional	Certain	Construction, 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	Medium Regional	Highly Likely	Construction, Operation and Decommissioning	Medium Local Site	The design of the proposed mining development will determine the visual impact.
	Potential visual impact of the proposed development on the commercial activities located within 1 km.	Medium Regional	Highly Likely	Construction, Operation and Decommissioning	Medium Local Site	The design of the proposed mining development will determine the visual impact.
	Potential visual impact of the proposed development on the Sense of Place	Medium Regional	Highly Likely	Construction, Operational and Decommissioning	Medium Local Site	Design of the proposed development can ensure that the development forms part of the area and is aesthetically pleasing.
	Potential visual impact of the proposed development on the construction phase	Medium Regional	Highly Likely	Construction	Low Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact. • Ensure that the design fits

	of the surrounding land users in close proximity					into the surrounding environment and it is aesthetically pleasing; • Reduce the construction period through careful planning and productive implementation of resources; • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads; • Ensure that rubble, litter and disused construction materials are managed and removed regularly; • Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way; • Reduce and control construction dust emitting activities through the use of approved dust suppression techniques; and
	Potential visual impact of the proposed development on the operational phase of the surrounding land users in close	Medium Regional	Highly likely	Operational	Medium Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact. • Ensure that the design fits into the surrounding

	proximity.					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.	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	Construction, Operational	Low	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.

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 Construction	Medium Positive Local	• A community skills audit should be undertaken by Kimcrush. Alternatively, the existing Sol Plaatje Labour Desk could be used to determine which skills are locally available and which employees could come into consideration for employment. • 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 of local construction workers during the construction phase to enable them to be employable during the operational phase would not stop the influx of outsiders, but could attempt

						to minimise the number of "new" outsiders coming to the area in search of employment. • Training courses should be accredited and certificates obtained should be acceptable by other related industries. • Guidance concerning legal requirements to which locals should adhere to, to make them employable, such as the standard construction industry requirements should also be attended to.
	Inflow of Temporary workers	Low Negative	Highly Probable	Start up and Construction	Low Negative Local	• Construction workers falling within the semi-skilled to unskilled category should be sourced from the local population where possible to avoid possible conflict arising between locals and the outside workforce, but also to limit the need for accommodation facilities. • Construction activities should be kept to normal working hours e.g. from 7 am until 5 pm during weekdays. • Construction schedules and activities should be clearly communicated to the local

						municipality and nearby residents. • Security on-site should be active prior to the construction period. • The construction site should be properly managed to avoid any littering and possible environmental pollution. Water and sanitation facilities should be up to standard. • Information distributed as part of the existing HIV/Aids awareness campaigns undertaken in the area should again be focused on and communicated to the local workforce. • Unrealistic employment expectations should not be created. • The development of informal vending "stations" where food and small goods are sold should be properly managed, to avoid littering, safety risks and possible environmental pollution.
	Influx of Jobseekers	Low Negative	Highly probable	Start-up and Construction	Low Negative Local	• Maximise the use of local labour where possible by developing a strategy to involve local labour in the construction process.

						• The development, publication and widespread dissemination of a recruitment policy could serve to encourage local employment and reduce the potential influx of jobseekers to the area. • The communication strategy should ensure that unrealistic employment expectations are not created.
	Community and Institutional Activities Local Economic Contribution	Medium Positive	Probable	Start-up and Construction	Medium Positive Regional	• Kimcrush should develop a database of local companies, including credible SMMEs that could qualify as potential service providers prior to the initiation of the tender process, to enable these local companies and SMMEs to be involved with the tender process. In this regard Kimcrush should liaise with local stakeholders, as well as with representatives of the SPM. • Even if local companies and SMMEs would be considered during the construction phase of the project, the tender process should be based on competitive business principles and the quality of services to be rendered to

						ensure adherence to standards and to maximise overall welfare.
	Conflicts between Local Residents and Newcomers Impact on Social Networks	Low Negative	Probable	Start-up and Construction	Low Negative Local	• Unrealistic job expectations should be restrained through a transparent communication process. • 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 pro-actively managed. • As far as possible, the movement of construction workers should be confined to the work site to avoid any potential for impact from this variable in proximate residential areas. • Specify the conduct of contract workers in worker related management plans and employment contracts. • Consult with local structures and SPM on employment matters. • Do not house construction workers on site, but ensure sufficient and proper accommodation facilities.

						• Ensure sufficient safety and security measures on site
	Individual and Family Level Impacts Impact on nearby residential properties.	Low Negative	Low probability	Start-up and Construction	Low Negative Local	• 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 • Strict security measures should be put in place. Security personnel should be on site on a permanent basis. • 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 and Construction	Low Negative Local	• Dust suppression methods should be strictly implemented if and where required • All construction 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 • The construction of additional access roads should be

						limited. • Speeding of construction vehicles must be strictly monitored.
	Safety and Security Risks	Low Negative	Highly Probable	Construction	Low Negative Local	• A Fire/Emergency Management Plan should be developed and implemented at the outset of the construction phase. • Open fires for cooking and related purposes should not be allowed on site. • Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting • The construction area should be fenced or access to the area should be controlled to avoid animals or people entering the area without authorisation. • The construction sites should be clearly marked and "danger" and "no entry" signs should be erected. • Speed limits on the local roads surrounding the construction sites should be enforced. • Speeding of construction vehicles must be strictly monitored

						• Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Construction	Low Negative Local	• Maximise the employment of locals where possible • First aid supplies should be available at various points at the construction site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the construction site • The general health of construction workers should be monitored on an on-going basis
	Community Infrastructure Needs Impact on Infrastructure and Services	Low Negative	Highly probable	Construction	Low Negative Local	• Maximise the employment of locals where possible
	Heritage Features	Low Negative	Highly probable	Construction	Low Negative Local	• 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.
	Intrusion Impacts Visual Impact and Sense of Place	Low Negative	Probable	Construction	Low Negative Local	• The construction site should be kept litter free • Site rehabilitation on certain sections of the site should occur as soon as the construction process allows • The recommendations made by the Visual Impact Assessment should be adhered to.
	Noise Impact	Low Negative	Probable	Construction	Low Negative Local	• The mitigation measures of the Noise Impact Assessment should be implemented • Construction vehicles should be in a good working order • Construction 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	• The development of skills and the creation of opportunities to obtain experience through the start-up and construction phase are of critical importance to ensure that the

						semi-skilled and unskilled positions can be filled from individuals (especially the youth) from the core communities (SPM area) as well as the wider district. • Job creation and training remains critical as there is still a high unemployment rate within the local communities even with all the mining activities undertaken in the area. The reason being that the local community members do not have the necessary skills to be easily employable. Training should thus be focused on mining related skills. • The general practice would be that if a mining company is not able to appoint a local person with the necessary skills, they would employ an "outsider". • A recruitment policy should be adopted to enhance positive employment impacts, limit in-migration of outside jobseekers and mitigate the potential impact of residual in-migration. • Kimcrush should clearly

						communicate their anticipated employment figures and job categories to the communities. • Employees should be properly informed of the skills development programmes of The Kimcrush and how they can be involved in these programmes. • 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, and the SPM.
	Community and Institutional Activities Local Economic Contribution	Medium Positive	Probable	Operational	High Positive Regional	• Focused programmes aimed at building SMME links to the mine could supplement the indirect economic benefits to the local communities. • The mine should adopt a Procurement Plan whereby they aim to provide SMME's with the opportunity to become involved in the procurement of capital goods, consumables and services.

