mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: **Jacobus Wouter van Zyl**
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FILE REFERENCE NUMBER SAMRAD: NC30/5/1/3/2/11071MP

Important Notice

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

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

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

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

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

Objective of the basic assessment process

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

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

(b) identify the alternatives considered, including the activity, location, and technology alternatives;

(c) describe the need and desirability of the proposed alternatives,

(d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:

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

  (ii) the degree to which these impacts —

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be managed, avoided or mitigated;

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

  (i) identify and motivate a preferred site, activity and technology alternative;

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

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

DEFINITIONS

Alternatives - In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to –
i. The property on which or location where it is proposed to undertake the activity;
ii. The type of activity to be undertaken;
iii. The design or layout of the activity;
iv. The technology to be used in the activity, and;
v. The operational aspects of the activity.

Baseline - Information gathered at the beginning of a study which describes the environment prior to development of a project and against which predicted changes (impacts) are measured.

Basic Assessment Process – This is the environmental assessment applied to activities listed in Government Notice No. R 983 (Listing 1) as amended by GNR 327 (dated 7/04/2017) and No. R985 (Listing 3) as amended by GNR 324 (dated 7/04/2017)**.** These are typically smaller scale activities of which the impacts are generally known and can be easily managed. Generally, these activities are considered less likely to have significant environmental impacts and, therefore, do not require a full-blown and detailed Environmental Impact Assessment (see below).

Biodiversity - The diversity, or variety, of plants, animals and other living things in a particular area or region. It encompasses habitat diversity, species diversity and genetic diversity.

Borehole - Includes a well, excavation, or any other artificially constructed or improved groundwater cavity which can be used for the purpose of intercepting, collecting or storing water from an aquifer; observing or collecting data and information on water in an aquifer; or recharging an aquifer.

Community - Those people who may be impacted upon by the construction and operation of the project. This includes neighbouring landowners, local communities and other occasional users of the area.

Construction Phase - The stage of project development comprising site preparation as well as all construction activities associated with the development.

Consultation - A process for the exchange of views, concerns and proposals about a project through meaningful discussions and the open sharing of information.

Critical Biodiversity Area - Areas of the landscape that must be conserved in a natural or near-natural state in order for the continued existence and functioning of species and ecosystems and the delivery of ecosystem services.

Cumulative Impacts - Direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors.

Environment - The surroundings within which humans exist and that are made up of
i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any Part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Authorisation (EA) – The authorisation by a competent authority of a listed activity.

Environmental Assessment Practitioner (EAP) – The person responsible for planning, management and co-ordination of environmental impact assessment, strategic environmental assessments, environmental management plans or any other appropriate environmental instrument introduced through regulations.

Environmental Impact Assessment (EIA) – In relation to an application to which scoping must be applied, means the process of collecting, organizing, analysing, interpreting and communicating information that is relevant to the consideration of that application. This process necessitates the compilation of an Environmental Impact Report, which describes the process of examining the environmental effects of a proposed development, the anticipated impacts and proposed mitigatory measures.

Environmental Impact Report (EIR) - A report assessing the potential significant impacts as identified during the Scoping phase.

Environmental Management Programme (EMPr) - A management programme designed specifically to introduce the mitigation measures proposed in the Reports and contained in the Conditions of Approval in the Environmental Authorisation.

Gross Domestic Product (GDP) by region - represents the value of all goods and services produced within a region, over a period of one year, plus taxes minus subsidies.

Hydrocarbons – Oils used in machinery as lubricants, including diesel and petrol used as fuel.

Impact - A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.

Interested and Affected Party (I&AP) – Any individual, group, organization or associations which are interested in or affected by an activity as well as any organ of state that may have jurisdiction over any aspect of the activity.

Municipality –

(a) Means a metropolitan, district or local municipality established in terms of the Local Government: Municipal Structures Act, 1998 (Act No. 117 of 1998); or

(b) In relation to the implementation of a provision of this Act in an area which falls within both a local municipality and a district municipality, means
   (i) The district municipality, or
   (ii) The local municipality, if the district municipality, by agreement with the local municipality, has assigned the implementation of that provision in that area to the local municipality.

NEMA EIA Regulations - The EIA Regulations means the regulations made under section 24(5) of the National Environmental Management Act (Act 107 of 1998) (Government Notice No. R 982, R 983, R984 and R 985 in the Government Gazette of 4 December 2014 refer as amended by GNR 324, 325, 326 and 327 of 7 April 2017.

No-Go Alternative – The option of not proceeding with the activity, implying a continuation of the current situation / status quo

Public Participation Process (PPP) - A process in which potential Interested and Affected Parties are given an opportunity to comment on, or raise issues relevant to, specific matters.

Registered Interested and Affected Party – All persons who, as a consequence of the Public Participation Process conducted in respect of an application, have submitted written comments or attended meeting with the applicant or environmental assessment practitioner (EAP); all persons who have requested the applicant or the EAP in writing, for their names to be placed on the register and all organs of state which have jurisdiction in respect of the activity to which the application relates.

Scoping process - A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail

Scoping Report – The report describing the issues identified during the scoping process.

Significant impact – Means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Spatial Development Framework (SDF) - A document required by legislation and essential in providing conservation and development guidelines for an urban area, which is situated in an environmentally sensitive area and for which major expansion is expected in the foreseeable future.
Specialist study - A study into a particular aspect of the environment, undertaken by an expert in that discipline.
Stakeholders - All parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.
Sustainable development - Sustainable development is generally defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. NEMA defines sustainable development as the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.
Visibility - The area from which the project components would actually be visible and depends upon topography, vegetation cover, built structures and distance.
Visual Character - The elements that make up the landscape including geology, vegetation and land-use of the area.
Visual Quality - The experience of the environment with its particular natural and cultural attributes.
Visual Receptors - Individuals, groups or communities who are subject to the visual influence of a particular project.

ACRONYMS AND ABBREVIATIONS

amsl	Above mean sea level
BA	Basic Assessment
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Area
DM	District Municipality
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
DSR	Draft Scoping Report
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
EStA	Early Stone Age
FoT	"Free on Truck ": means there is no processing and that it's a raw product.
FSR	Final Scoping Report
GA	General Authorisation
GDP	Gross Domestic Product
GDPR	Regional Gross Domestic Product
GGP	Gross Geographic Product
GNR	Government Notice Reference
ha	Hectares
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
km	Kilometres
km²	Square kilometres
LED	Local Economic Development
LM	Local Municipality
LoM	Life of Mine
LN	Listing Notice
L/s	Litres per second
LSA	Late Stone Age
m³	Metres cubed
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential Evaporation
MASMS	Mean Annual Soil Moisture Stress (% of days when evaporation demand was more than double the soil moisture supply)
MFD	Mean Frost Days
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MSA	Middle Stone Age
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act 107 of 1998 as amended
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NEM:WA	National Environmental Management: Waste Act 59 of 1998
NFEPA	National Freshwater Ecosystem Priority Area

NHRA	National Heritage Resources Act 25 of 1999
NWA	National Water Act 36 of 1998
PES	Present Ecological State
RDL	Red Data List
ROM	Run of Mine
S&EIR	Scoping and Environmental Impact Reporting
SAHRA	South African National Heritage Resources Agency
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SLP	Social and Labour Plan
StatsSA	Statistics South Africa
WMA	Water Management Area
WML	Waste Management License
WUL A	Water Use License Application

Contents

1. Contact Person & Contact Details EAP

1.1 General information

Name:	Nicolaas Jacobus van Zyl (Id 6305015007088)		
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Postal address:	P.O. Box 255, Springbok		
Postal code:	8240	Cell:	082 8898696
Telephone:	082 8898696	Fax:	086 6562942
E-mail:	vanzyl.eap@gmail.com		

1.2 Qualifications

Current qualifications in this field were obtained through formal studies at the Cape Town Technicon, Nelson Mandela Metropolitan University and the University of the Orange Free State, which is the following:

- National Diploma Nature Conservation (1986)
- National Higher Diploma (B-Tech) Nature Conservation (1992)
- Master's Degree Environmental Management (MOB 750) (2001)

Further qualifications in this field were also obtained through short courses at the University of the Orange Free State, which is the following:
Environmental Impact Assessment (2001)
Wildlife Management through Veld Management (2001)
Resource evaluation and game ranch management (2003)
Arc GIS (2009)

1.3 Profession affiliation/registration

Environmental Assessment Practitioners Association of South Africa (Registration Number 2019/2034)
International Association for Impact Assessment South Africa (Membership Number: 7384)

1.4 Summary of the EAP's past experience.

With the implementation of the Mineral and Petroleum Resources Development Act 28 of 2002 Mr. van Zyl has started assisting small scale miners with all facets of applications for mining permits in terms of section 27 and prospecting rights in terms of section 16 of the MPRDA. Mr van Zyl has an excellent knowledge of the relevant acts applicable to the mining sector including the following:
Mineral and Petroleum Resources Development Act 28 of 2002
Mineral and Petroleum Resources Development Amendment Act 49 of 2008
Mineral and Petroleum Resources Regulations 2004
National Environmental Management Act 107 of 1998 as amended
National Environment Laws Amendment Act 25 of 2014 as amended
NEMA: Environmental Impact Assessment Regulations, 2014
NEMA: Financial Provisioning Regulations, 2015
NEMA: Waste Act 59 of 2008 as amended
NEMA: Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015
National Water Act 36 of 1998 as amended (with special attention to section 21 water uses)

Since 2002 Mr. van Zyl completed more than 150 applications for Mining Permits, more than 100 applications for Prospecting Rights and 15 for Mining Rights. The mineral regulations and environmental management for most of these projects were managed throughout the life of the project including:

- Applications for Mining Permits, Prospecting-, and Mining Rights manual and Samrad online system.
- Prospecting or Mining Work Programs including financial and technical competence
- Requirements for broad-based socio-economic empowerment in terms of the Charter for the mining

and minerals industry, 2018.

- Requirements for Social and Labour Plans in terms of Reg 40 to Reg. 46B of the MPRDA Regulations 2004 as amended
- Applications for Environmental Authorisations including screening and site sensitivity verification reports.
- Environmental Reports BAR & S&EIAR in terms of the NEMA EIA Regulations 2014 as amended
- Final Rehabilitation, Decommissioning and Mine Closure Plans including Risk Assessment Reports in terms of the NEMA Financial Provisioning Regulations, 2015 as amended.
- Public participation processes
- Execution and registration of rights including sec 42 diagrams for MPTRO
- Annual Progress Reports on the implementation of PWP/MWP as well as SLP submitted in terms of MPRDA regulation 45
- Annual Environmental Performance audits including annual Rehabilitation Plans and reviews of the Final Rehabilitation, Decommissioning and Mine Cosure Plan
- Application for closure certificate including Final Mine Closure Plans together with financial quantum reviews.
- Review of a Social and Labour Plan after every five years in terms of the MPRDA Regulation 46B, taking into account the changing nature of the relevant needs of the mine community as per the Integrated Development Plans.
- Other applications in terms of the MPRDA include:
  - ✓ Section 102 applications
  - ✓ Section 20 applications
  - ✓ Section 53 Applications
  - ✓ Section 11 Applications

2. Location of the overall Activity

Table 1

Farm Name:	Farm Jannelsepan No. 39
Application area (Ha)	5Ha
Magisterial district:	Gordonia Northern Cape Province ZF Mgcawu District Municipality Dawid Kruiper Local Municipality
Distance from nearest town	12km south-west of Upington
21-digit Surveyor General Code	C03600000000003900000

2.1 Locality map (show nearest town, scale not smaller than 1:250000).

The proposed Mining Area is located on a 5Ha portion of the remainder of the farm Jannelsepan 39 situated in the ZF Mgcawu District Municipality and Dawid Kruiper Local Municipality of the Northern Cape Province.

The property is registered in the name of Louisvale Irrigation Board by virtue of Title deed KEF1-14/1923CTN filed in the Kimberley Deeds Office. LPI Code C03600000000003900000. The mining area is located approximately 12km south-west of Upington on the R359, untitled paved road and existing farm tracks. Refer to the layout plan **Figure 2** that shows the properties and co-ordinates.

Property	Portion	Size (Ha)		LPI Code	Deed	Owner
		Property	Application			
Farm Jannelsepan	Rem	15.7999	5	C03600000000003900000	KEF1-14/1923CTN	Louisvale Irrigation Board

Figure 1: Locality map
contemplated in regulation 2(2) read with regulation 2(3) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 30 of 2002)