						This Plan should be implemented in conjunction with the local municipality and local development programmes in the surrounding communities. These programmes could focus on providing support and technical advice to entrepreneurs and/or SMMEs to enable them to supply goods and materials for operations at the future mine
	Capacity Building and Skills Training	Medium Positive	Probable	Operational	High Positive Regional	• A community skills database audit could be undertaken. Alternatively the existing Sol Plaatje Labour Desk could be used to determine which skills are available and which employees should undergo further training and skills development. • The findings of the community skills database should determine and contribute to the specific type and level of training interventions to be provided during the operational life of the mine. • Training and career path plans must be focused on mining related skills. Progress in this

						regard should be monitored on an annual basis. • In-house training through learnerships to fill the hard-to-fill vacancies would be crucial for long term capacity building and skills development within the core and affected communities • Sectors for portable skills training should also be identified in consultation with the SPM to ensure the transfer of applicable skills relevant at the time of downscaling. • Women should also benefit from the skills training programmes.
	Social Development and social services support	Medium Positive	Probable	Operational	High Positive Regional	• Involvement in upliftment programmes should be done according to the priority needs and projects identified as part of the SPM IDP, as well as in consultation with other stakeholders such as the local community representatives, traditional leaderships and youth organisations. • Focus involvement on the existing LED programmes and/or existing community development projects

						undertaken in the area. • Community development projects initiated by Kimcrush should avoid benefiting only a selected few but should follow a broad based approach, still taking budget constraints into consideration.
	Conflicts between local residents and newcomers Impact on social networks	Low Negative	Probable	Operational	Low Negative Local	• Maximise the employment of locals as far as possible • Make use of credible SMME's for the provision of goods and services • Embark on regular communication efforts towards the community with regards to the mine's involvement in the communities. This could be done through an established forum
	Individual and Family level impacts Impacts on daily living and movement patterns and family activities	Low Negative	Highly Probable	Operational	Low Negative Local	• Maximise the employment of local labour to limit the negative impacts on the infrastructure and services within the area • The applicant should enter into discussions with the local municipality to indicate their employment profile in order to determine the need for housing and the additional

						pressure it would place on the existing infrastructure and services. • 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.
	Impact on Sol Plaatje Local Municipality	Low Positive	Probable	Operational	Low Positive Regional	• Assist the SPM with the diversification of the local economy • Emphasise the use of local service providers (BEE) and focus on the development of LED programmes • Institute a joint municipal coordinating and implementing committee to support the municipalities' local economic and social develop needs and requirements, where feasible • Ensure that mine employees do have access to proper housing facilities
	Health and safety	Low	Highly	Operational	Low Negative	• The general health of

	risks	Negative	Probable		Local	employees should be monitoring on an on-going basis • EMP Guidelines should be strictly adhered to and international best practice should be sought
	Community Infrastructure Needs Impact on Infrastructure	Low Negative	Probable	Operational	Low Negative Local	• The establishment of a bus transport service for employees would limit negative impacts on the road network and traffic volumes.
	Intrusion Impacts Visual Impact and Sense of Place	Low Negative	Highly Probable	Operational	Low Negative Local	• Recommendations and mitigation measures as part of the EMP should be strictly implemented. • Mining areas should be rehabilitated as soon as the Mining Works Programme allows
	Noise Impact	Low Negative	Probable	Operational	Low Negative Local	• Recommendations and mitigation measures proposed by the Noise Impact Assessment should be strictly implemented • 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	Low Negative	Highly probable	Decommissioning	Low Negative Local	• Downscaling of production should be undertaken over a period of time. • Downscaling and

	experienced during decommissioning (closure of the mine) could include the following: 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; A decline in the local economy would also have a direct impact on the financial status of the affected local municipalities; Negative impact on the revenue base of the local municipalities; Population changes					retrenchment of contractor and permanent staff should be done over a period of time. • 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

	and out-migration of people from the area; Negative impact on the social fabric and social networks; A new class of jobseekers targeting other mines in the area; Decrease in the quality of life of the surrounding communities due to the discontinuation of social development support and local economic development programmes; Possible relocation of families; Skilled workers moving out of the area in search of employment elsewhere; Negative impact on infrastructure development and maintenance; A change in					

	community infrastructure; Disruptions and nuisance factors associated with the actual decommissioning such as noise, visual and traffic related impacts; Increased safety risks associated with the decommissioning of the infrastructure; 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.					
Interested and Affected Parties	Loss of trust and a good standing relationship between the IAP's and the mining company.	Low to medium	Possible	Construction, Operational and Decommissioning	Low Local	Ensure continuous and transparent communication with IAP's

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**

Impact Assessment

Before the impact assessment could be done the different project Activities/infrastructure components were identified.

The following infrastructure will be established and will be associated with the mining operation:

- Crushing plant:
  The weathered dolerite is hauled to a screen to screen the gravel to size Oversize weathered dolerite is crushed and screened. Screened gravel is stockpiled and sold to customers who either collect from site or it is delivered to the customer worksite.

  After stripping the competent dolerite is drilled and blasted by blasting contractors. After blasting the dolerite is loaded and hauled to the crushing plant where the dolerite is crushed to various sizes of aggregate. The aggregate generated are ballast, crusher sand, crusher dust, 19mm, 13mm, 9.5mm and 6.7mm stone.

  The equipment used is excavators, articulated dump trucks, tipper trucks, jaw crusher, cone crusher VSI crusher, conveyer belt systems and generators.

- Explosive Magazine:
  The mine will need two magazines to store the different explosive products namely:
  - 200 case detonator ad accessories magazine (3 meter x 6 meter)
  - 200 case explosives magazine (3 meter x 6 meter)

  The magazine area will be fenced to comply with the guidelines set out by the Chief inspector of Explosives (CIE). The fence must be further than 10 meter away from the magazine.

  The CIE determines the safety radius necessary, but the typical approved radiuses have been 90 meter for the inner radius & 180 for the outer radius.

  No structures are allowed in the area contained by the inner radius and only structures approved by the CIE.

  The construction of the magazines and the safety and security measures for the magazines and the magazine area are regulated by the Explosives Act.

- Ablution Facilities: A Park home or brick building 25m²

- Clean & Dirty water system:
  It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.

- Concrete Bund walls and diesel Depots 250m²
  Fuel Storage facility (Diesel tanks):

It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.

- Re-fuel and lube station.
- Mining Area (Pit in mining area):
  The mining process will be initiated by drilling of blast holes. These holes will then be blasted where after the aggregate will be loaded from the open excavations and hauled to the crushing plant.
- Generator:
  The mine infrastructure plan made provision for a brick building that will house the generators for power generation on site.
- Parkhome offices (±60m²) and Office Parking Bay:
  It is anticipated that vegetation will be cleared in this area and superfine material will be used as groundcover for the parking.
- Roads (both access and haulage road on the mine site):
  Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 2 km of roads, with a width of 15 meters. The width of the road is based on an operating width of the haul trucks of 5 meters.
- Salvage yard (Storage and laydown area) .
- Overburden Stockpiles
- Topsoil storage area (temporary): Topsoil dumps X3.
- Waste disposal site (domestic and industrial waste):
  It is anticipated that the operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area:
  - Small amounts of low level hazardous waste in suitable receptacles;.
  - Domestic waste;.
  - Industrial waste.
- Temporary Workshop and Wash Bay Facilities (300m²) and Storage Facilities (3000m²).
- Water distribution Pipeline.
- Water tank:
  It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.
- Weighbridge.
- Weighbridge control room: – Mobile container.

The criteria used to assess the significance of the impacts are shown in the table 7 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 8: 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 made the following evaluation criteria need to be described.

Table 9: 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 10: 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 **Postmasburg area**
4	Regional/District **Regional**	Direct and Indirect impacts affecting environmental elements within District **(ZF-Mgcawu District)**
5	**Provincial**	Direct and Indirect impacts affecting environmental elements in the **Northern Cape Province**

Table 11: 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 12: 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.

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/dumps will alter the topography by adding features to the landscape. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. 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

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered)

Geology and mineral resource

Level of risk: Very low

Mitigation measures

- Ensure that optimal use is made of the available mineral resource through proper planning.
- The mining of aggregate should be well planned and all infrastructure positions should be selected with the main aim of avoiding sterilization of future resources.
- No dumping of materials prior to approval by mine manager.

Topography

Level of risk: Low-Medium

Mitigation measures

- Mining continuously with backfilling if possible, otherwise when space to backfill becomes available;
- Employ effective rehabilitation strategies to restore surface topography of and controlled dumping and plant site;
- Stabilise the mine residue deposits;
- All temporary infrastructures should be demolished during closure.

Soil erosion

Level of risk: Medium

Mitigation measures

- 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 minimised in terms of the surface area and duration, wherever possible;
- The soil that is stockpiled during construction 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;
- 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;
- The mining operation should avoid land with steep slopes;
- Dust suppression should take place;
- 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;
- 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.

Soil pollution

Level of risk: Low

Mitigation measures

- 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.

Land capability and land use

Level of risk: Low

Mitigation measures

- Ensure that optimal use is made of the available land through consultation with land owner and proper planning of mining activities.
- Employ effective rehabilitation strategies to restore land capability and land use potential of the mining area.
- All activities to be restricted within the demarcated areas.

Ground water

Level of risk: Low

Mitigation measures

- Training and awareness
    - Make all employees aware of water conservation/water demand management, water pollution avoidance and minimization measures reporting procedure and registry of incidents.
    - Train all employees to reduce water consumption.
    - Make one (1) individual person at a management level responsible for the management of the overall mine water balance. Train departmental heads in the managing of water balance, water pollution and water conservation within their sectors.
    - Train all employees in the implementation of standard operating procedures (SOP's) (e.g. hydrocarbon management, sewerage plant management, monitoring and record keeping).
- Minimise and manage the loss in water resource
- Allow for a safe working environment
- Reduce Waste Material Oxidation Potential
    - Stockpile areas should be cleared as quickly as possible;
    - Continuous monitoring of runoff water quality.

Surface water

Level of risk: Low

Mitigation measures

- Sufficient care must be taken when handling hazardous materials to prevent pollution.
- If servicing and washing of the vehicles occur on site, there must be specific areas constructed for these activities, which must have concrete foundations, bunding as well as oil traps to contain any spillages.
- A walled concrete platform, dedicated store with adequate flooring or bermed area and ventilation must be used to accommodate chemicals such as fuels, oils, paints, herbicide and insecticides.
- Oil residue shall be treated with oil absorbent and this material removed to an approved waste site.
- Spill kits must be easily accessible and workers must undergo induction regarding the use thereof.
- At all times care should be taken not to contaminate surface water resources.
- Provide bins for staff at appropriate locations, particularly where food is consumed.
- The mining site should be cleaned daily and litter removed.
- Conduct ongoing staff awareness programmes in order to reinforce the need to avoid littering, which can contribute to surface water pollution.
- Only environmental friendly materials must be used during the construction phase to minimize pollution of surface water runoff and/or underground water resources.
- Pipe leakages should be minimized.
- 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.

Indigenous flora

Level of risk: Low to medium

Mitigation measures

- 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.
- Minimise the footprint of transformation

- Encourage proper rehabilitation of mined 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;

Alien invasive plants

Level of risk: Low-Medium

Mitigation measures

- 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

Level of risk: Low

Mitigation measures

- 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). No construction personnel or vehicles may leave the demarcated area except those authorized to do so. Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors.
- 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.

- 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 habitats and minimise the overall mining footprint.
- The 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

Habitat

Level of risk: High

Mitigation measures

- 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). No construction personnel or vehicles may leave the demarcated area except those authorised to do so.

Air quality

Level of risk: Low-Medium

Mitigation measures

- Vegetation must be removed when soil stripping is required only. These areas should be limited to include those areas required for mining only, hereby reducing the surface area exposed to wind erosion. Adequate demarcation of these areas should be undertaken.
- Control options pertaining to topsoil removal, loading and dumping are generally limited to wet suppression.
- Where it is logistically possible, control methods for gravel roads should be utilised to reduce the re-suspension of particulates. Feasible methods include wet suppression, avoidance of unnecessary traffic, speed control and avoidance of track-on of material onto paved and treated roads.
- The length of time where open areas are exposed should be restricted. Mining should not be delayed after vegetation has been cleared and topsoil removed.
- Dust suppression methods should, where logistically possible, must be implemented at all areas that may / are exposed for long periods of time.
- For all mining activities management should undertake to implement health measures in terms of personal dust exposure, for all its employees:
    - Speed limits;
    - Spraying of surfaces with water;
    - Backfilling of excavations where possible and rehabilitation of disturbed areas; and

Noise and vibration

Level of risk: Medium

Mitigation measures

- Machinery with low noise levels which complies with the manufacturer's specifications to be used.
- Construction activities to take place during daytime period only.
- Noise monitoring on a quarterly basis.
- Vehicles to comply with manufacturers' specifications and any activity which will exceed 90.0dBA to be done during daytime only.
- Emergency generators to be placed in such a manner that it is away from any residential area.
- Noise monitoring to be done along the mine footprint and noise sources within the mine boundary on a monthly basis after which the frequency can change to a quarterly basis.
- The siren when conveyor, hauling vehicles area reversing and/or any other mine vehicle to be replaced with a vibrating type siren if it is approved by the Department of Labour.
- Haul roads to be levelled on a regular basis to avoid the formation of potholes.
- Actively manage the process and the noise management plan must be used to ensure compliance to the noise regulations and/or standards. The levels to be evaluated in terms of the baseline noise levels.
- Actively manage the process and noise and vibration impact assessment to determine compliance to the noise regulations and/or vibration standards. The levels to be evaluated in terms of the baseline noise levels.

Visual impacts

Level of risk: Low Medium

Mitigation measures

Mitigation measures may be considered in two categories:

- Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered; and

- Secondary measures designed to specifically address the remaining negative effects of the final development proposals:

- Primary measures that will be implemented should mainly be measures that minimise the visual impact by softening the visibility of the mining activities, by "blending" with the surrounding areas. Such measures will include rehabilitation of the disturbed area, such as the dumps by re-vegetation of the area and using an aesthetically pleasing design for the proposed development.

- During the construction phase the following mitigation measures should be implemented to minimise the visual impact.
- Ensure that the design fits into the surrounding environment and it is aesthetically pleasing.
- Reduce the construction period through careful planning and productive implementation of resources.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter and disused construction materials are managed and removed regularly.
- Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way.
- Reduce and control construction dust emitting activities through the use of approved dust suppression techniques; and
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting or restrict lighting to certain areas.
- During operational phase, the following mitigation measures should be implemented to minimise the visual impact.
- 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 and road safety

Level of risk: Low

Mitigation measures

- Implement measures that ensure the adherence to traffic rules.