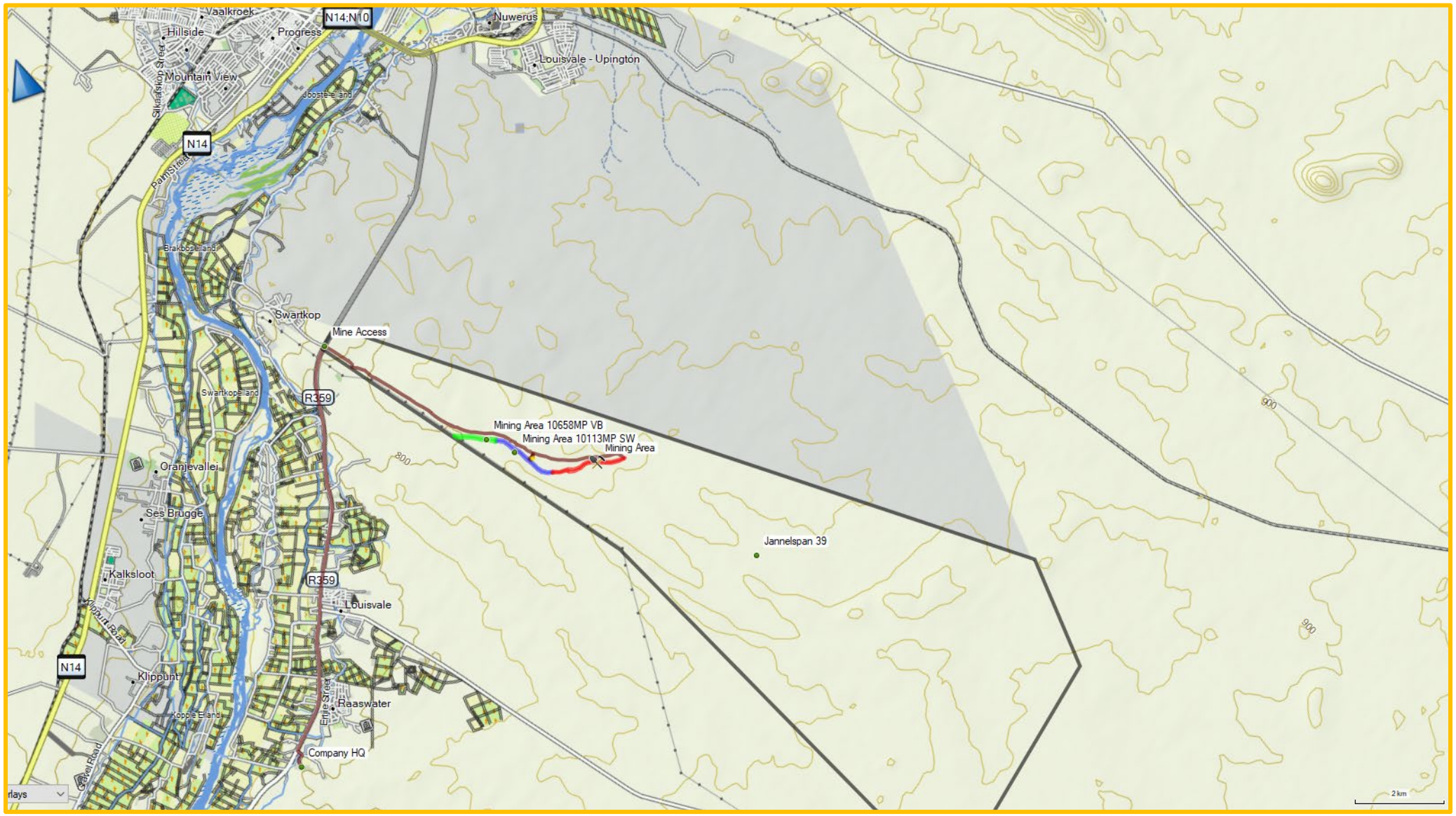
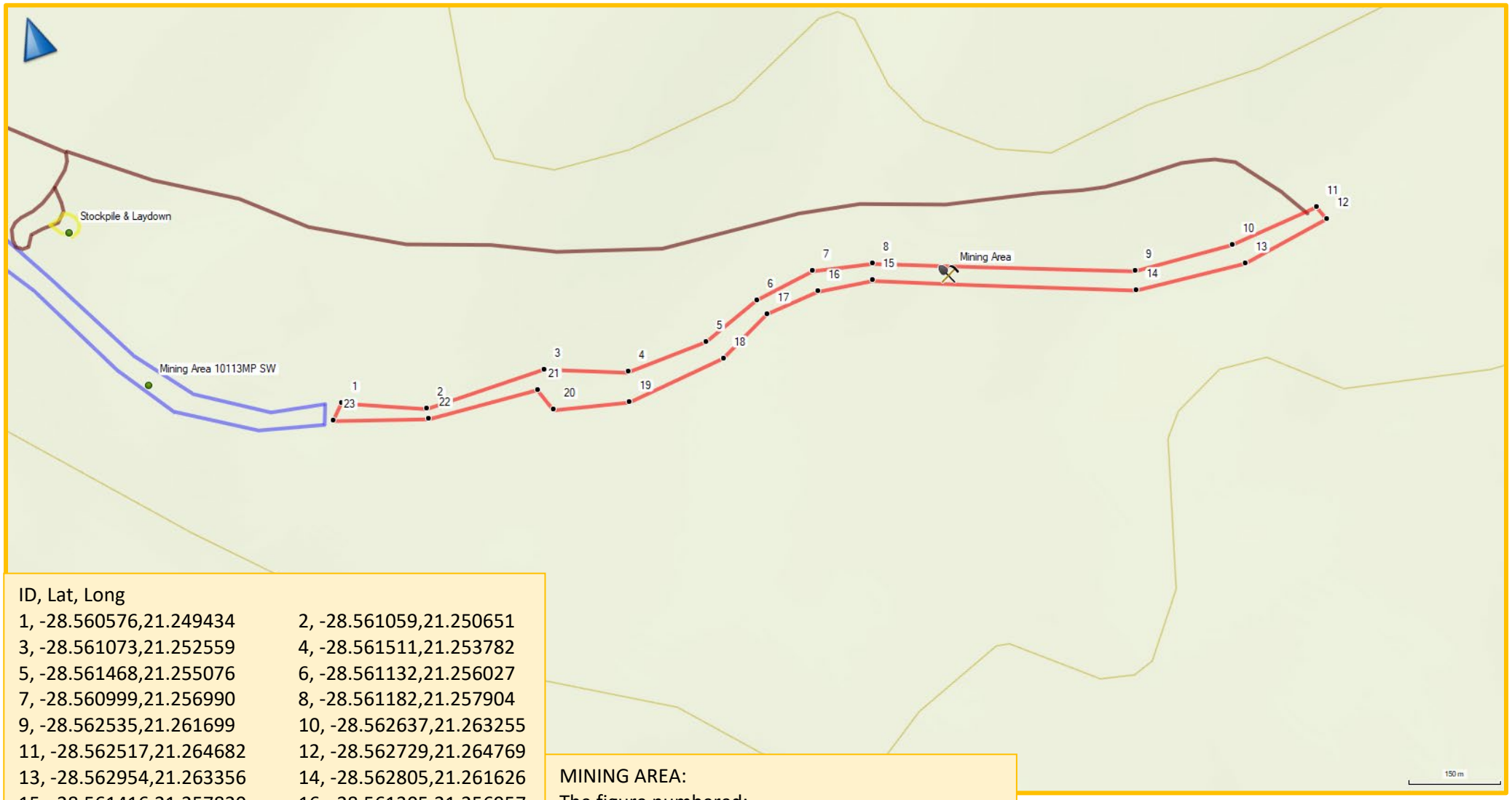


Figure 2: Layout plan

contemplated in regulation 2(2) read with regulation 2(3) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 30 of 200



ID, Lat, Long	
1, -28.560576,21.249434	2, -28.561059,21.250651
3, -28.561073,21.252559	4, -28.561511,21.253782
5, -28.561468,21.255076	6, -28.561132,21.256027
7, -28.560999,21.256990	8, -28.561182,21.257904
9, -28.562535,21.261699	10, -28.562637,21.263255
11, -28.562517,21.264682	12, -28.562729,21.264769
13, -28.562954,21.263356	14, -28.562805,21.261626
15, -28.561416,21.257820	16, -28.561305,21.256957
17, -28.561372,21.256104	18, -28.561774,21.255241
19, -28.561931,21.253644	20, -28.561678,21.252500
21, -28.561324,21.252364	22, -28.561208,21.250629
23, -28.560774,21.249221	

MINING AREA:
The figure numbered:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23 being a 5Ha portion of land situated over a portion of the Remainder Jannelsepan No 39 in the Kenhardt District

Figure 3: Site Plan

3. Description of the scope of the proposed overall activity

The proposed sand mining area is situated on a 5ha section of the Donkerhoekspruit on Farm Jannelsepan No. 39, located 12km south-west of Upington.

Mining is in the form of a simple process that only includes loading and hauling of river sand from the 'ephemeral drainage line. The excavations in the 'ephemeral drainage line will be on average 1.5 meters deep.
Refer to Figure 1 to 3 above which shows the location of the proposed sand mining permit area. Also refer photo 1 below showing current sand mining operations adjacent to this application as an example of the scale of the proposed mining operation also note existing tracks to be used and lack of infrastructure. Sand will be loaded directly on trucks as it is mined therefore no stockpiles is planned or if required will very small and developed along the existing farm track. removed as it is stockpile area including the laydown area and access routes.
Refer section 3.2 for a description of the activities to be undertaken

Photo 1: Previous sand mining operations on the same area as an example of the scale of the proposed mining operation also note existing tracks to be used and lack of infrastructure

3.1 Listed and specified activities

Table 2

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
Site establishment for mining of river sand from ephemeral tributary of the Orange River, including: • Removal and stockpiling of topsoil from laydown areas adjacent to river bank. • Refuse collection containers. • Mobile ablution facilities. • Accessing the site via existing farm tracks. Refer to Photo 1.	Total footprint is 5 hectares	**X**	GNR 983 Listing Notice 1 of 2014 (dated 8 December 2014), as amended by GNR 517 (dated 11 June 2021): **Activity 21**: Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in Listing Notice 1 or in Listing Notice 3, required to exercise the mining permit.	No
Mining requires the clearance of indigenous and alien vegetation on an area of 5 hectare within the ephemeral drainage line.		**X**		No
Mining includes removal of river sand from the ephemeral drainage line and access from the bank to the river bed. Refer to Figure 1 to 3 and Photo 1.		**X**		No
The rehabilitation, decommissioning and closure of the mining site which will only be required at final decommissioning and closure.		X		**No**

3.2 Description of the activities to be undertaken

The methodology and technology to be employed in each phase is described below:

3.2.1 Construction phase: Development of infrastructure and logistics

- Due to the small scale of operations no permanent infrastructure will be developed and only existing roads will be used as access. Refer to Figure 1 to 3 for the location of the existing roads that provide access off the R359 to the mining area. Farm tracks along the ephemeral drainage line provide access to the sections being mined. This is the method preferred to keep vehicles and roads out of the ephemeral drainage line as much as possible. With regard to haul roads existing roads will be used and farm tracks and will be upgraded and maintained by the mine for the hauling of sand with 20m³ trucks to the company headquarters in Upington.
- No buildings and infrastructure will be required as the operation will be run from the company headquarters where all logistics will be available.
- No process water or electricity is used in the mining operation and no permanent infrastructure will be required due to the small scale and simple mining method to be employed.
- Domestic waste will be collected in plastic containers and transported daily to the company headquarters. A temporary storage area for used lubrication products and other hazardous chemicals will be provided for the collection of the small volume of waste before it is removed to the company headquarters. Only one 200-liter container is needed for the small amount of waste.
- Maintenance Oil/grease/diesel management systems will require a parking area/service bay, provided as part of the stockpile area outside the drainage channel and will provide for drip trays for stationary equipment.

3.2.2 Operational phase

This operation will only involve the loading and hauling of raw river sand and no processing will take place. The only surface disturbance that will take place, except for the mining excavation within the ephemeral drainage line, is a small stockpile area and service bay (parking) for equipment outside the ephemeral drainage line. During operations mining will only consist of loading and hauling of river sand. Only temporary product stockpiles will be developed as sand will be transported to the applicant's headquarters for stockpiling and distribution as it is loaded.

The total footprint will be 5 hectares and sand will be removed over the total area. Backfilling is not an option as the sand is completely removed as it is washed in from upstream. All material consisting mainly of river sand is removed from the ephemeral drainage line to a depth of 1.5m and sold as a Free on Truck (FoT) product. No processing is taking place except for limited stockpiling so no mining waste or overburden and Fine Residue Deposits (FRD) will be created. Refer Photo 1 showing previous sand mining operations adjacent to this application to give an indication of the scale of operations.

Only minor repairs are done on site. A PVC lining and drip trays are used during maintenance and accidental spills are cleaned up immediately by removing of the contaminated sand. The small volume of contaminated sand is sold with the rest of the sand to be used in the building industry. Equipment used in the mining process is transported to the company headquarters for major repairs. The trucks will transport sand from the site 6 days a week, operating between 7h00 and 18h00. No operations will take place on Sundays or during the builder's break at year end.

As part of the operational phase training of personnel in the implementation of the EA will be undertaken and the implementation of the environmental awareness plan as part of the BAR will be an ongoing process.

3.2.3 Decommissioning phase

Planning for closure and restoration from the beginning of an operation makes the process easier; waste can be removed as it is created, excavation can be planned so that topography restoration is less complicated, and topsoil can be re-used at shorter intervals. Site rehabilitation can make the land more valuable and attractive for resale. Additionally, establishing a closure strategy (and communicating that activity to the public) can help enhance the company's reputation as a socially-responsible operation. The decommissioning and closure phase at the end of the life of the mine will consist of implementing the Final Rehabilitation, Decommissioning and Closure Plan (attached at Annexure 1).

4. Policy and Legislative Context

Table 3: Policy and Legislative Context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED	HOW DOES THIS DEVELOPMENT COMPLIY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT
Legislation		
Constitution of South Africa, specifically everyone has a right; a. to an environment that is not harmful to their health or wellbeing; and b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: i. prevents pollution and ecological degradation; ii. promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.	Mining activities	The mining activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together avoided be minimised and mitigated in order to protect the environmental right of South Africans.
Minerals and Petroleum Development Resources Act, Act 28 of 2002 (MPRDA) section 16 (as amended) MPRDA Regulations as amended by GNR349 of 18 April 2011.	Application to the DMRE for a mining permit in terms of Section 27 for an area not exceeding 5 hectares in extent.	The conditions and requirements attached to the granting of the Mining Permit will apply to the mining activities. DMRE is the Competent Authority (CA) for this NEMA and NEM: WA application.
Mine Health and Safety Act, 1996 (No. 29 of 1996) (MHSA) and Regulations	Mining activities	Mining operations will be governed by the MHSA and associated Regulations.

National Environmental Management Act, No 107 of 1998 (as amended) (NEMA) Environmental Impact Assessment Regulations, 2014 (EIA Regulations 2014) and Environmental Impact Assessment Regulations Listing notices 1, 2 and 3 published in terms of NEMA in Government Notices 982, 983, 984 and 985 of 4 December 2014 (as amended by GN No. 517 of 11 June 2021) Regulation 16{1)(b)(v) submission of a report generated from the national web based environmental screening tool report will be compulsory when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21. "Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Section 24(5) (a) and (h) and 44 of NEMA, 1998, when applying for EA ("the Protocols"), in Government Gazette (GG) 43110 (dated 20 March 2020) and Government Notice (GN) 320.Protocols in GG 43855 of GN No. 1150 dated 30 October 2020 provide for Terrestrial and Animal Plant Species.	Application to the DMRE for Environmental Authorisation in terms of the 2014 EIA Regulations	An Application for Environmental Authorisation must be submitted to DMRE for an Environmental Authorisation. The application for EA including screening tool report must be acknowledged by the competent authority before the BAR process can start. The listed activities (Listing Notice 1, Activity 21) that are triggered determine the Environmental Authorisation (EA) application process to be followed and in this case a Basic Assessment Report (BAR) process Refer Section 10.3 Summary of specialist reports
Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production		These regulations have informed the Final Closure Plan and financial provisioning for the Project. The disturbed area shall be rehabilitated in such a way that is stable, non-polluting, non-eroded, free from alien invasive species and suitable for the agreed post closure land use.
National Guideline on minimum information requirements for preparing Environmental Impact Assessments for mining activities that require environmental authorisation, published in terms of NEMA in Government Notice 86 of 2018		The compilation of this Basic Assessment Report including a Final Rehabilitation, Decommissioning and Mine Closure Plan and the Public Participation Process are required in terms of NEMA.