Heritage resources

Level of risk: Low

Mitigation measures

- 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.

Socio-economic

Level of risk: Low-Medium

Mitigation measures

In order to ensure that negative impacts are minimised and positives are enhanced, the following is recommended:

- Implement the mitigation measures as proposed in this report.
- As job creation is one of the most pressing socio-economic needs in the local community, through the development of Kimcrush mine should focus on SMME development and related local job creation, whilst considering the limitations of the available local skills.
- Kimcrush should assist their employees to find suitable housing in the towns surrounding the mining area to limit additional impacts on the provision of services and infrastructure by the SPM.
- Assistance in terms of skills development for those that would be employed during the start-up and construction phases of the project, as well as for permanent employees during the operational phase of the project would be necessary. Education is critical to sustain the socio-economic development of the community members living in the area. Continued support for training and capacity building thus remain important.
- Possible SMME links to the mine should be pursued to maximise local business benefits;
- The establishment of a management and monitoring committee to deal with increased social pressure on the local area, as well as increased pressure on the infrastructure and services provision is recommended. Such a committee should not only consist of representatives of Kimcrush, but all the mining companies operating in the area together with representatives from the Sol Plaatje Local Municipality.
- The development and execution of the Social and Labour Plan should be done in consultation with the Sol Plaatje Local Municipality.
- Kimcrush should communicate and present their involvement in the community (goodwill, social responsibility, capacity building programmes, skills development, general development support and so forth) to obtain community support.
- Ensuring continued contact and communication between Kimcrush Mine, the Sol Plaatje Local Municipality, and local community leaders, as well as nearby landowners is critical, especially during the start-up and construction phase, but should also continue for the life of mine.

Interested and affected parties

Level of risk: Medium

Mitigation measures

- Maintain active communication with IAPs.
- Ensure transparent communication with IAPs at all times.
- IAPs must be kept up to date on any changes in the mining operation.

- 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.

ix) Motivation where no alternative sites were considered

No alternative location for the proposed mining operation was considered, as the aggregate resource is in this area. There is therefore no other alternative with regard to the overall operation footprint.

x) Statement motivating the alternative development location within the overall site (Provide a statement motivating the final site layout that is proposed)

Not applicable. There is no alternative development location for the site as this is the area with the mineable resource.

h) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity (Including (i) a description of all environmental issues and risks that are identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures)

Not applicable. There is no 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).

i) 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)

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	SIGNIFICANCE IF MITIGATION
Explosive Magazine:	Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Medium	Access control Maintenance of Explosive Magazine Dust control and monitoring Noise and vibration control and monitoring Storm water run-off control Rip disturbed areas to allow re-growth of vegetation cover Noise control	Medium
Crushing Plant:	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Medium	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound	Medium

					power levels; Installing suitable mufflers on engine exhausts and compressor components; Installing acoustic enclosures for equipment causing radiating noise; Installing vibration isolation for mechanical equipment; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	
Ablution Facilities Chemical Toilets	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of sewage facilities on a regular basis.	Very Low
Clean & Dirty water systems:	Surface disturbance Soil contamination Surface water contamination	Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Low	It will be necessary to divert storm water around dumps areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage areas. Reclaimed dumps, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-	Low

					vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipes will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible.	
Concrete Bund walls and diesel Depots 250m² Fuel Storage facility (Diesel tanks): Re-fuel and lube station.	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. 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	Low

					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.	
Mining Area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	Medium	Access control Dust control and monitoring Noise and vibration control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays MRD stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Installing acoustic enclosures for equipment causing radiating noise; Installing vibration isolation for mechanical equipment; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	Low

					Minimizing – unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, etc. Effluents and waste should be recycling and re-use as far as possible. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). No construction personnel or vehicles may leave the demarcated area except those authorized to do so. Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors. 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. 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 minimise the overall mining footprint. The 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	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Low

	Surface water contamination					
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Medium	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Installing acoustic enclosures for equipment causing radiating noise; Installing vibration isolation for mechanical equipment; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints.	Low
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Low

Roads (both access and haulage road on the mine site):	Dust Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air quality Fauna Flora Groundwater Noise and vibration Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Installing acoustic enclosures for equipment causing radiating noise; Installing vibration isolation for mechanical equipment; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. 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.	Low
Temporary	Groundwater	Groundwater	Construction	Medium	Concrete floor with oil/water separator	Low

Workshop Facilities and Wash bay	contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Soil Surface water	Commissioning Operational Decommissioning Closure		Storm water run-off control Immediately clean hydrocarbon spills	
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Monitor pipeline for water leaks Maintenance of pipeline 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.	Low
Water tanks: 1. X 10 000 litre water tanks and purifiers for potable water.	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintain water tanks and structures	Low

j) Summary of specialist reports

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):-

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS HTAT 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
ECOLOGICAL ASSESSMENT REPORT KIMCRUSH (Pty) Ltd Vooruitzigt Dolerite Mine **August 2017** **By Boscia Ecological Consulting cc** **Mr Clayton Weatherall-Thomas Tasks: Field and impact assessment Qualifications: MSc Botany (Nelson Mandela Metropolitan University), BSc (Hons) Botany (Nelson Mandela Metropolitan University)** **Dr Elizabeth (Betsie) Milne Tasks: Project coordination, assessment review and final collation Qualifications: PhD Botany (Nelson Mandela Metropolitan University), Masters Environmental Management (University of the Free State), BTech Nature Conservation (Tshwane University of Technology)**	Three plant communities were identified on site of which the open woodland communities in the west is included in the core mining area and considered to be of high sensitivity. The secondary woodland in the east is considered to be of medium sensitivity, while the transformed areas are of low sensitivity. The most profound impacts are expected to be related to the loss of indigenous vegetation, especially species of conservation concern. Species of conservation concern that are found in the earmarked habitat include Vachellia erioloba, Harpagophytum procumbens, Pelargonium aridum and Babiana bainesii. Similarly, the mining operation will result in the large-scale clearance of indigenous vegetation. Permit applications regarding protected flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation. Similarly, if any of the Vachellia erioloba trees are to be affected, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries three months prior to any potential disturbances to these trees. To conclude, it is clear that the destruction of the natural habitat within the study area is inevitable. The significance of the impacts will be affected by the success of the mitigation measures implemented and the rehabilitation programme for the mining area. In my opinion, authorisation can be granted if the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures.	X	Contained in the mitigation measures and EMPR