National Environmental Management: Waste Act, Act 59 of 2008 (NEMWA)NEM: WA (as amended) National Waste Information Regulations published in GN 625 of 2012 Waste Classification and Management Regulations in GN 634 of 2013 Waste listed activities in GN 921 of 2013 National Norms and Standards for the Storage of Waste, in GN 926 of 2013 National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening or Baling of General Waste, in GN 1093 of 2017 National Norms and Standards for the Assessment of Waste for Landfill Disposal, in GN 635 of 2013 Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation in GN 632 of 24 July 2015.	Sections 13.8; 13.9; 13.10 & Section 15 General waste management measures as part of environmental awareness plan	These regulations have informed the planning and management of waste for the Project. No listed activities are triggered or included as part of the Environmental Authorisation (EA) application process. The generation of potential waste will be minimized through ensuring employees of the Applicant are subjected to the appropriate environmental awareness campaign before commencement of sand mining. All waste generated during the mining activities will be disposed of in a responsible legal manner. Proof of legal disposal will be maintained on site.
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) [NEMBA] National list of ecosystems that are threatened and in need of protection, 2011 (in GN 1002 dated 2 December 2011) Alien and Invasive Species List, 2016 (in GN No. 864 dated 29 July 2016)	Section 8 Figure 4, 5, 6, 7, 8, 9, 10, 11 & 12.	There are no listed Critically Endangered, Endangered or Vulnerable ecosystems on site. The site is located within in Ecological Support Area and the Mining and Biodiversity Guidelines sourced off SANB BGIS Map Viewer identify the area as Cat B
National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004). National Dust Control Regulations in GN R827 of 1 November 2013 List of Activities which Result in Atmospheric Emissions, published in GN 893 of 2013 National Ambient Air Quality Standards (NAAQS), in GN 1210 of 2009 National Atmospheric Emission Reporting Regulations, in GN 283 of 2015	Section 8	These regulations have informed the planning and management of emissions from the Project. Dust control measures are included in the EMPr
National Heritage Resources Act, 25 of 1999 ("NHRA")	Section 8	Refer to Annexure 3 for a copy of the Heritage Impact Assessment and Annexure 4 for a copy of the Paleontological Impact Assessment

National Water Act (Act 36 of 2008) Regulations on Use of Water for Mining and Related Activities aimed at the Protection of Water Resources in GNR 704 of 1999 Several General Authorisations have been published in terms of Section 39 of the NWA (various dates) Purification of Waste Water or Effluent, published in GNR 991 of 1984 Regulations for the erection, enlargement, operation and registration of Water Care Works, published in GNR 2834 of February 1986 Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals in GNR 267 of 2017	Section 8	These regulations have informed the planning and management of water and stormwater arising from the Project. The applicable Water Use activities are Section 21(c) related to impeding or diverting the flow of water in a watercourse, and Section 21(i) related to altering the bed, banks, course or characteristics of a watercourse. A General Authorisation in terms of GN 509 of 2016 for Section 21(c) and 21(i) is in place refer Annexure 4
Promotion of Administrative Justice Act, 2000 (Act 3 of 2000) [PAJA]	Decision by the Competent Authority	Gives effect to section 33 of the Constitution that requires that "Everyone has the right to administrative action that is lawful, reasonable and procedurally fair". All administrative actions must be based on the relevant considerations
Protection of Personal Information Act, 2013 (Act No. 14 of 2013) (POPIA) Clarity On Applicability of The Protection of Personal Information Act, 2013 To Requirements of The Environmental Impact Assessment Regulations, 2014 Relating to Registers of Interested and Affected Parties and The Inclusion of Comments in Reports (circulated on 3 September 2021)	Annexure 2: PPP Report	The guidance document provided by the Department of Forestry, Fisheries and the Environment was used to determine the information to be included or excluded from the public domain to protect private or personal information.
Land Use Planning Act, 2014 (Act 3 of 2014) (LUPA)	Comments required from the Dawid Kruiper Local Municipality.	Consent use in terms of the Municipal Planning By-Law, 2015 is required to permit mining on properties that are zoned for Agricultural purposes.
Hazardous Substances Act, 1973 (Act No. 15 of 1973) (HAS)		These regulations have informed the planning and management of hazardous substances for the Project.
National Forest Act, 1998 (Act No. 84 of 1998) (NFA)		Permit(s) will be required if any protected species are cut, removed and/or translocated from the Project footprints.
Provincial Environmental Legislation: The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA)		
National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003) (NEM: PAA)		These regulations have informed the planning and management of the Project. The Project footprint does not overlap with any existing protected areas, or any areas identified for protected area buffers.

Municipal Plans and Policies		
ZF Mgcawu District Municipality IDP 2021 - 2022	Section 5.4	The Need & Desirability of the project is referenced in terms of the District Municipality IDP, specifically relating to employment creation, and ensuring the implementation of environmentally sustainable practices, along with an integrated approach to addressing climate change response, which are included in the EMPr
Dawid Kruiper Integrated Development Plan (IDP) 2017 - 2022	Section 5.3	The Need & Desirability of the project is referenced in terms of the IDP, specifically relating to employment creation and sustainable resource utilisation. Relevant mitigation measures are included in the EMPr.
Northern Cape Provincial Spatial Development Framework (NCPSDF)	Section 5 & 8.	Sustainable development is a key consideration as addressed in this impact assessment report.
Northern Cape Provincial Growth and Development Strategy 2004-2014 (NCPGDS)	Section 5 & 8.	Sustainable development is a key consideration as addressed in this impact assessment report.
Standards, Guidance and Spatial Tools		
Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute. 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria.	Section 5.1 & 8. Figure 4	The mitigation measures to address and mitigate the potential impacts of the mining are included in the EMPr.
DEA Guideline on Need & Desirability (2017)	Section 5.7	Refer to Section 5.7
DEA Guideline on PPP DMR Guideline on Consultation with Communities and I&APs (undated)	Section 7 & Table 4	Refer to Section 7 & Table 4
DEAT Integrated Environmental Management Information Series 5: Impact Significance (2002)	Section 8	Refer Impact Assessment Tables
DEAT Integrated Environmental Management Information Series 7: Cumulative Effects Assessment (2004)	Section 8	Refer Impact Assessment Tables
BGIS (www.bgis.sanbi.org)	Baseline environmental description	Used during desktop research to identify sensitive environments within the mining right area.
SANS 10103:2008 The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and to Speech Communication	Management / Monitoring measures	Used to set the standard allowable for noise mitigation measures are included in the EMPr.
SANS 1929:2005 Edition 1.1 – Ambient Air Quality Limits for Common Pollutants		Standard for dust fallout. Dust mitigation measures are included in the EMPr.

5. Need and desirability of the proposed activities

5.1 Mining and Biodiversity Guidelines (2013)

The Mining and Biodiversity Guidelines (2013)[1] state that: "Sustainable development is enshrined in South Africa's Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act (No. 10 of 2004) (hereafter referred to as the Biodiversity Act) and is fundamental to the notion of sustainable development. International guidelines and commitments as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa".

DMR, as custodian of South Africa's mineral resources, is tasked with enabling the sustainable development of these resources. This includes giving effect to the constitutional requirement to "prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"[2].

The primary environmental objective of the MPRDA is to give effect to the "environmental right"[3] contained in the South African Constitution. The MPRDA further requires the Minister to ensure the sustainable development of South Africa's mineral resources, within the framework of national environmental policies, norms and standards, while promoting economic and social development.

The Mining and Biodiversity Guidelines (2013) document identifies four categories of biodiversity priority areas in relation to their biodiversity importance and implications for mining. The categories of relevance to this Mining area as shown in Figure 4 are: "Category B: Highest Biodiversity Importance" – highest risk to mining.

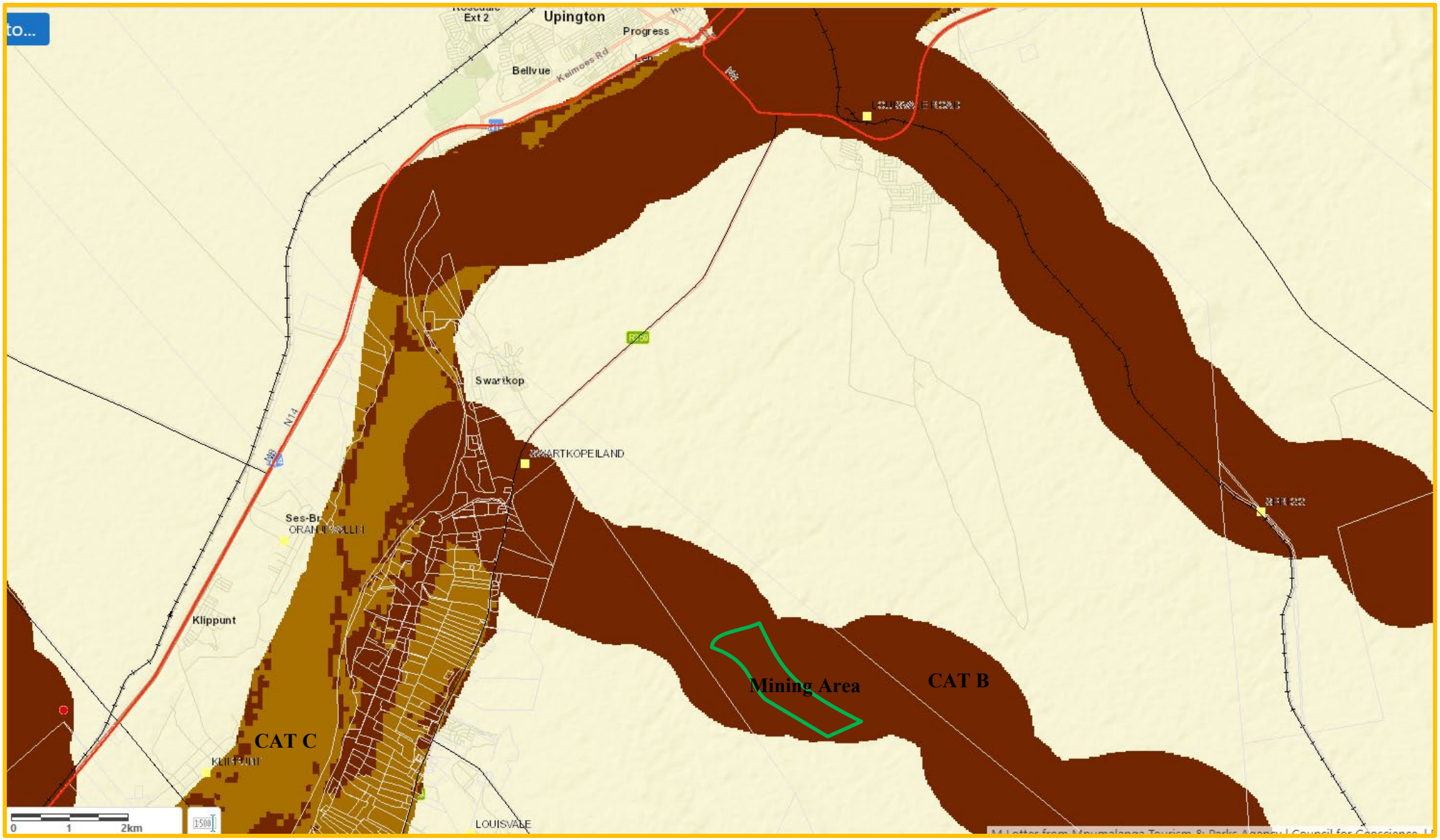
These categories have since been super-ceded by the Critical Biodiversity Area (CBA) map (refer to **Figure 8b**), which would be interpreted as Category B is now CBA 1, Category C is now CBA 2 and Category D is now Ecological support areas.
These categories basically require an environmental impact assessment process to address the issues of sustainability.

[1] Department of Environmental Affairs, Department of Mineral Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute. 2013. Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector. Pretoria.

[2] Constitution of the Republic of South Africa (No. 108 of 1996).

[3] Section 24 of the Constitution states that "everyone has the right (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Figure 4: Location of Mining area in terms of Mining and Biodiversity Guidelines sourced off SANB BGIS Map Viewer



5.2 Building Material Supply and Employment benefits

Building sand is commonly used for the manufacture of plaster, mortar and concrete. The ZF Mgcawu District fulfils an important urban niche in the Northern Cape region, where the Applicant's building material and sand supply company is located. The project site is located approximately 12km south-west of Upington. The area's development potential in terms of renewable energy has seen an increase in the need for construction materials.

The proposed sand mining activity is considered to be a temporary land use, and the area will be rehabilitated in accordance with the final rehabilitation, decommissioning and closure, plan of the mine attached as Annexure 1. The benefits of the project can be divided into social and economic classifications. The mine will provide limited direct employment for local persons. The operation further creates indirect employment opportunities in equipment supply industries, transport and sand mining, and the construction environment.

5.3 Dawid Kruiper Draft Integrated Development Plan (2017 - 2022) & Spatial Development Framework

The Dawid Kruiper Local Municipality (DKLM) comprises an area of about 44 231km^2 and is formally the largest Local Municipality in the whole of South Africa. DKLM makes up 12% of the total Northern Cape Province and about 4% of the whole of South Africa.

Integrated Development Plan (IDP)

In the Constitution of South Africa (108 of 1996) the objectives of a municipality or local government structure are described as follows under "section 152. (1) the objects of local government are-

(a) to provide democratic and accountable government for local communities;
(b) to ensure the provision of services to communities in a sustainable manner;
(c) to promote social and economic development;
(d) to promote a safe and healthy environment; and
(e) To encourage the involvement of communities and community organisations in the matters of local government".

In terms of economic indicators, the Dawid Kruiper Municipality enjoys comparative advantages in all of the economic sectors, except mining, compared to the district. The Municipality should therefore capitalise on these advantages to further strengthen its position in the district. Furthermore, the fastest growing sectors in the Municipality were those of the agriculture, electricity and water, and mining sectors. The current growth occurring in these sectors should be exploited to ensure the creation of new job opportunities for local people.

The long-term vision for socio-economic development and environmental sustainability for the municipality is expressed in the SDF, in addition to the guidelines for a land use management.

The proposed sand mining project will provide job security, local employment, local skills transfer, economic upliftment and building material supply for the solar renewable energy sector, in a sustainable manner as ensured through this environmental impact assessment process and implementation of the Closure and Rehabilitation Plan.

Spatial Development Framework (Draft Report August 2017; Section A)

The SDF contains "Principle 2: Spatial Sustainability: which states that spatial planning and land use management systems must promote the principles of socio-economic and environmental sustainability through encouraging the protection of prime and unique agricultural land; promoting land development in locations that are sustainable and limit urban sprawl; consider all current and future costs to all parties involved in the provision of infrastructure and social services so as to ensure for the creation of viable communities."

5.4 ZF Mgcawu District Municipality Draft IDP 2021 - 2022

The ZF Mgcawu District Municipality accounts for about 30% of the Northern Cape economy, and the ZF Mgcawu's economy is largely dominated by mining and agriculture. The vision of this DM is: "Quality support to deliver quality services". The IDP's strategic objective of relevance to this project is considered to be "(v) To Facilitate the Development of Sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy", with Local Economic Development (LED) objectives of business development and support highlighted under this objective.

The provision of job security, employment and skills transfer are identified as positive environmental impacts in this report.

The ZF Mgcawu District Municipality acknowledges that climate change poses a threat to the environment, its residents, and future development. Actions are required to reduce carbon emissions (mitigation) and prepare for the changes that are projected to take place (adaptation) in the district. ZF Mgcawu District Municipality has therefore prioritised the development of a Climate Change Vulnerability Assessment and Climate Change Response Plan. Through this program key climate change vulnerability indicators were identified. These are indicators where ZF Mgcawu District Municipality may be at risk to the impacts of climate change, and include biodiversity and the environment, and water.

Changes in climate are predicted to result in the shifting of bioregions in South Africa. In the ZF Mgcawu District Municipality, it is projected that with the warmer temperatures that there will be a replacement of Nama Karoo biome with Savanna and Desert biomes. A large amount of Nama Karoo and Nama Karoo related species will be lost. Terrestrial and river ecosystems and their associated species will also be negatively impacted. The proposed priority responses in the biodiversity and environmental Sector are:

- Research on better veld/land management practices (overgrazing) & awareness conservation.
- Monitoring and enforcement of municipal by-laws focusing on conservation and pollution issues.
- Pursue formal conservation of threatened, endangered and unprotected vegetation types not represented in formal conservation areas.

The ZF Mgcawu District Municipality is currently experiencing issues of water scarcity and quality. Climate change is expected to exacerbate this problem. Drought, reduced runoff, increased evaporation, and an increase in flood events will impact on both water quality and quantity.

The effects of climate change, such as flood events, on the proposed mining project will be mitigated as per the measures contained in the EMPr. The mitigation for emissions of greenhouse gases from vehicles associated with the mining activities is included in the EMPr.

5.5 Northern Cape Provincial Spatial Development Framework (NCPSDF)

The NCPSDF states that the: "Northern Cape is not one of South Africa's richest provinces in monetary terms. Accordingly, there is a need for coherent prioritisation of projects within a spatial economic framework that takes due cognisance of environmental realities and the imperative to create a developmental state". The NCPSDF was designed as an integrated planning and management tool for all spheres of government to facilitate on-going sustainable development throughout the province.

The NCPSDF, together with the Provincial Growth and Development Strategy (PGDS), is set to fulfil an important role as a spatial and strategic guideline that addresses the key challenges

of poverty, inequality and environmental degradation through the innovative use of the resources (capital) of the province for the benefit of all concerned."
The potential for job security, employment and skills transfer are identified as positive environmental impacts in this impact assessment. The potential negative environmental impacts will be mitigated through the implementation of the EMPr and the Closure and Rehabilitation Plan, to ensure a sustainable mining activity.

5.6 Northern Cape Provincial Growth and Development Strategy (NCPGDS)

The NCPGDS has the following vision for the province: "Building a prosperous, sustainable growing provincial economy to reduce poverty and improve social development." The strategy for the growth and development of the province is guided by the following key principles:

- Equality – notwithstanding the need to advance persons previously disadvantaged, development planning should ensure that all persons should be treated equally;
- Efficiency –the promotion of the optimal utilisation of existing physical, human and financial resources;
- Integration – the integration of spatially coherent regional and local economic development and improved service delivery systems.
- Good Governance – the promotion of democratic, participatory, cooperative and accountable systems of governance and the efficient and effective administration of development institutions;
- Sustainability – the promotion of economic and social development through the sustainable management and utilisation of natural resources and the maintenance of the productive value of the physical environment;
- Batho Pele – the placement of people and their needs at the forefront of its concern and serve their physical, psychological, developmental, economic, social and cultural interests equitably.

5.7 DEA Guideline on Need and Desirability (2017)

As referenced in the DEA Guideline on Need and Desirability (2017), NEMA defines "evaluation" as "the process of ascertaining the relative importance or significance of information, in the light of people's values, preferences and judgements, in order to make a decision." In evaluating each impact (negative and positive) in terms of each of the aspects of the environment, "need and desirability" must specifically be considered in the analysis of each impact of the proposed activity. However, to determine if the proposed activity is the best option when considering "need and desirability", it must also be informed by the sum of all the impacts considered holistically. In this regard "need and desirability" also becomes the impact summary with regard to the proposed activity.

These Guidelines state that: "In considering the impact summary it must be remembered that ultimately the aim of EIA is to identify, predict and evaluate the actual and potential risks for and impacts on the geographical, physical, biological, social, economic and cultural aspects of the environment, in order to find the alternatives and options that best avoid negative impacts altogether, or where negative impacts cannot be avoided, to minimise and manage negative impacts to acceptable levels, while optimising positive impacts, to ensure that ecological sustainable development and justifiable social and economic development outcomes are achieved".

The **principles of Integrated Environmental Management (EIM)** as set out in Section 23 of NEMA have been considered in this environmental assessment as explained below.

- **Environmental management placing people and their needs at forefront of its concern, and serve their physical, physiological, developmental, cultural and social interests equitably** – This process is being undertaken in a transparent manner and all effort is being made to involve all the relevant stakeholders and Interested and Affected Parties. I.e., Public participation is being undertaken to obtain the issues / concerns / comments of the affected people for input into the process. Refer to Section 7 in this report.
- **Socially, environmentally and economically sustainable development** – All aspects of the receiving environment and how this will be impacted have been considered and investigated to ensure a minimum detrimental impact to the environment. Where the impact could not be avoided, suitable and effective mitigation measures have been proposed to ensure that the impact is mitigated, and these are detailed in Table 14, and included in the EMPr.
- **Consideration for ecosystem disturbance and loss of biodiversity** – the Donkerhoekspruit is classified as a "Category C: Moderately Modified" water resource. The proposed site is located in a Critical Biodiversity Area 2 (CBA2), and in an Ecological Support Area (ESA). The Bushmanland Arid Grassland vegetation type found on site is not listed in the "National List of Threatened Ecosystems that are Threatened and in Need of Protection" in GN 1002 dated 9/12/2011. Ecosystem disturbance and loss of biodiversity are considered in the impact assessment. There is a high occurrence of alien invasive vegetation on the river banks and in the dry river bed. The sand extraction process is considered to be a relatively short-term type of mining. Rehabilitation back to the natural state is a key component, and will be undertaken in a phased manner as the mining activities progress. This report together with the EMPr and Closure Plan proposes mitigation measures which will minimise the impacts of the proposal on the environment.
- **Pollution and environmental degradation** – The implementation of recommendations made and proposed mitigations are detailed in Table 14 and Table 15, and Closure Plan **Annexure 1** to ensure minimum environmental degradation.
- **Landscape disturbance** – All aspects of the receiving environment and how this will be impacted have been considered and investigated to ensure a minimum detrimental impact to the environment. Where the impact could not be avoided, suitable and effective mitigation measures have been detailed in Table 14 and Table 15, and Closure Plan Annexure 1 to ensure that the impacts are mitigated. For example, landscape disturbance impacts associated with the mining operation, erosion and dust have been identified and detailed mitigation measures are included in the EMPr to minimise the impacts.
- **Waste avoidance, minimisation and recycling** – These aspects were considered and incorporated into Table 14 and table 15, and Closure Plan Annexure 1.
- **Responsible and equitable use of non-renewable resources** – These aspects have been considered and there is not much scope to reduce the use of non-renewable resources, such as vehicle transport.
- **Avoidance, minimisation and remedying of environmental impacts** - All aspects of the receiving environment and how this will be impacted have been considered and investigated to ensure a minimum detrimental impact to the environment. Where the impact could not be avoided, suitable and effective mitigation measures will be proposed to ensure that the impact is mitigated. A number of mitigation measures have been included in Table 14 the EMPr, and Closure Plan Annexure 1.
- **Interests, needs and values of Interested and Affected Parties** – This process has been undertaken in a transparent manner and all effort is being made to involve all the relevant stakeholders and Interested and Affected Parties (I&APs). Comments received from I&APs

on the Draft Basic Assessment Report to be included as part of the Final Basic Assessment Report are summarised in Section 7, Table 4.

- **Access of information** – Potential Interested and Affected Parties was notified of the proposal and the availability of the DBAR. Identified potential Interested and Affected Parties were also invited to register as in terms of the NEMA EIA Regulations (Reg 43(1)) only registered interested and affected parties is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.
- **Promotion of community well-being and empowerment** – This process is being undertaken in a transparent manner and all effort is being made to involve all the relevant stakeholders and potential I&APs.

Potential impacts on the biophysical environment and socio-economic conditions have been assessed, and steps have been taken to mitigate negative impacts, and enhance positive impacts. Adequate and appropriate opportunity is being provided for public participation. Environmental attributes have been considered based on the available information, and environmental management practices have been identified and established to ensure that the proposed activities will proceed in accordance with the principles of IEM.

6. Motivation for the overall preferred site, activities and technology alternative.

The site was selected as it contains good quality building sand located in a convenient position in close proximity to transport routes and to the Applicant's business premises where the building material is manufactured. The layout and technology of this sand mining project has been determined by the shape, position and orientation of the mineral resource, which is the sand in the ephemeral drainage line.

The operational approach is practical and based on best practice to ensure a phased approach of mining followed by rehabilitation in sequential stages.

- The preferred and only location of the sand mining activity is on the earmarked section of the Dokerhoekspruit as indicated on the plans.
- The preferred and only activity is the mining of sand.
- The preferred and only technology is the use of machinery to remove the sand from the ephemeral drainage line, and for trucks to transport the sand to the Applicant's business premises.

The locality and layout of the activity on the site is shown in **Figure 1 to 3**.

There are no other reasonable or feasible sites, layouts, activities, technologies, or operational alternatives for further consideration in the impact assessment component, other than the mandatory "no-go" alternative that must be assessed for comparison purposes as the environmental baseline.

7. Details of the Public Participation Process Followed

7.1 Introduction

The public participation process has been conducted according to the requirements as prescribed in Regulations 40 to 44 of the EIA Regulations, 2014 (as amended).

The formal public participation process, which meets the requirements of the NEMA EIA Regulations and the MPRDA were followed and include the following activities:

Potential I&APs was notified about the project and of commencement of the Basic Assessment (BA) process and invited to registration as stakeholders by means of:

- Written notification to
  - the occupiers of the site and the owner or person in control of the site where the activity is to be undertaken;
  - owners, persons in control of, and occupiers of land adjacent to the site where the activity is to be undertaken;
  - the municipal councillor of the ward in which the site is situated
  - the municipality which has jurisdiction in the area;
  - every State department that administers a law relating to a matter affecting the environment relevant to an application for an environmental authorisation;
  - any organ of state having jurisdiction in respect of any aspect of the activity
- Media advertisements and site notices.
- Registered I&APs including every State department that administers a law relating to a matter affecting the environment relevant to an application for an environmental authorisation were given the opportunity to review and comment on the Draft Basic Assessment Report and plans submitted to such party during the public participation process.
- Registered I&APs will be notified of the outcome of the environmental authorisation, and if required the appeal process to be followed.

7.2 Summary of issues raised by I&Aps

Table 4 Summary of issues raised by I&Aps to be included in the Final BAR

Interested and Affected Parties, persons consulted is marked with an X		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Reference in this report where the issues and or response were incorporated.
ORGANS OF STATE					
Department: Agriculture, Environmental Affairs, Rural Development and Land Reform	X				
Department of Water & Sanitation	X				
Dept of Roads and Public Works					
National Department of Transport: Environmental Co-Ordinator	X				
SAHRA	X				
Landowners or Lawful occupier/s of the land					
Louisvale Irrigation Board	X				
Landowners or lawful occupiers on adjacent properties					
Municipal Manager Dawid Kruiper Local Municipality	X				
Johan Strauss Family Trust					
Lentlandspan (Pty) Ltd					
J Steenkamp Boerdery CC					
Daniel Johannes Malan	X				
Municipality					
"Z F Mgcawu District Municipality Municipal Manager"	X				
Dawid Kruiper Local Municipality	X				
Ward Councilor (Ward 9 Dawid Kruiper Local Municipality)					
Communities					
None					
Traditional Leaders					
None					
Interested parties - Reply on advertisement and site notices					

8. Process to reach the proposed preferred alternative

8.1 Site Alternatives

8.1.1 Location

This site was selected because it contains good quality building sand and it is located in a convenient position close to the R359 and the Applicant's Headquarters. The proposed site is located within a section of the Donkerhoekspruit on the Remainder Farm Jannelsepan No 39 based on the fact that the river sand is suited for building purposes. The section of the Donkerhoekspruit for sand mining has a flat gradient, with no permanent surface water. The rural nature of the area effectively means that the proposed mining activities will not disturb any local communities. There are no reasonable or feasible location alternatives for further consideration.

8.1.2 Type of activity

The Applicant is not the land owner, so it would not be realistic for the applicant to propose another type of activity, as his core business is the supply of building materials. The holder of a mining permit is required to rehabilitate the environment affected by mining to its natural state or to another predetermined land use. The mining activity takes place over a relatively short time period, so the selection of the best post-mining long term land use is an important consideration. In the case of this application the best post-mining land use alternative is to return the ephemeral drainage line to a natural state as functional drainage line. Other activity alternatives have therefore not been considered as the purpose of the proposed project is to mine sand from the section of the ephemeral drainage line as indicated. The only other activity required to be assessed in terms of NEMA is the "do-nothing" alternative, as detailed further below.

8.1.3 Design or Layout of activity

The design or layout of a mining project is determined by the shape, position and orientation of the mineral resource, which in this case is linear along an ephemeral drainage line lying in a south-north orientation. There would be two feasible ways of mining this resource. It could be mined from south to north or in the opposite direction. Best practice dictates that it is better to mine and rehabilitate the area sequentially in mining blocks from upstream, as this minimises the disturbance to the mining blocks once they have been rehabilitated. The significance of the environmental impacts associated with different possible design or layout alternatives would be very similar, therefore layout alternatives have not been assessed in the impact ratings table.

8.1.4 The technology to be used in the activity

The technology used in a mining project is determined by the shape, position and orientation of the mineral resource, with the technology alternative for sand mining being restricted to the use of machinery to remove the sand to an average depth of 1.5 metres, and includes trucks for the hauling of the sand to the Applicant's business operations. There are no technology alternatives for further consideration.

8.1.5 Operational alternatives

The proposed sand mining activities will take place during normal working hours from 07h00 to 18h00 on week days and Saturdays. The hauling of the sand will therefore also take place during these hours. There are no operational alternatives for further consideration.

8.1.6 The No-go Alternative

The No-Go Alternative will mean that sand mining will not take place. There will no supply

of sand for the building and renewable energy industry from this site, resulting in the need to look for suitable sand deposits in other river channels. There will be no new employment opportunities or guaranteed job security.

The No-Go Alternative will result in the status quo remaining of the section of the Donkerhoekspruit earmarked for sand mining. The Donkerhoekspruit is considered to be a Category C River, which means that it is Moderately Modified. The alien vegetation that is present in the river is required by the National Environmental Management Biodiversity Act to be removed by the landowners, with or without the sand mining operation in the river.

The assessment of alternatives must at all times include the "no-go" option as a baseline against which all other alternatives must be measured. The "no go" alternative is therefore assessed together with the preferred alternative.

8.2 Site sensitivity (Baseline Environment)

8.2.1 Regional setting

The proposed sand mining area is located on a section of the Donkerhoekspruit on Farm Jannelsepan No. 39, located 12km south-west of Upington in the Dawid Kruiper Local Municipality of the ZF Mgcawu District Municipality, Northern Cape. The site is located approximately 5.5km east of the Orange River and 4.5 km's east of Louisvale.

8.2.2 Geology

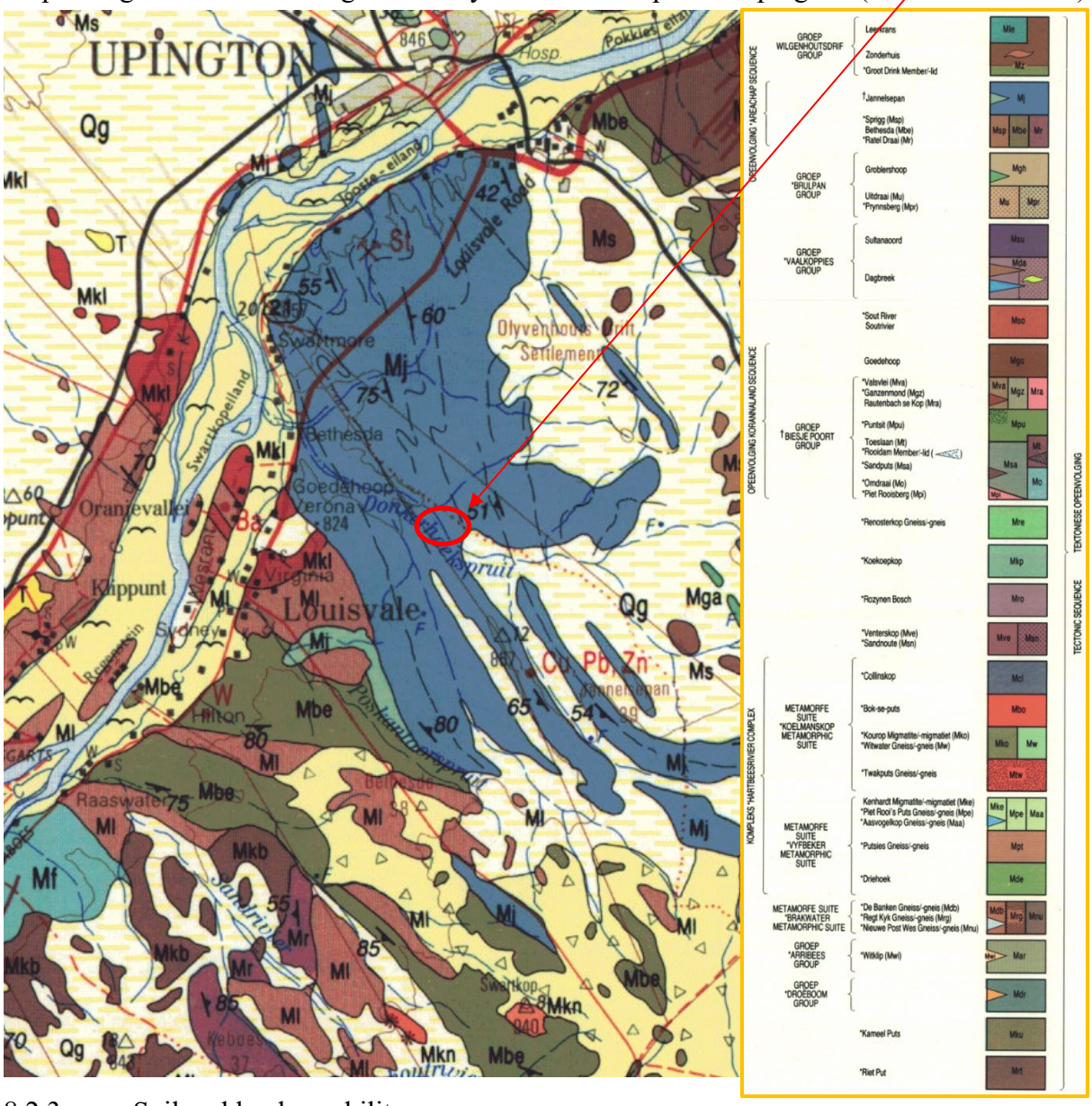
According to the PIA (Annexure 4) the proposed sand mining site lies in the Areachap Terrane of the Namaqua-Natal Province which has been broadly dated to between 1200 and 1000 Ma (Cornell et al., 2006). This complex of metamorphic rocks has been intruded by pre-tectonic intrusive orthogneisses and also by syn- to late-tectonic granitoids, such as the Eendoorn Suite and Daberas Granodiorite, and the Friersdale Charnokite.