Annexure B			
PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEONTOLOGICAL ASSESSMENT) REQUESTED IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR A MINING RIGHT ON A PORTION OF PORTION 1 & PORTION OF PORTION 351 OF FARM VOORUITZIGT 81 KIMBERLEY DISTRICT, NORTHERN CAPE PROVINCE Prepared by Edward Matenga (MPhil, Archaeology; PhD Archaeology &Heritage, Uppsala/Sweden)	No heritage resources were found during the survey. This gives the project a green light to go ahead. If heritage resources are to be found during the prospecting or mining phases, the procedure is to approach the relevant heritage authorities (SAHRA and/or the Provincial Heritage Resources Authority) and a heritage expert will be called to attend.	X	Contained in the mitigation measures and EMPR
Annexure C			
PALAEONTOLOGICAL ASSESSMENT (DESKTOP) REQUESTED IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR A MINING RIGHT ON A PORTION OF PORTION 1 & PORTION OF PORTION 351 OF FARM VOORUITZIGT 81 KIMBERLEY DISTRICT, NORTHERN CAPE PROVINCE Prepared by Joseph Chikumbirike (PhD Palaeontology,	The proposed mining intends to exploit the unfossiliferous Karoo dolerite rock which underlies the project area under a cover of Gordonia Formation sandy red soils. It is unlikely that fossiliferous Dwyka or Ecca formations will be affected. The affected Gordonia Formation is of low palaeontological sensitivity. Besides the fact that the impact of the proposed development on fossil resources is expected to be minimal, it is recommended that the Environmental Control Officer (ECO) puts in place a contingency plan to rescue chance finds and where possible preserve them in situ. It is further advised that the recommendationsmade here should also be incorporated into the EnvironmentalManagement Plan (EMP) for the proposed mining operations. A standard Fossil Finds Procedure (FFP) has been drafted by Heritage Western Cape and is appended to this report to provide field guidance to the ECO.	X	Contained in the mitigation measures and EMPR

University of the Witwatersrand) **Annexure D**			
Fossil finds procedure appended to the PIA. **Annexure E**	Besides the fact that the impact of the proposed development on fossil resources is expected to be minimal, it is recommended that the Environmental Control Officer (ECO) puts in place a contingency plan to rescue chance finds and where possible preserve them in situ. It is further advised that the recommendationsmade here should also be incorporated into the EnvironmentalManagement Plan (EMP) for the proposed mining operations. A standard Fossil Finds Procedure (FFP) has been drafted by Heritage Western Cape and is appended to this report to provide field guidance to the ECO.		
GEOHYDROLOGICAL STUDY FOR THE KIMCRUSH VOORUITZICHT DOLERITE MINE For WADALA MINING AND CONSULTING By GHT CONSULTING PROJECT TEAM L.J van Niekerk & D.C. Moolman Project No.: 369-26-GHD.804, October 2017 Report No.: RVN804.1/1794 **Annexure F**	It can be concluded that the surface water sites S01 and S02 located in the northern and southern pit respectively is groundwater seeping into the pit areas as the groundwater levels are between 6 and 16mbgl. It is recommended that at least 2 monitoring boreholes (upstream and downstream) must be drilled to evaluate the potential yield of the local aquifer, geological permeabilities and the effect the dewatering of the pits may have on the local water level and aquifer. Water quality monitoring can also be done at these boreholes.		

Attach copies of the Specialist Reports as appendices (All studies attached as Annexures from A – F)

k) Environmental impact statement

(i) Summary of the key findings of the environmental impact assessment;

- The Crushing plant may have a medium impact on air quality, fauna, flora, noise, soil and surface water after mitigation.
- The Ablution facilities will have a very low impact on groundwater and soil in case of an emergency spill after mitigation.
- The Clean & Dirty water systems may have a low impact on groundwater, soil and surface water after mitigation.
- The Fuel Storage facility (Diesel tanks) may have a low impact on groundwater, soil, and surface water after mitigation.
- The Mining Area may have a medium impact on air quality fauna, flora, noise, soil, surface water and topography after mitigation.
- The Salvage yard (Storage and laydown area) may have a low impact on fauna, flora, groundwater, soil and surface water after mitigation.
- The Security Gate and guard house at access control point may have a low impact on air quality, fauna, flora and soil after mitigation.
- The Product Stockpile area may have a low impact on air quality, fauna, flora, noise, soil and surface water after mitigation.
- The waste disposal site (domestic and industrial waste) may have a low impact on groundwater, soil, and surface water after mitigation.
- The Roads (both access and haulage road on the mine site) may have a low impact on air quality, fauna, flora, noise, soil and surface water after mitigation.
- The Workshop and Wash bay may have a low impact on groundwater, soil and surface water after mitigation.
- The Water distribution Pipeline may have a low impact on fauna, flora, and surface water after mitigation.
- The Water tanks may have a low impact on fauna, flora, and surface water after mitigation.

From the assessment of impacts throughout all the phases it is clear that though the impacts may occur directly as a result of the proposed start in mining operations, the impacts are mostly of medium significance before mitigation. According to the assessment carried out by the EAP the majority of the impacts can be reduced to a low significance with the appropriate mitigation measures in place.

The EAPs and environmental consultants responsible for the compilation of this document, and the associated PPP are of the opinion based on the presented specialist assessments and impact assessment that the Environmental Authorization application should be authorised.

The following mitigation measures are crucial and should form part of the environmental authorisation to ensure that the applicant manages impacts adequately:

- Adhere to the approved Environmental Management Programme
- Adhere to the Emergency procedures Report and implement spill clean-up procedures
- Apply for relevant permits with authorities for the removal of indigenous tree species and indigenous vegetation if applicable.
- Major spills should be reported within 24hr to the Department of Water and Sanitation and the NCDENC.

The nature of impacts can vary widely depending on the type of physical environment, the size of the 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.

In general, the environmental impacts associated to the mining operation are rather negative, while the social impacts are more beneficial. Impacts on vegetation are likely to be most profound, because the mining operation will constitute large-scale clearance of indigenous vegetation and most likely also the removal of protected species if any are encountered. The specialist study indicated no protected species. Soil erosion and surface water deterioration are likely to be possible important impacts if appropriate management strategies are not practised.

Positive impacts include the eradication of alien invasive species. Positive social impacts include the creation of jobs, social upliftment, training opportunities, community development and numerous economic benefits.

To conclude, it must be accepted that any activities will have both physical and social impacts. Therefore the destruction of the natural environmental features within the mining area is inevitable. The significance of the impacts will however be affected by the success of the mitigation measures implemented and the rehabilitation programme for the mining area.

(ii) Final Site Map;

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicated any areas that should be avoided, including buffers. Attach as **Appendix (Figure 15)**

The final site map below indicates the mining right application area in which all mining will take place. Existing roads are also depicted. The associated infrastructure relating to the mining site is also indicated.

The only other buffers that must be implemented is the 100m away from any fixed infrastructure like the roads that runs on the perimeter of the farm 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 a 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, dams, waste dumps, or any other structure whatsoever including such structures 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;

Please see Final Site Map below.