This region is called the Namaqua-Natal Province and comprises igneous and metamorphic rocks that were formed or metamorphosed during the Namaqua Orogeny about 1200-1000 million years ago. The Jannelsepan Formation comprises migmatitic amphibolite and calc-silicate rocks. It has been interpreted as metamorphosed basaltic lavas and dolerite (Cornell et al., 2006). Precise dating of the various rocks is problematic. To the northeast are the schists, quartzites and amphibolites of the Dagbreek Formation. They are close to the Trooilapspan Shear Zone.

Overlying part of these ancient rocks are extensive deposits of the Kalahari Group that are considerably younger and are composed of aeolian sands, alluvium and calcrete. A thin film of haematite on the rounded sand grains gives them a reddish colour (Partridge et al., 2006). In some parts the sands form dunes that have been stabilised by vegetation.

Figure 5: Geology of Mining area

Map enlarged from the Geological Survey 1: 250 000 map 2820 Upington. (Area shown in red)



8.2.3 Soil and land capability

According to the screening report (DEA) no nearby wind or solar developments or intersections with Environmental Management Framework areas are present. The closest approved Solar PV is 8.8Km from the mining area.

The proposed project site is located within an 860m section of the Donkerhoekspruit. Farm Jannelsepan No. 39 is boarded by mostly undeveloped natural. There is two existing sand mining operation immediately upstream of the proposed site operating under approval of 10113MP registered to Sizwe Planthire CC and 10658MP Van Zyl's Blasting en Grondwerke CC.

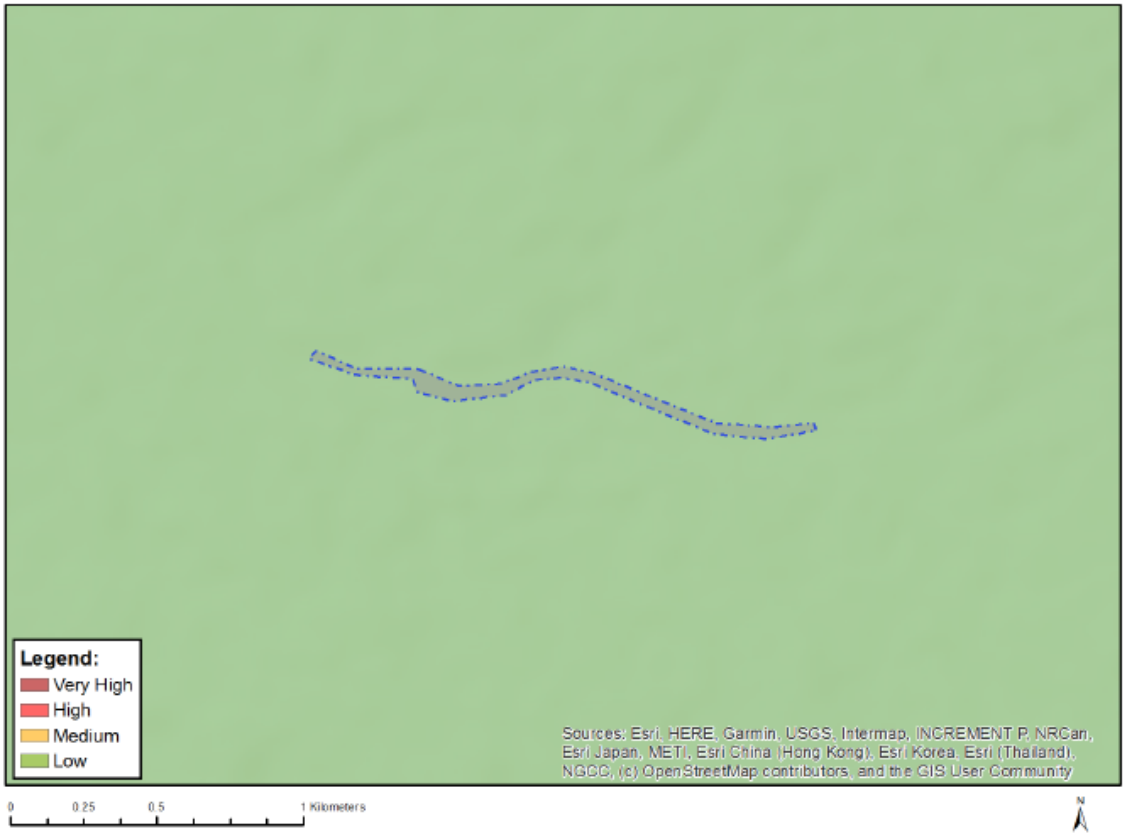
The surrounding landscape is typical of that occurring generally away from the Orange River in this region, tending to be rocky with shallow sandy soils and relatively to extremely sparse vegetation. This particular stretch of the Donkerhoekspruit has quite marked riverine vegetation, where patches of deeper sediment are preserved.

For the Agriculture Theme the sensitivity is regarded as low sensitivity and is used for livestock grazing and production (Refer Figure 6a and Table 5)

Table 5: Agriculture theme Sensitivity Features

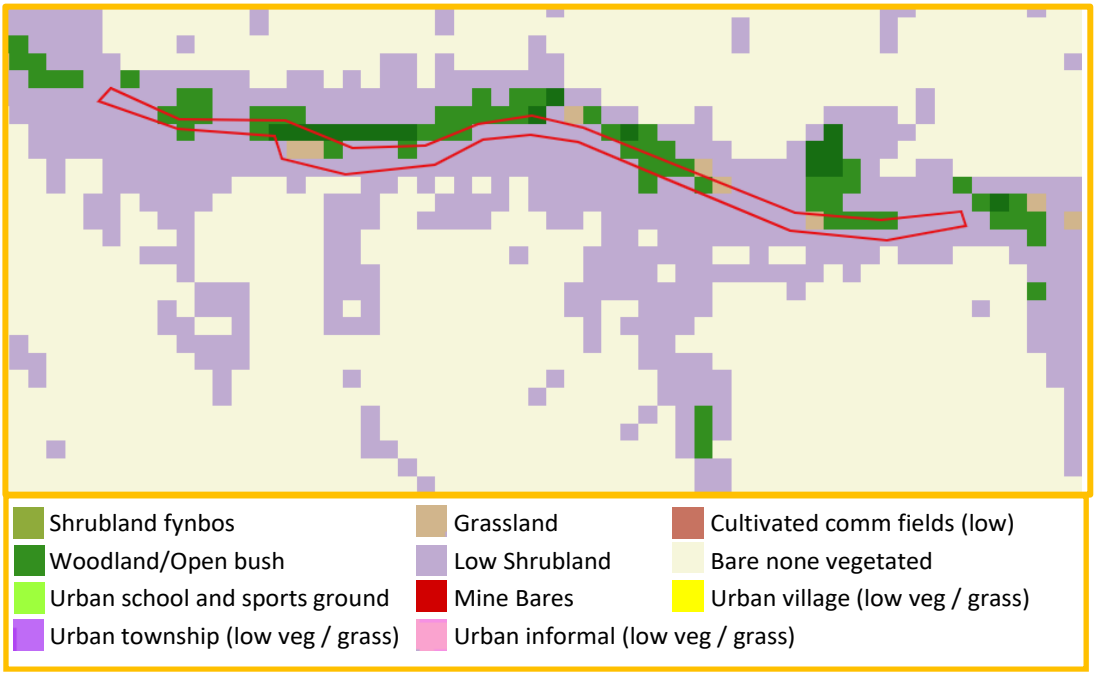
Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low

Figure 6a: Map of relative agriculture theme sensitivity



Note that current land cover indicators do not take into account degradation due to, for example, spread of alien plants, secondary impacts of mining (e.g., sand mobilization) or overgrazing by livestock. The Land Capability map is provided as Figure 6b.

Figure 6b: Mining area in terms of Land Cover sourced off SANB BGIS Map Viewer



As can be seen from Figure 6a the small footprint of mining activities 5Ha will not have an impact on other land uses or agricultural production. No Agro-Ecosystem Specialist Assessment is therefore required due to the fact that no areas were identified as being of "very high" or "high" sensitivity for agricultural resources during the site verification.

8.2.4 Landscape – Topography

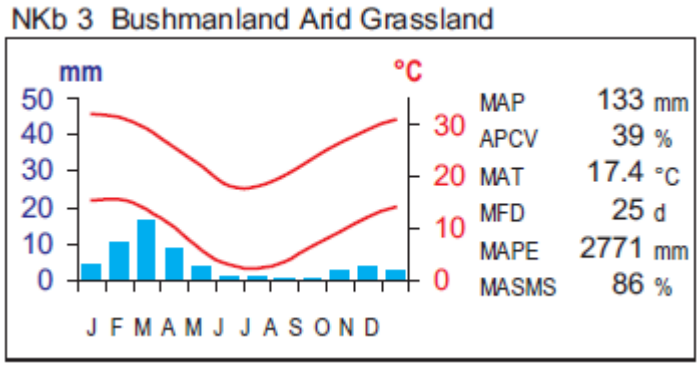
As described in the Heritage Impact Assessment: "The surrounding landscape is typical of that occurring generally away from the Orange River in this region, tending to be rocky with shallow sandy soils and relatively to extremely sparse vegetation. This particular stretch of the Donkerhoekspruit has quite marked riverine vegetation, where patches of deeper sediment are preserved."

The proposed project site is located within an 860m section of the Donkerhoekspruit. Farm Jannelsepan No. 39 is boarded by mostly undeveloped natural areas as shown on Figure 1.

8.2.5 Climate

According to Mucina and Rutherford (2006), the rainfall is largely in summer and early autumn and is very variable for year to year. The Mean Annual Precipitation (MAP) ranges from about 70mm in the west to 200mm in the east. Mean maximum and minimum monthly temperatures for Kenhart are 40.6°C and -3.7°C for January and July respectively. Frost incidence ranges from around 10 frost days per year in the northwest to about 35 days in the east. Wind swirls (dust devils) are common on hot summer days (Figure 7).

Figure 7: Climate Figure



8.2.6 Biodiversity, Flora and Fauna

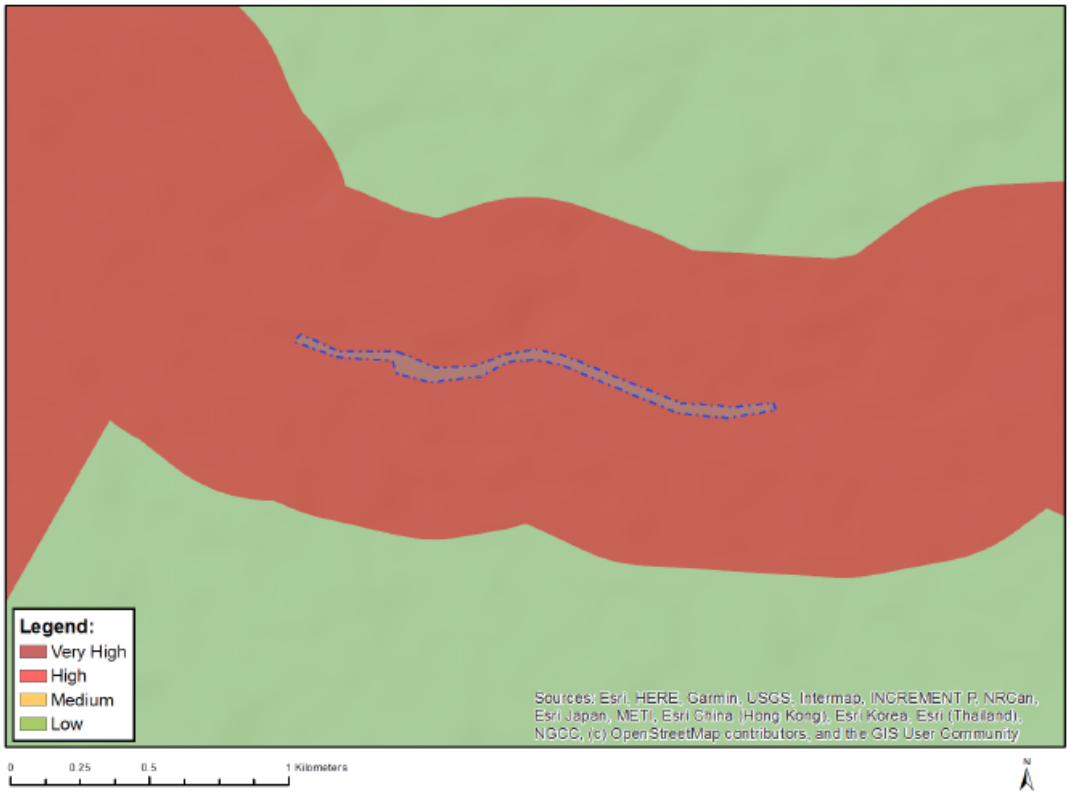
Biodiversity

According to the screening report (DEA) the mining area is regarded as very high sensitivity with regard to Terrestrial Biodiversity as it is located within Ecological Support Area (Refer Table 6 and Figure 8a).

Table 6: Terrestrial biodiversity theme Sensitivity Features

Sensitivity	Feature(s)
Very High	ESA

Figure 8a: Map of relative terrestrial biodiversity theme sensitivity



The location of the project site is within Bushmanland Arid Grassland (NKb 3). According to Mucina and Rutherford (2006) this vegetation is associated with extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses which gives this vegetation type the character of semi-desert 'steppe", with low shrubs in places, and annual herbs after good rainfalls.

According to Mucina and Rutherford (2006) this vegetation type (Bushmanland Arid Grassland) is Least Threatened, with none conserved in statutory conservation areas and with very little having been transformed, where the alien shrub Prosopis sp. which can be seen as threat.

The vegetation found along the Donkerhoekspruit corridor is characteristic of non-perennial drainage channels in the area, with larger trees located along the banks of the river including such alien invasive trees such as Prosopis sp., and protected tree species such as the Camelthorn tree (*Vachellia erioloba*).