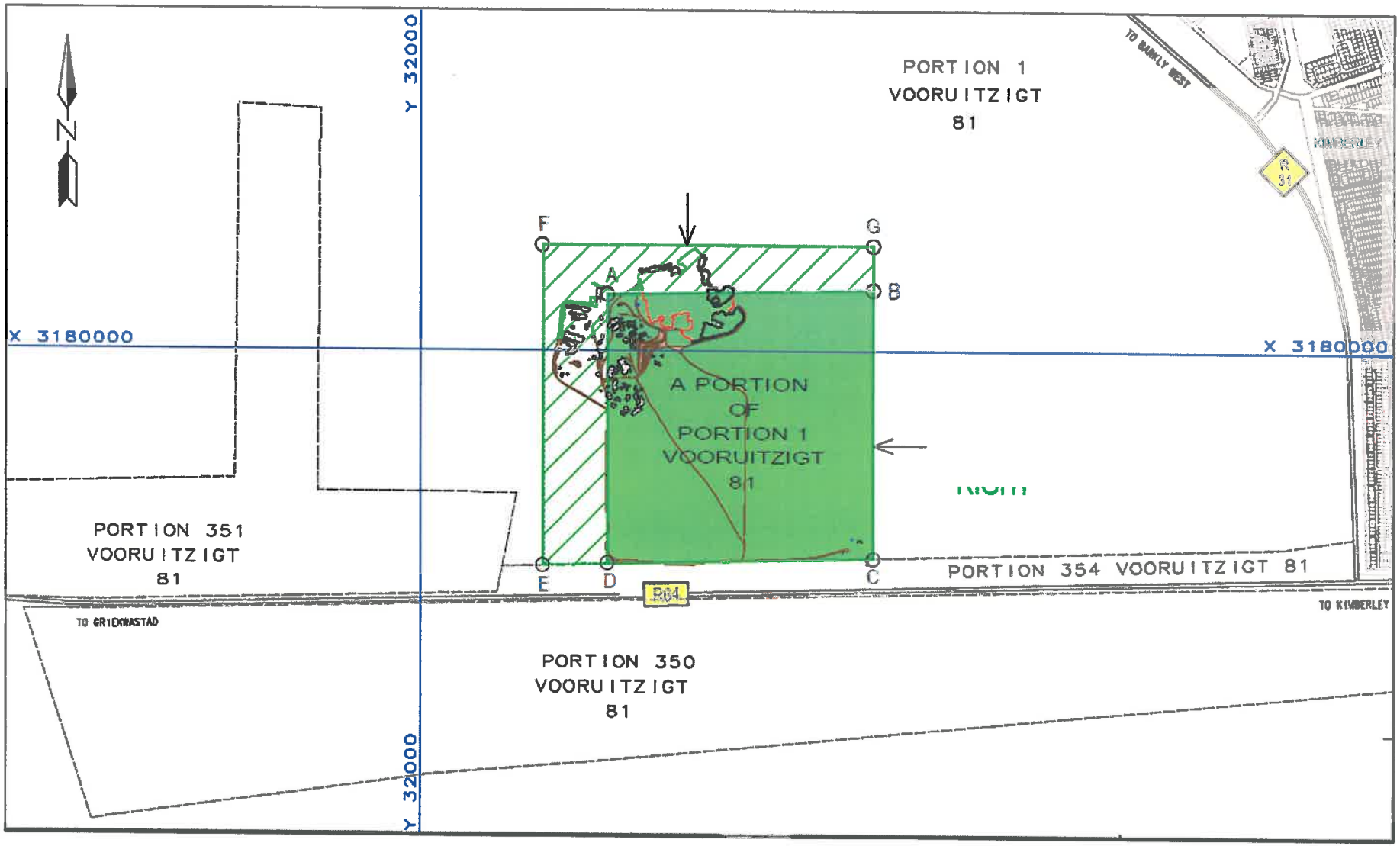


Figure 13. Final Site Surface layout map.

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

As mentioned before, the specific occurrence of dolerite, gravel, sand and clay in the area dictates the selection of the specific mining site and there are no alternatives in terms of project location.

In terms of alternative land use, the proposed mining operation will be done in such a way that residential living and (grazing) will still be possible as the site will be rehabilitated in such a way that it allows the establishment of grass cover again.

The mining operation will provide 31 jobs and will also add to the increased economic activity and the area surrounding the mine.

The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration.

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. However the site layout plan has been developed not to place any infrastructure where resource materials could be located. The infrastructure and stockpiles/dumps will alter the topography by adding features to the landscape. Topsoil removal and Mine Residue Dumps will change the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and backfilling of excavations, 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

grazing activities can still be performed in areas not earmarked for the operation, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be directly 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.

The transformation of natural habitats to mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise and vibration due to operational activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates.

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, activities on the residential areas 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.

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.

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.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and operation-related businesses.

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.

In terms of the Social Impact Assessment findings derived from the information available at this stage it is concluded that the likely benefits of the proposed project outweigh the potential social risks and/or threats to the local communities. However, as indicated earlier in the report, the possible impact on the infrastructure and service needs due to the inflow of an additional workforce should be addressed. It would remain the responsibility of the Local Municipality, but considering the social framework within which the mine operates, it is important for the mine to engage with the SPM in this regard to minimise any possible negative impacts. Such engagement should also contribute to meaningful contributions to the communities situated in close proximity to the mine.

It is furthermore important to ensure that any negative impacts as a result of the mining activities on the nearby residents should be limited.
The mining activities and associated infrastructure by itself will thus not introduce new social risks and hazards, but only increase the probability and scale of those already associated with the existing mining activities
On a more detailed level, the following **positive** impacts are anticipated:

- The creation of job opportunities in the area, and associated local economic development;
- Support to the Local Municipality in respect of service delivery and infrastructure development/maintenance through the implementation of the Social and Labour Plan of Kimcrush ;
- Economic and revenue contribution to the local municipal area, as well as the Frances Baard District and adjacent municipalities;
- The involvement of Kimcrush with regards to training and capacity building of its employees and subsequent improvement of the livelihoods of the employees' families, as well as its efforts in sustaining the socio-economic development of the communities in close proximity to the operation;
- The involvement of Kimcrush with regards to social development projects and support through the Integrated Development Plans (IDPs);
- The positive impact of mining activity on the regional and local economy; and
- Positive impact of extensive local procurement focus.

Negative impacts as a result of the mining activity refer to:

- Inconvenience and intrusion impacts during the start-up and construction phases of the project such as the inflow of an additional workforce to the area, the possible influx of jobseekers, possible increase in the criminal activities (safety and security issues), disruption of social networks, as well as possible health risks;
- Disruptions in the daily living and movement patterns (increased traffic and possible dust pollution);
- Additional pressure on infrastructure development and maintenance;
- General intrusion impacts such as visual and noise pollution

From a social perspective it can be concluded that the proposed Kimcrush Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMPR are adhered to e.g. ongoing environmental management and rehabilitation once the mine reaches its end of life.

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

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as conditions of authorisation.

Air Quality

- To limit the creation of nuisance dust the following management guidelines must be followed:
- Avoidance of unnecessary removal of vegetation.
- Routine spraying of unpaved site areas and roads utilized by the mining operation with water.
- Speed limits of vehicles inside the mining area must be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used.
- Continuous dumping and rehabilitation of disturbed areas.
- All cleared, disturbed or exposed areas must be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.

Archaeology:

- All operators of equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered:
    - All construction in the immediate vicinity (50m radius of the site) should cease.
    - The heritage practitioner should be informed as soon as possible.
    - In the event of obvious human remains the SAPS should be notified.
    - Mitigation measures (such as refilling) should not be attempted.
    - The area in a 50m radius of the find should be cordoned off with hazard tape.
    - Public access should be limited.
    - No media statement should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.

Fauna

- To ensure a minimum of impact to animals the following management guidelines will be followed:
    - Speed limits of vehicles inside the application area must be strictly controlled to avoid road kills.
    - Continuous controlled dumping of waste material.
    - Operational areas must be low angled as a preventative measure to ensure an escape route for animals.
    - No hunting (snares) must be allowed at the application area or in the surrounding area.
    - All mining and access roads must be fenced.

Flora

- No trees or shrubs must be felled or damaged for the purpose of obtaining firewood.
- Management must take responsibility to control declared invader or exotic species on the site. The following control methods must be used:
    - 'The plants will be uprooted, felled or cut off and can be destroyed completely.'
    - The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide.

- Valid permits from DAFF must be obtained before any protected plant species are removed or damaged if encountered.
- Continuous controlled dumping and spreading of previously stored topsoil over the rehabilitated areas.
- All rehabilitated areas, where applicable and possible must be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to mining activities commenced if the natural succession of vegetation is unacceptably slow.
- Fires may only be allowed in facilities or equipment specially constructed for this purpose.
- The end objective of the re-vegetation program must be to achieve a stable self-sustaining habitat unit.

Groundwater

- Vehicle- and equipment maintenance must only be allowed within the maintenance area. Only emergency breakdowns may be allowed in other areas.
- The following procedure must be followed if a vehicle or piece of equipment would break down inside an excavation and outside of the maintenance area.
    - Drip pans must be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.
    - All efforts must be made to move the broken down vehicle or piece of equipment to the maintenance area.
    - If the vehicle/piece of equipment cannot be moved, the broken part must firstly be drained of all fluid. The part must then be removed and taken to the maintenance area.
- No repairs may be allowed outside the maintenance area except for emergencies.
- Equipment used as part of the proposed operation must be adequately maintained so as to ensure that the oil, diesel, grease or hydraulic fluid does not leak during the operation.
- Fuel and other petrochemicals must be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, must be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall must be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater).
- Proper sanitation facilities must be provided for employees. No person may pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine.
- Acceptable hygienic and aesthetic practices must be adhered to.
- The workshops, washing bays and sewage tanks should be constructed far away from significant aquifer systems.
- SOP for storage, handling and transport of different hazardous materials.
- Place oil traps (drip trays) under stationary vehicles, only re-fuel al fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only.
- Ensure good housekeeping rules.

Noise

- Working hours must be kept between sunrise and sunset as far as possible.
- As a minimum, ambient noise levels emanating from the mining activities may not exceed 82dBA at the site boundary.
- The Company must comply with the Occupational Noise Regulations of the Occupational Health and Safety Act, Act 85 of 1993.
- The company must comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
- The management objective must be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area.
- When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABS 083 as amended, in any place at or in any mine or works where persons may travel or work exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level.
- Hearing protection must be provided to all employees where attenuation cannot be implemented.
- If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.

Mechanical equipment

- All mechanical equipment must be in good working order and vehicles must adhere to the relevant noise requirements of the Road Traffic Act.
- All vehicles in operation must be equipped with a silencer on its exhaust system.
- Safety measures, which generate noise such as reverse gear alarms on large vehicles, must be appropriately calibrated / adjusted.

Screening / Migration Control:

- Appropriate measures must be specifically being installed and / or employed at the plant to act as screen and to reflect/reduce the noise.
- Appropriate non-metallic washers/insulation must be used with any joining of apparatus made from materials such as corrugated iron. Such apparatus must be maintained in a fixed position.

Safety

- No employees may reside on the mine site.
- Access and haul roads must be maintained.
- Security access point to ensure monitoring of access to the site.

Soil

- In all places of development the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil must be removed where possible, from all areas where physical disturbance of the surface will occur.

- In all areas where the above growth medium will be impacted on, it must be removed and stockpiled on a dedicated area. The maximum height of stockpiles may not exceed 2 meters.
- The growth medium/topsoil must be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.
- If any soil is contaminated during the life of the mining area, it must either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company.
- Erosion control in the form of re-vegetation and contouring of slopes must be implemented on disturbed areas in and around the site.
- Topsoil must be kept separate from overburden and may not be used for building or maintenance of access roads.
- The stored topsoil must be adequately protected from being blown away or being eroded.
- Compacted areas must be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation.
- Vehicle movement must be confined to establish roads for as far as practical in order to prevent the compaction of soils.

Surface water

- The disposal of oil, grease and related industrial waste must be transported to the stores area where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease must be removed on a regular basis from the operation by a registered approved contractor.
- All refuse and waste from the different sections must be handled according to NEMA Guidelines. Recycling of waste is encountered in all the consumer sections of the operation, where recyclable materials must be collected before dumping them in the domestic waste disposal area.
- All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap must be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.
- Erosion and storm water control measures must be implemented.
- An application for an integrated Water Use Licence must be submitted at the Department of Water Affairs for all actions to be performed which requires authorization in terms of water uses.
- Vehicle repairs must only take place within the maintenance area for vehicles. Repairs within open excavations must be limited to emergency break downs with drip trays.
- Re-fuelling must only take place in the re-fuelling area. If this is found not to be practical, drip trays must be used whenever re-fuelling takes place outside of this area.
- During rehabilitation the application must endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.

Topography

- All excavations must be rehabilitated if and when possible and made safe so as to reflect as far as possible the pre-mining topography of the area.
- All temporary features e.g. plant, containers and stockpiling must be removed and handled in the prescribed manner during rehabilitation.

Visual

- Security Lights must be fixed at an angle to ensure that it does not cause a disturbance to the surrounding environment at night
- Excavations must be subject to progressive controlled dumping and made safe (including the re-establishment of vegetation).
- Permanent structures or features that are part of the proposed mining operation must be kept neat and well presented.
- Waste material of any description must be removed from the mining area on a regular basis and be disposed of at a recognized landfill facility.

The impact management objectives for Kimcrush planned mining operation should include:

- To ensure efficient extraction of the dolerite, gravel, sand and clay and to prevent the sterilization of any dolerite, gravel, sand and clay reserves.
- To limit the alteration of the surrounding topography
- To manage and preserve soil types
- To prevent the loss of land capability
- To ensure the continuation of economically viable land use.
- To ensure that the surrounding ground water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quality of ground water resources.
- To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quantity and quality of ground water resources.
- Rehabilitation of disturbed areas during the mine life cycle as well as during closure phase has to be done to minimize erosion and/or pollution of natural streams.
- To contain soils and materials within demarcated areas and prevent contamination of storm water runoff.
- To minimise the loss of natural vegetation.
- To prevent the proliferation of alien invasive plants species.
- To protect the wildlife and bird species.
- To protect the natural habitat of wildlife and bird species.
- To maintain visual integrity; and to minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors.
- To minimise noise and vibration to a level that disturbances felt by the communities are limited.
- To reduce the impact on visual quality due to intrusive mine infrastructure, activities and facilities.
- To ensure that all traffic generated by the proposed mining development does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.

- To preserve possible historical and cultural artefacts located on site in compliance with the South African Heritage Resources Act, 1999 (Act No 25 of 1999).
- To ensure that the current socio-economic status quo is improved.
- To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties.

m) Final proposed alternatives

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

The locality of this Mining area is based on the **prospecting right** area, prospecting and bulk sampling has taken place on the area. The footprints of most infrastructures were chosen to utilize old disturbance and minimize new footprints. There is therefore no other alternative with regard to the overall operation footprint.

The location of the central mining site and associated infrastructure is primarily based on proximity to the access roads, proximity to the areas earmarked for mining and limited additional impact on the environment.

It will therefore cause additional impacts if this infrastructure is moved and render the consideration of alternative mining sites useless.

The mining activities and methodologies associated with mining of dolerite, gravel, sand and clay in dumps (i.e. dump workings) is the only economic viable method currently being used by the dolerite, gravel, sand and clay fraternity. There is no alternative mining method for the mining of dolerite, gravel, sand and clay.

n) Aspects for inclusion as conditions of Authorisation

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

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

(Which relate to the assessment and mitigation measure proposed)

The above mitigation measures are tried and tested over many years in the aggregate mining industry. The Company must monitor the potential impacts throughout the life of operation, and mitigate any deviations detected. This has been proven to be very effective in existing operations.