Figure 8b: Critical Biodiversity Areas

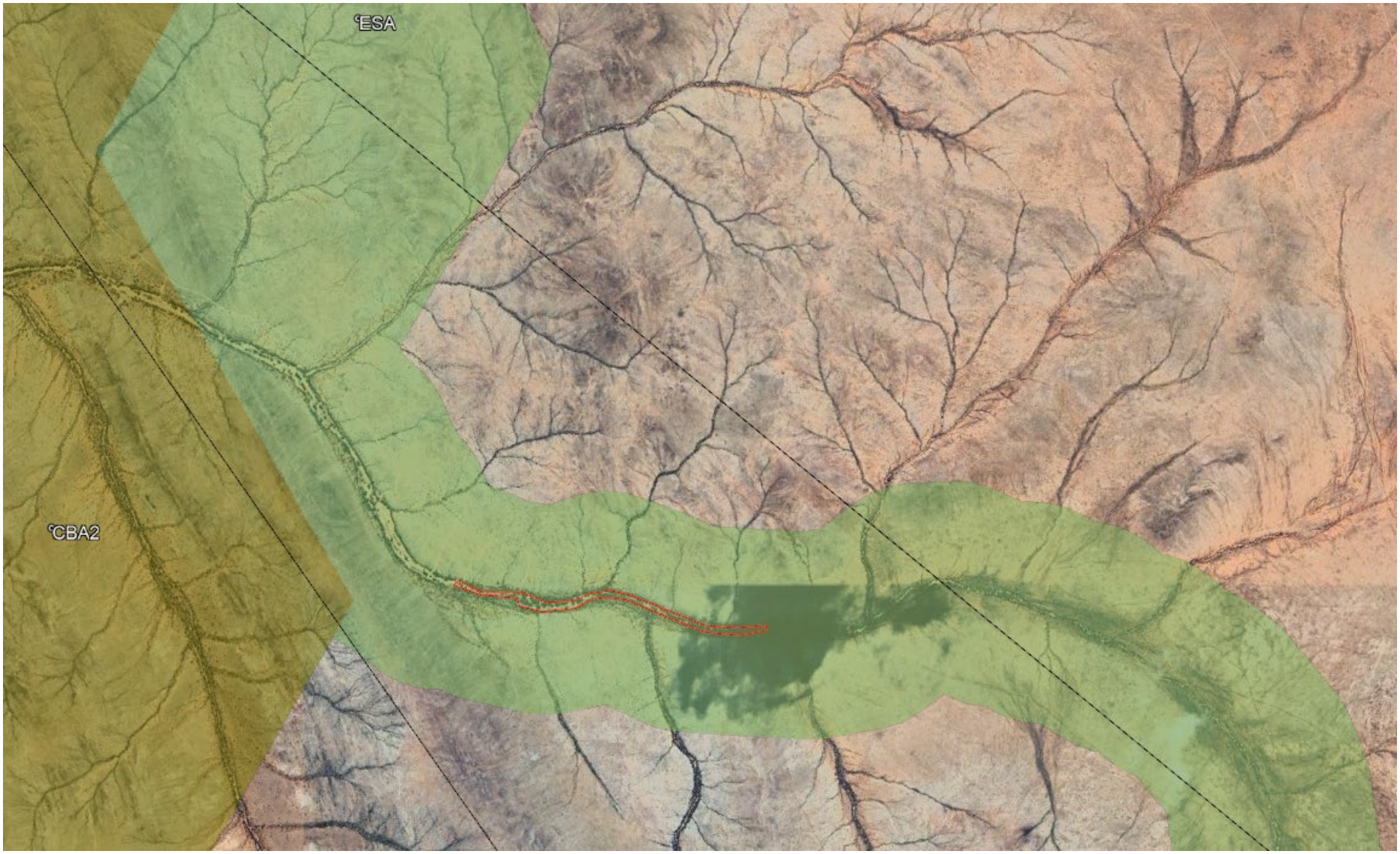


Figure 8c: Sensitive Ecosystems (none within 50Km)

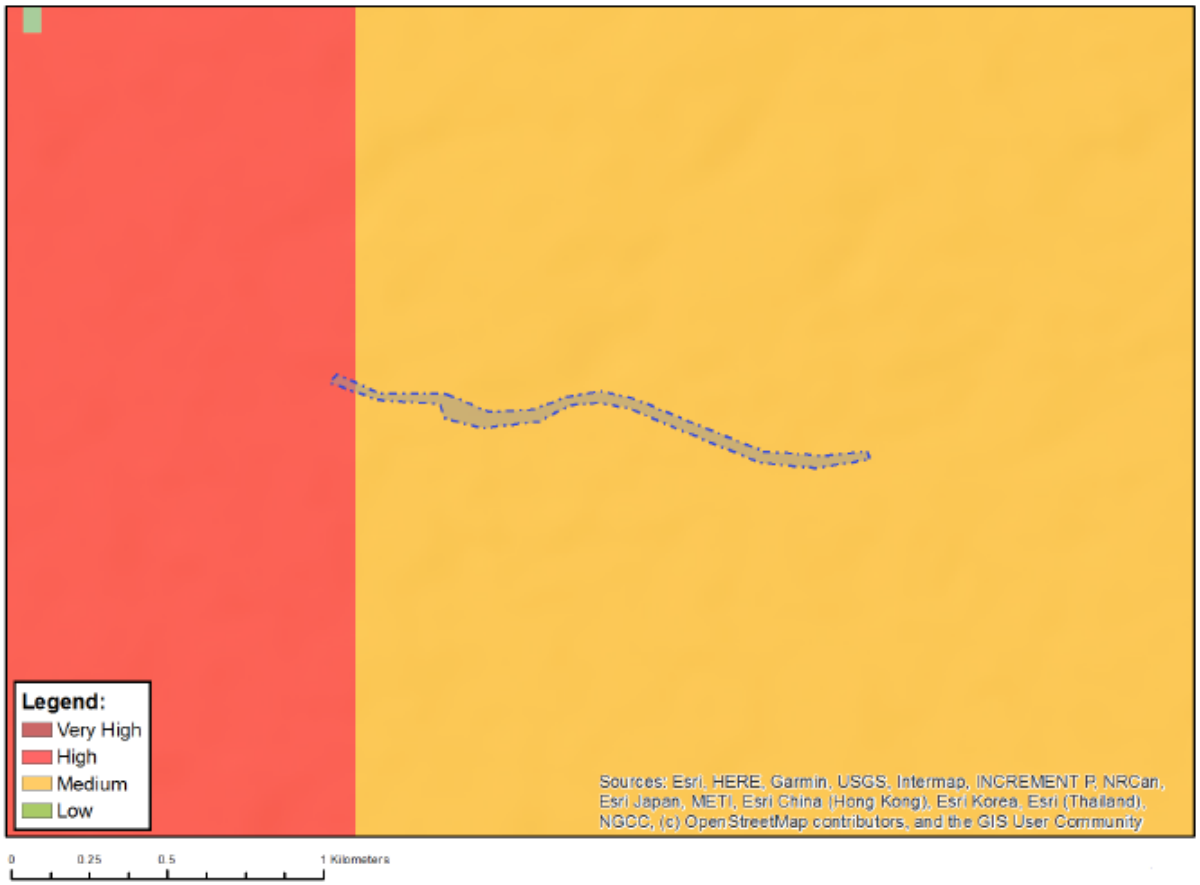
Fauna

According to the screening report (DEA) the major part of the prospecting area is regarded as medium sensitivity with regard to Animal Species with only a very small portion in the west regarded as high sensitivity (Refer Table 7 and Figure 9).

Table 7: Animal Species theme Sensitivity Features

Sensitivity	Feature(s)
High	Aves-Neotis ludwigii
Medium	Aves-Neotis ludwigii

Figure 9: Map of relative Animal Species theme sensitivity



With reference to Table 7 the only species listed as medium sensitivity is the Aves species, Neotis ludwigii (Ludwig's bustard). Ludwig's bustard is classified as Endangered according to the IUCN Red List, as the population is projected to have undergone a very rapid population decline due to collisions with power lines, a trend which is set to continue into the future as the power grid in southern Africa expands and successful mitigation measures are yet to be implemented.

No terrestrial animal species specialist assessment is necessary as these birds have a wide distribution range and sand mining activities will have no impact on this species and if a nesting site is discovered it will be avoided. Mining activities will have an insignificant impact on animal species due to the small areas to be disturbed and short duration of activities. Mitigation of the disturbance is also possible and after mitigation there will be no impact.

Flora

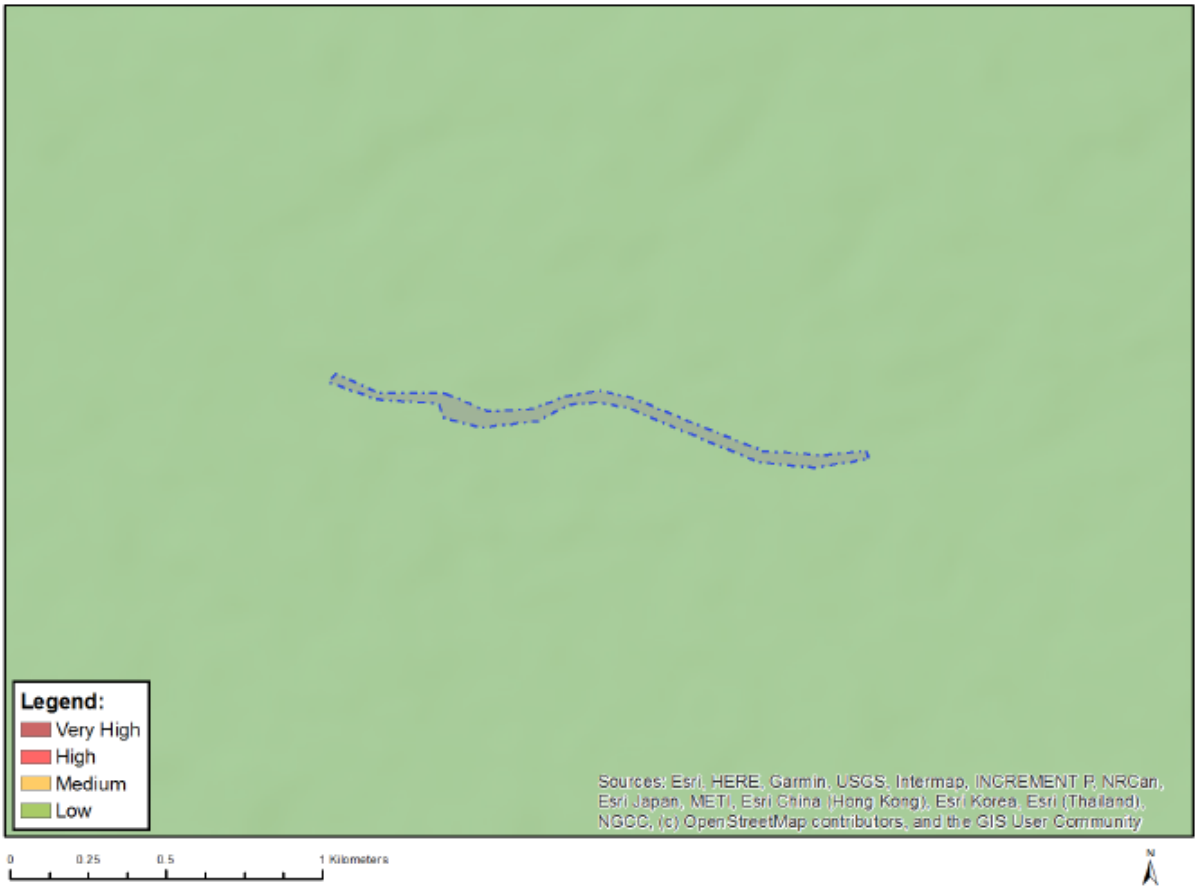
According to the screening report (DEA) the mining area is rated as having a low sensitivity regarding plant species (Refer Table 8 and Figure 10a and 10b).

The mining area is dominated by Bushmanland Arid Grassland (NKb 3) vegetation unit (Mucina and Rutherford, 2006), which is not classified as Critically Endangered, Endangered nor Vulnerable in terms of the NEM:BA listed Ecosystems (GNR 32689) (Figure 10b).

Table 8: Plant Species theme Sensitivity Features

Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 10a: Map of relative Plant Species theme sensitivity



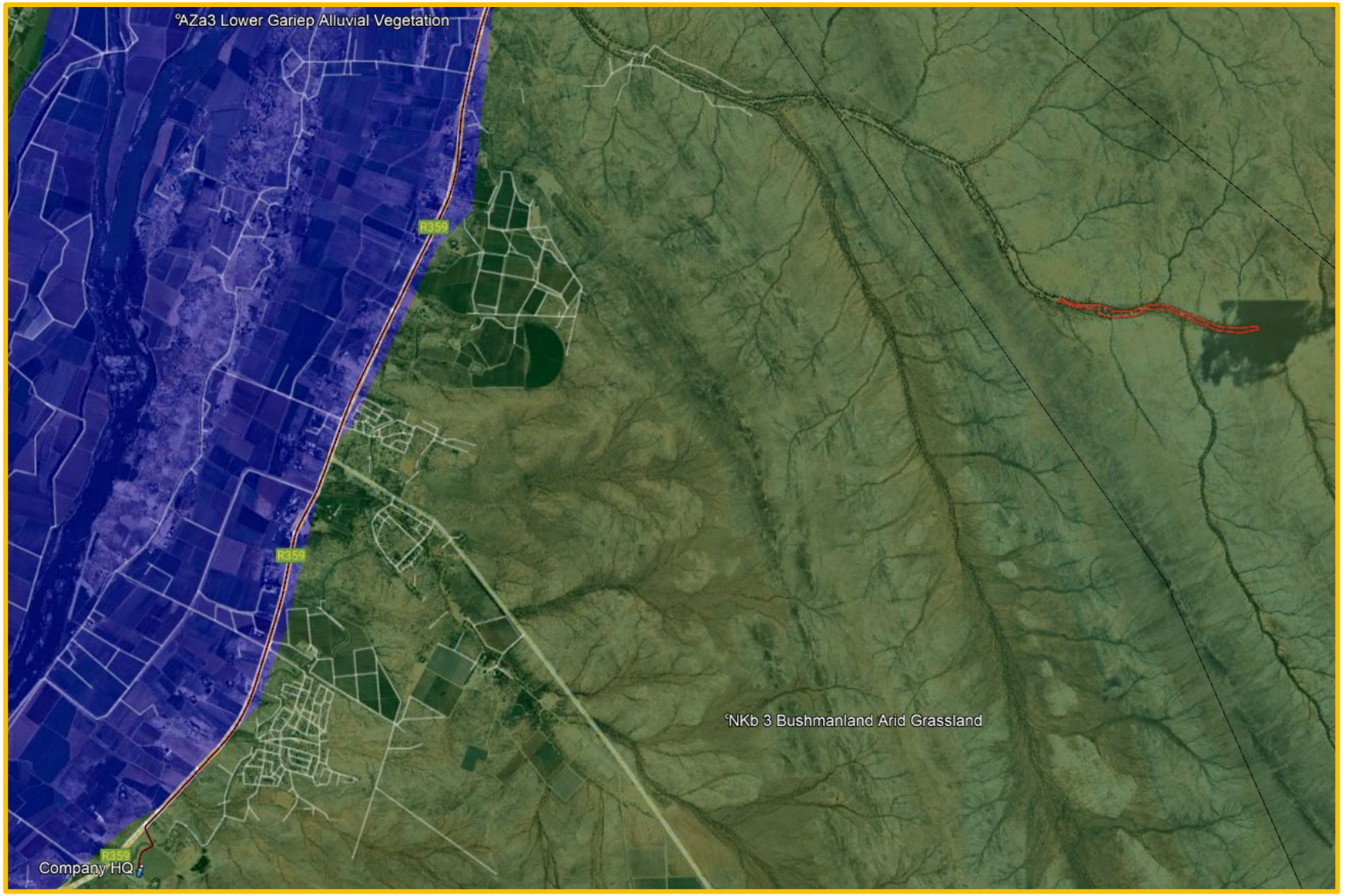
Bushmanland Arid Grassland (NKb 3)

According to (Mucina and Rutherford, 2006 this vegetation is associated with extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses which gives this vegetation type the character of semi-desert ‘steppe”, with low shrubs in places, and annual herbs after good rainfalls.