The EAP who compiled this document and the specialists who compiled the respective specialist reports have extensive knowledge in their field and it is therefore assumed that the above assumptions are adequate and that the information provided is correct.

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 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.

(1) Specific conditions to be included into the compilation and approval of EMPr

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

(2) Rehabilitation requirements

A Detailed rehabilitation plan will be appended to the EMPR. The Mine had to provide to the DMR, a financial rehabilitation guarantee to the amount as calculated in terms of the financial quantum Guideline and approved by the DMR.

Infrastructure areas

On completion of the mining operation, the various surfaces, including the access road, the office area, storage areas and the plant site, will finally be rehabilitated as follows: All other material on the surface will be removed to the original topsoil level where possible. This material will then be backfilled into any open pits. 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, plant, and other items used during the operational period will be removed from the site.

On completion of operations, all buildings, structures or objects on the office site will 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:

Water Quality Management in accordance with the South African Water Quality Guidelines must be adhered to in order to provide timely and accurate water data to the Department of Water and Sanitation (DWS) as well as to manage impacts caused by the activity. Specific objectives of such a program are to:

- Determine whether water quality comply with water quality standards.
- Provide timely data for intervention as and when required.
- Assess the status of water quality in the surrounding areas.
- Provide analytical water quality information describing trends (present conditions and changes).

The objectives are to limit the adverse effect of pollutants in the water resource. The setting of in-stream Resource Water Quality Objectives (RWQO) is based on the South African Water Quality Guidelines.

Water Monitoring Points

Surface water: The nearest down-gradient non-perennial stream is situated approximately 0.7 km and 3.7 km from the site. The streams are not utilised as a water source for human domestic uses. Monitoring takes place by collecting surface water samples during the rainy season at a frequency of once a month if possible.

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 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 – Kimberley, 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:

Acid Mine Drainage: No potential for bad quality leachate or acid mine drainage development is associated with aggregate mine closure.

Long Term Impact on Ground Water: No after effect on the groundwater yield or quality is expected. The two drill holes that have been suggested by the Geohydrological study will be drilled and yield and quality further investigated.

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 monitoring of all material and replacement of topsoil where available should be ensured.

q) Period for which the Environmental Authorisation is required

30 years. Thus the period required is for the Life of Mine of the Mining Right.

r) Undertaking

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic Assessment Report and the Environmental Management Programme Report.

The undertaking required to meet the requirements of this section is provided at the end of the EMPR and is applicable to both the Environmental Impact Assessment Report and the Environmental Management Programme Report.

s) Financial Provision

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation

i) Explain how the aforesaid amount was derived

The total cost to rehabilitate and mitigate the Kimcrush Mine site as it stands currently (risking premature rehabilitation) is estimated to be R1 872 648.00 according to the DMR calculations.

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplicatior factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	1703.61	13.72	1 1	1 1	23373.5292
2 (A)	Demolition of steel buildings and structures	m2	236.45	191.16	1	1	45199.782
2(B)	Demolition of reinforced concrete buildings and structures	m2	7.89	281.71	1	1	2222.6919
3	Rehabilitation of access roads	m2	12730	2	1	1	25460
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	332.01	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	181.1	1	1	0
5	Demolition of housing and/or administration facilities	m2	0	382.32	1	1	0
6	Opencast rehabilitation including final voids and ramps	ha	6.5	194579.4	0.52	1	657678.372
7	Sealing of shafts adits and inclines	m3	0	102.62	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0.468	133609.85	1	1	62529.4098
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha		166408.65	1 1	1	0
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	0	483329.59	1 1	1 1	0
9	Rehabilitation of subsided areas	ha	0	111878.12	1	1	0
10	General surface rehabilitation	ha	5	105841.53	1	1	529207.65
11	River diversions	ha	0	105841.53	1	1	0
12	Fencing	m	0	120.73	1	1	0
13	Water management	ha	0	40243.93	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	5	14085.38	1	1	70426.9
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum	0			1	0
					Sub Total 1		1416099.335

1	Preliminary and General	84965.90009	weighting factor 2 1	84965.90009
2	Contingencies	141609.8335		141609.8335
			Subtotal 2	1642674.07
			VAT (14%)	229974.37
			Grand Total	1872648

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

(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining Work Programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be)

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

t) Deviations from the approved scoping report and plan of study

i) Deviations from the methodology used in determining the significance of potential environmental impacts and risks

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation)

Not applicable – No deviations from the methodology proposed in the Scoping Report.

ii) Motivation for the deviation

Not applicable – No deviations from the methodology proposed in the Scoping Report.

u) Other 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

(Provide the results of investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as **Appendix 2.19.1** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 therein)

From a social perspective the following objectives and measures should be included as part of the Social Management Plan (SMP) as part of the Environmental Management Plan (EMP).

It should be noted that the responsibility of the mitigation lies with the owner, operator, and/or with the local municipality. The mitigation measures would have to form part of the respective stakeholder's expenditure predictions or operations and management within the area, therefore the monitoring activities cannot be expressed in financial terms.

From a social perspective it can be concluded that the proposed Kimcrush Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act (Provide the results of investigation, assessment, evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)*(i)*(vi) and (vii) of that Act, attach the investigation report as **Appendix 2.19.2** and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12 herein)

This Heritage Impact Assessment (HIA) report has been prepared in compliance with Section 38 of the National Heritage Resources Act (No 25/1999). The Client, Kimcrush (Pty) Ltd, intends to lodge an application for a Mining Right on a Portion of Portion 1 & Portion of Portion 351 of the Farm Vooruitzigt 81, Kimberley District, Northern Cape Province. The HIA forms an integral component of an Environmental Impact Assessment to be conducted as a prerequisite for the authorisation of the project.

The proposed mining will be undertaken by open cast methods. The target mineral is dolerite which will be crushed at the site to obtain various grades of stone for civil works: ballast stone, crusher sand, crusher dust, paving gravel, building concrete stone, and other grades of concrete stone for roadworks and rail installation. As the foot print of the mine will be extended new service roads will be opened and other support infrastructure developed. These physical works may result in the disturbance or destruction of heritage resources if they exist. For this reason an HIA is necessary to prepare a heritage impact statement showing what is present or what is likely to occur at the site.
A Heritage Impact Assessment (HIA) is a study to evaluate the impact a proposed development or site alteration will have on the cultural heritage resources and to recommend an overall approach to the conservation of the resources. An HIA is based on an understanding of heritage and its significance, and if heritage is found in the area of the proposed development mitigation options are considered and recommendations made on a conservation strategy that best conserves the resource(s) within the context of the proposed development.

Findings of the survey

Borrow pits have been operated on an eastern portion of the property as revealed by wide troughs of varying depths (P1), while on the southern part of this area excavations have been partially filled up with building debris (P2). Building debris is also found on the north-western edge of the excavated area.

All the material appear to have been deposited within the last 20 years, while the borrow pits have been active up to a recent date. None of this material therefore carries heritage significance. Elsewhere the surface appears to be sterile without material evidence of past human activity. Furthermore there is no evidence of the impact of the city on the property which carries heritage significance.

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

(the EAP managing the application, must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as **Appendix 4**)

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