According to Mucina and Rutherford (2006) this vegetation type (Bushmanland Arid Grassland) is Least Threatened, with none conserved in statutory conservation areas and with very little having been transformed, where the alien shrub Prosopis sp. which can be seen as threat.

The vegetation found along the Donkerhoekspruit corridor is characteristic of non-perennial drainage channels in the area, with larger trees located along the banks of the river including such alien invasive trees such as Prosopis sp., and protected tree species such as the Camelthorn tree (*Vachellia erioloba*).

Figure 10b: Vegetation



8.2.7 Aquatic biodiversity and Water Resources

The three main rivers in the ZF Mgcawu District Municipality (ZFM) are the Orange, Hartbees and Molopo Rivers. The Orange River is under severe pressure from agriculture and the encroachment of alien vegetation. All rivers in the ZFM, except the Orange River, are non-perennial rivers.

The proposed site is located with the D73F Quaternary Catchment area which falls under the Department of Water & Sanitation's Lower Orange Water Management Area.

Refer to Figure 1, 2 and 3 that shows the location of the project site on a section of the Donkerhoekspruit, which is a tributary to the Orange River. It is not a Freshwater Ecosystem Priority Area (FEPA), and is classed as Category C: Moderately Modified as referenced from the SANBI BGIS NFEPA Database Map Viewer.

River FEPAs achieves biodiversity targets for river ecosystems and threatened/near-threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological category). Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. This does not mean that FEPAs need to be fenced off from human use, but rather that they should be supported by good planning, decision-making and management to ensure that human use does not impact on the condition of the ecosystem. It is important to note that river FEPAs currently in an A or B ecological category may still require some rehabilitation effort, e.g., clearing of invasive alien plants and/or rehabilitation of river banks.

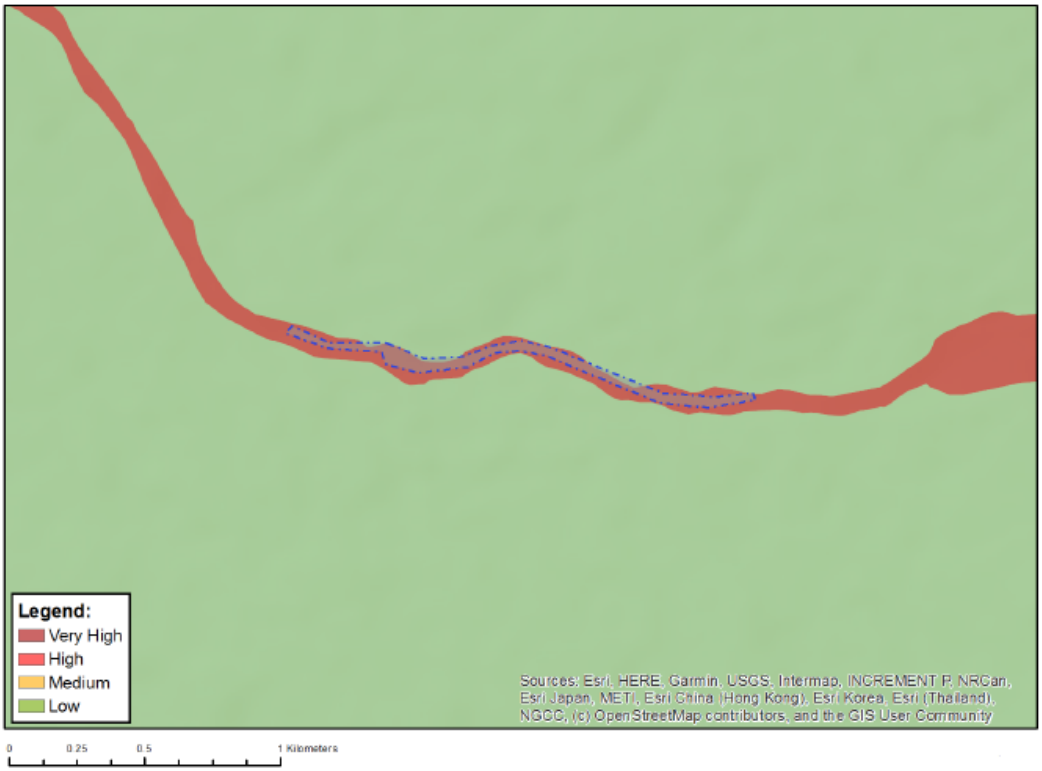
There are no wetlands near the proposed project site as shown in Figure 11b.

According to the screening report (DEA) the mining area is rated as having a very high sensitivity regarding Aquatic biodiversity (Table 9 & Figure 11a).

Table 9: Aquatic biodiversity theme Sensitivity Features

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Rivers_AB
Very High	Wetlands_(River)

Figure 11a: Map of relative Aquatic biodiversity theme sensitivity



This mining operation will require Water Use Authorization (WUA) in terms of the National Water Act, Act 36 of 1998, but as it falls within the ambit of the General Authorisation no. 4229: Government notice 509 of 2016 it is regarded as permissible in terms of Section 22 (1) (a) (iii) of the NWA. A general authorisation for section 21 c & 21i water uses of the NWA (36, 1998) were obtained for Impeding or diverting the flow of water in a watercourse (21c) and Altering the Bed, Banks, Course or Characteristics of a Watercourse (21i) (Annexure 4).

Figure 11b: Location of Mining area in relation to Aquatic biodiversity

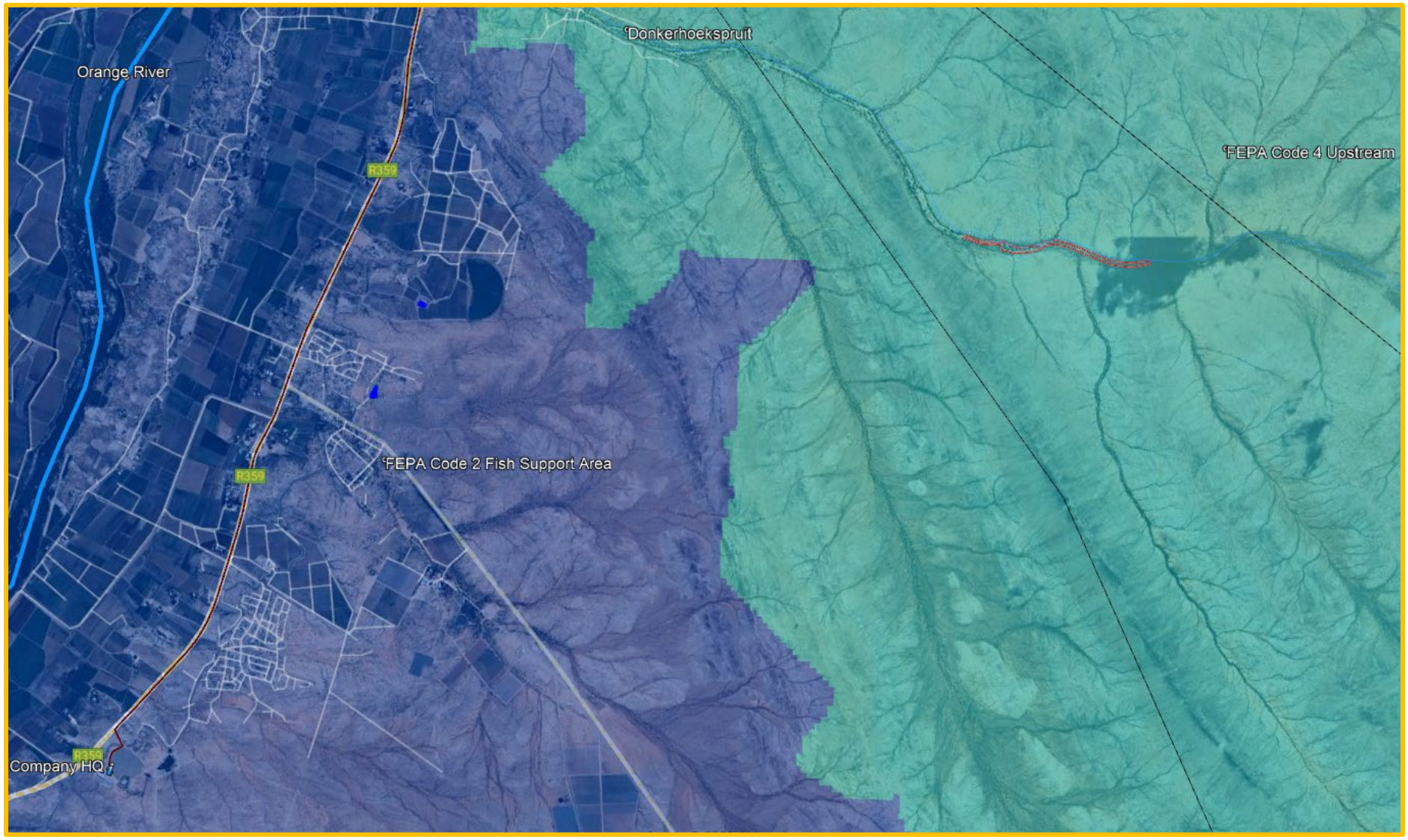


Figure 11c Location of Mining area in relation to Wetland features

8.2.8 Emissions

Air Quality

Dust is generated by wind over un-vegetated or denuded areas and given the surrounding extent of semi-desert dust generation is high under windy conditions (dust storm). Dust is generated off un-surfaced roadways on site and during the existing mining operations from the adjacent mines which has transported the finer sand over the adjacent areas. Mining activities will take place in a very remote area and dust generation will be limited to a small radius around the operation.

Noise

Farm traffic-generated noise occurs in the area and such noise levels are low (observed estimate at ±55dBA). Noise from earth moving equipment and machinery associated with the existing mining operation on the adjacent mine will be within the norm and due to the remote locality of the operation will have no impact.

8.2.9 Socio-economic

Local economy

Key constraints/problems/issues in terms of the development of Dawid Kruiper Municipality include a shortage of job opportunities and job creation in the area. The natural resource base and economy does not have the capacity to support the total population, forcing the labour force to seek employment opportunities outside of the Municipality (e g. Kimberley), etc. Furthermore, low levels of income obtained in the area imply low levels of buying power and, therefore, few opportunities for related activities such as trade. This in turn also supports the "leakage" of buying power.

With regards to the socio-economic characteristics of the local population, the employment rate for the Municipality is relatively high, with as much as 75% of people of working age who are actively seeking employment being able to secure a job. However, the majority of the employed population is found in elementary occupations, which require little or no skills. This is also reflected in the low education levels of the local population, with as much as 12% of the population aged 20 years and older having no form of education whatsoever. This, to some extent, constrains the development potential of the Municipality in the development of more advanced industries. The level of employment and type of occupations taken up by the population of the Municipality also directly affects their income levels.

The Municipality's economy is rather centred on the trade and retail sector, due to its strong tourism sector, leaving the local economy fairly vulnerable for any significant changes in this industry. It is, therefore, important that the Municipality seeks to further diversify its economy into other sectors. Furthermore, the manufacturing sector of the municipality is one of the lowest performing sectors of the local economy. This sector has the potential to generate significant growth for the region, and Dawid Kruiper Municipality is experiencing a lack of manufacturing activities. As a result, much in the municipality has to be sourced from outside of the municipal boundaries, resulting in money flowing out of the local economy.

Due to the unique spatial manifestation of the municipality, both the first and second economy is mostly located around the CBD and farms. Upington has a well-defined business centre with numerous residential areas. Secondary activities in the study area are mainly light industrial, warehousing, and light engineering works.

New economic opportunities arose for the Dawid Kruiper municipal area with the generation of sustainable solar energy developments, including the need for new power line construction in the area, creating employment opportunities, and economic spin-offs such as an increase in the demand for the supply of locally sourced building materials.

Social Profile

According to the Stats SA Census 2011 data the population of Dawid Kruiper Municipality's was 107 162 in 2016. This reflects an overall population growth of 1.82% between 2011 up to 2016. The unemployment rate decreases significantly from 34% in 2001 to 22.1% in 2011, and there was a huge decline in the youth unemployment rate from 42.3% in 2001 to 29% in 2011 but the youth unemployment rate is still very high in comparison with the overall unemployment rate of the municipality. Although about 44.7% of the Dawid Kruiper population is between 14 and 35 years old, youths remain relatively marginalised. All municipal services except sewerage increased since 2001 with electricity for lighting increased from 91.1% in 2011 to 94% in 2016 within the Khara Hais area and 69 % within the Mier Area, respectively.

8.2.10 Paleontological, Archaeological and Cultural and Heritage Resources

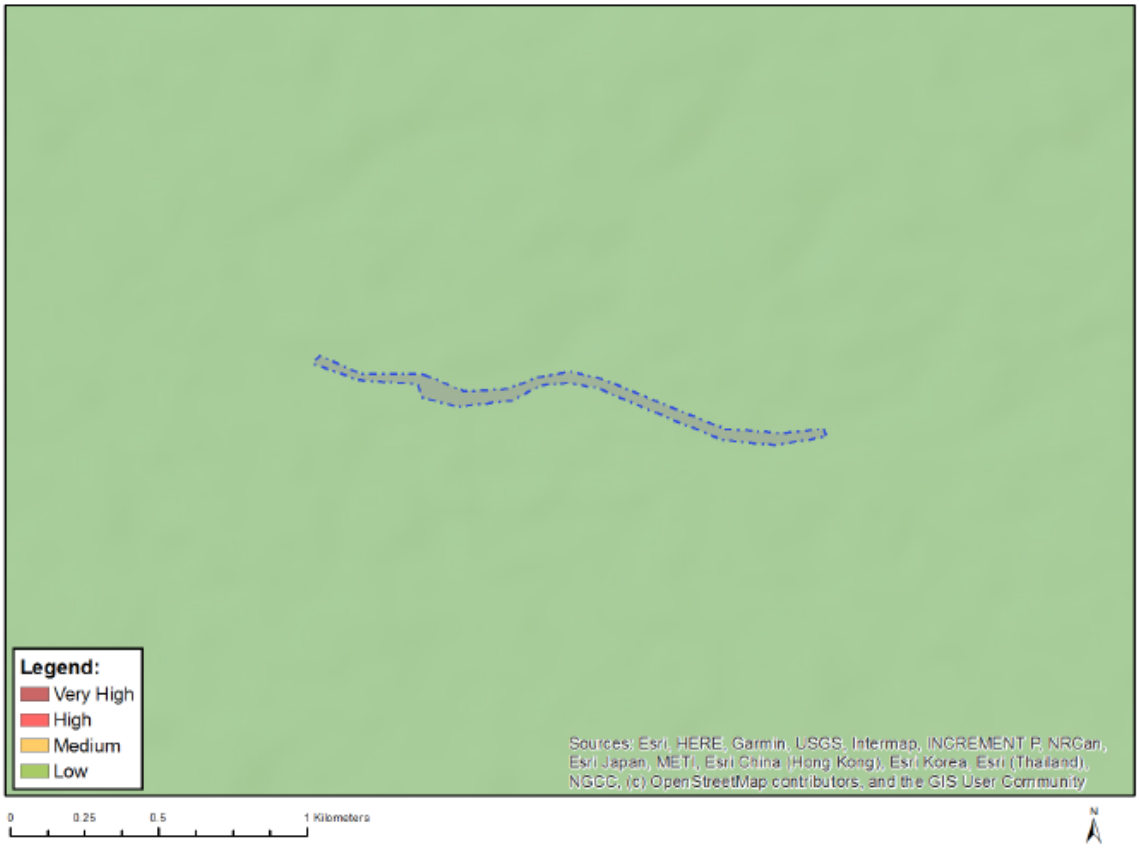
According to the screening tool the relative archaeological and cultural heritage sensitivity is rated as low (Refer Table 10 and Figure 12a).

According to the AIA (Annexure 3) Precolonial/Stone Age material noted at the portion of Jannelsepan was found to be generally of low significance, where present at all. Minimal isolated archaeological finds found in the sand source area within the dry bed of the spruit are in secondary context. Criteria used for impact significance assessment for archaeological traces rate the impacts as not worthy of further mitigation. Mining should however be limited to the intended zone within the bed of the spruit so as not to disturb possible materials in in situ sediments alongside the spruit.

Table10a: Cultural and Heritage theme Sensitivity Features

Sensitivity	Feature(s)
Low	Low sensitivity

Figure 12a: Map of relative Cultural and Heritage theme sensitivity



According to the screening tool the relative Palaeontological sensitivity is rated as medium as is the case according to the SAHRA Paleontological (fossil) Sensitivity Map (Refer Table 10b and Figure 12b & 12c). The PIA (Annexure 4) states that based on the nature of the project, and since there is no chance of finding fossils in either the hard rock or loose surface sands there would be no impact on the fossil heritage. Taking account of the defined criteria, the potential impact to fossil heritage resources is zero.

Table10b: Paleontological theme Sensitivity Features

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity

Figure 12b: Map of relative Paleontological theme sensitivity

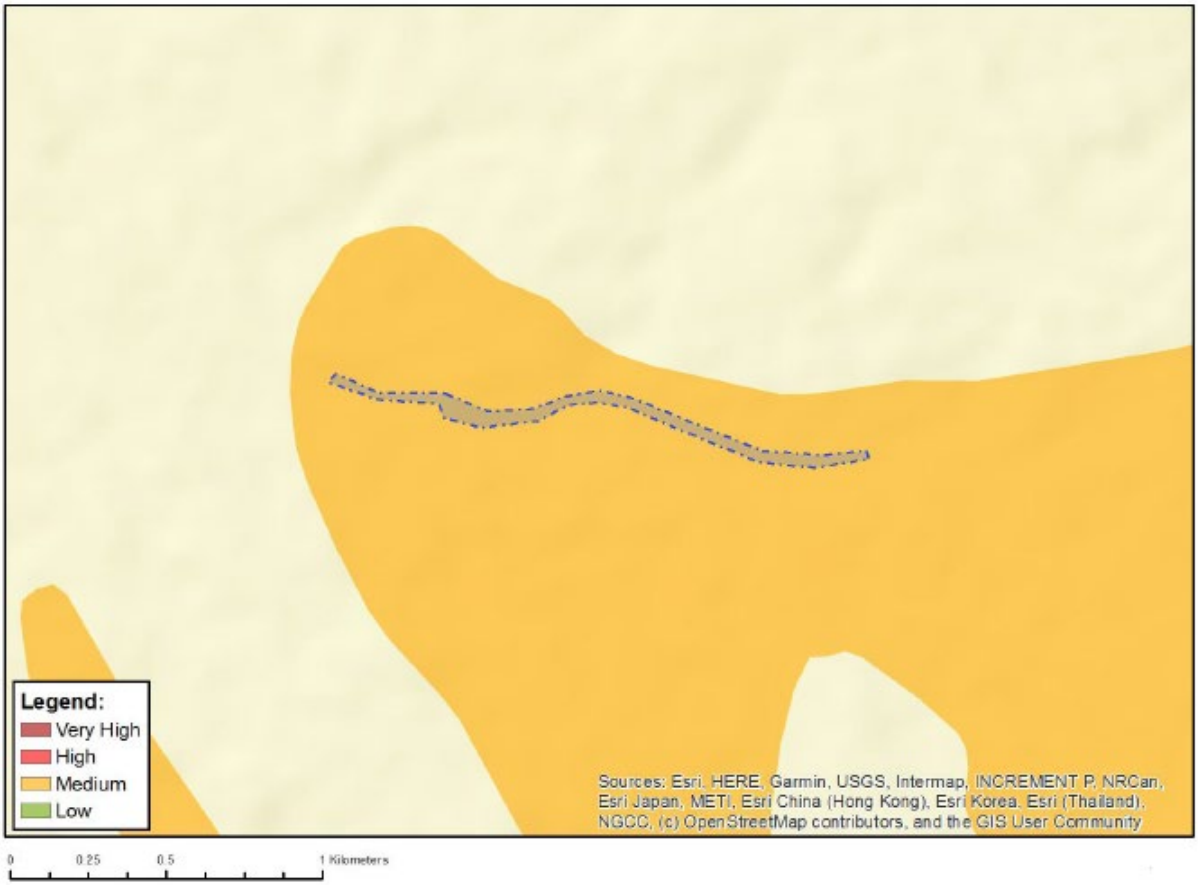
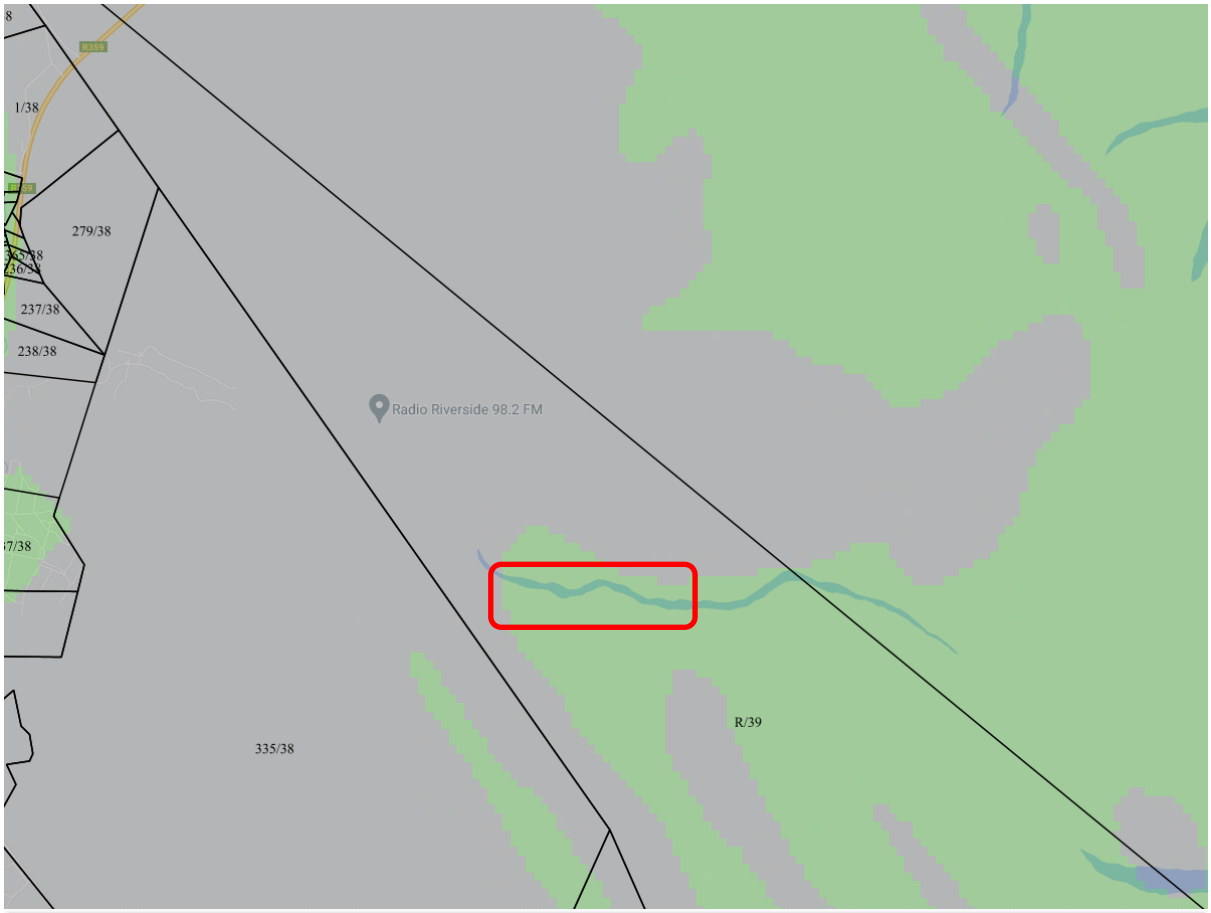


Figure 12c: Map of relative Palaeontological theme Sensitivity (*Extract from the SAHRIS Palaeosensitivity Map*)



Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

8.2.11 Environmental and current land use maps

There are existing mining sites in the project site, as detailed in Section 3 above. There is also extensive livestock farming in the area. Refer to Figure 4 to 12 provided as part of the specific attributes and sections above.

8.2.12 Description of specific environmental features and infrastructure on the site

Refer to Figure 3 to 12 which provides an overview of the position of the propose project site in the Donkerhoekspruit, the existing access tracks, and the extent of the vegetation on the river banks and in the river itself.

The area also has a number of farm tracks that traverse the site from the R359. The invasive activities will seek to use existing roads in order to access the property and it is not expected that any new access roads will be opened up. The map Figure 1 and 3 above gives an overview of the mining area, settlements and roads that traverse the site.

9. Risks and associated Impacts identified

As described earlier in this report, the mining activities are restricted to the removal of river bed sand up to an average depth of 1.5 meters from an ephemeral drainage line.

The impact assessment focuses only on the invasive aspects (associated activities) as these will have the potential to impact on the biophysical and social environment. The impact assessment (Table 14) is furthermore separated into three distinct phases, namely:

- Construction phase (Site establishment);
- Operational phase (Sampling and Drilling), and.
- Decommissioning

9.1 Potential Risks/impacts

9.1.1 Potential risks associated with Soil (contamination, erosion, compaction) & Land capability (viable and sustainable land)

- Uncontrolled expansion of mining footprint by not restricting the area disturbed by mining and the associated activities/infrastructure, resulting in loss of land with agricultural potential.
- Uncontrolled development of roads, where existing farm roads are not used for mining operations and redundant internal roads are left behind.
- Post-mining landform not compatible with the surrounding landscape and not capable of productive land use that achieves a land capability equal to that of pre-mining conditions.
- The post-mining landscape increases the requirement for long-term monitoring and management.
- Destruction of vegetation on the banks will lead to scouring, increased soil erosion causing loss of topsoil.
- Long term changes in land use are caused by not implementing prompt rehabilitation and maintenance of disturbances when possible as part of the annual rehabilitation plan.
- Unsuccessful rehabilitation can reduce the post-mining land use options. Rehabilitated areas could be too unstable to support post-mining land use objectives compatible with surrounding areas.
- The potential risks related to waste management practices that will require implementing of mitigation and management actions to limit the residual impact after mine closure.
- Sub-surface infrastructure remaining behind, limiting the intended post-closure land use including footings and foundations, power supply and water installations including pumps and pipelines.
- Unwanted ruins, buildings, foundations, footings and waste management practices creating or leaving legacies.
- Equipment and other items used during the mining operation were left behind.
- Incomplete removal of re-usable infrastructure.
- Rubble from demolished infrastructure left behind.
- No industrial or mine waste is generated during the mining process and all material consisting mainly of river sand will be removed from the site and sold as a FoT product. No processing will take place so no mining waste or overburden and fine residue dumps will be created and there will be only limited product stockpiles present on site.

9.1.2 Potential risks associated with Change in topography

- Change in topography due to excavations and stockpiles remaining after mining.
- Potentially dangerous areas like excavations incorrectly rehabilitated including uncontrolled access to potentially unsafe post-mining areas.

- The risk of deep and unstable excavations that can be detrimental to the safety and health of humans and animals can be regarded as insignificant given the extremely low rainfall in the area and small size of the excavations. The drainage channel is only in flood on average once a year and during flood events any excavations are filled naturally with sand washed in from upstream.
- Due to the simple mining process that only includes loading and hauling, there will be no unsafe areas like steep slopes that would require demarcation to prevent access by humans and animals.
- No infrastructure, sub-surface voids, fine residue dams or evaporation ponds will be developed that can lead to potentially unsafe post-mining areas; therefore, no post mining access control would be required.
- To prevent significant negative effects the post-mining topography must be adjusted where possible to minimise the effect on water flow and increase potential for re-vegetation.

9.1.3 Potential Risks associated with Biodiversity, Flora & Fauna

- Disturbance to sensitive environments such as Critical Biodiversity areas and any associated biodiversity corridors, land with historical or conservation value part of NPAES, Wetlands and other Aquatic Ecosystems, terrestrial habitats for species of conservation concern (SCC) and high potential agricultural land.
- Impact on biota would most likely be a result of the clearing of vegetation from the watercourse prior to sand removal taking place
- Disturbance of ecology due to loss of habitat and cumulative impact of illegal collecting during long-term or life of mine can degrade areas and reduce the viability of adjacent areas.
- Inadequate control of alien invasive vegetation species can result in the establishment of populations or seed sources that threaten adjacent areas.
- Loss of indigenous vegetation due to disturbed footprints at mining area.

9.1.4 Potential Risks associated with Aquatic biodiversity & Water Resources

- Impact on the flow regime would be definite, for the duration of the operational phase during which excavation equipment is required within the watercourse itself.
- Compacted areas such as roads and operational footprint areas would result in an increase of sheet runoff that would in turn increase the volume of water reaching the ephemeral drainage line.
- Inadequate topsoil restoration or creation of unnatural surface topography or slope which could impact lower or adjacent slopes due to increased runoff velocity.
- Altered storm water runoff response due to large impervious areas and concentrated runoff in drainage systems. Concentrated storm runoff from infrastructure areas is erosive, causing sheet, rill and donga erosion features.
- Impact on surface water through modification of infiltration rates by increasing the extent of hardened surfaces.
- Potential contamination of groundwater from unmanaged use of hydrocarbons on-site, and incorrect storage of hazardous substances.
- Oil fuel leaks onto soil through the earthmoving and transport equipment and machinery or spillage of fuel during the transfer from fuel bowser to equipment.
- Chemical contaminants impacting surface and/or groundwater quality or resulting in discharge that exceeds the concentrations permitted.
- Vehicle wash bays and workshop facilities produce petrochemical and solvent contaminated runoff.
- Sanitary conveniences, fuel depots or storage facilities of potentially polluting substances

can contaminate surface water.
- Waste classes are not kept in separate streams and incomplete removal of waste.
- The potential risks arising after mine closure are changes in the quantity of surface water compared to pre-mining quantities that may negatively affect the area.

9.1.5 Potential Risks associated with visual intrusion, noise, vibration, light pollution and air emissions.

- Terrain morphology plays a critical role in defining the visual envelope of mine developments and can either reduce or enhance visual impact. Apart from visual intrusion, there is also the risk of a reduced sense of place. The visual intrusion impact of mining activity would be on nearby roads, homesteads, settlements, tourist accommodation, and along tourism routes or corridors.
- The visual disturbance would be caused by mining activities such as excavations. Buildings provide a colour contrast, as do disturbed areas against adjacent natural areas.
- Nuisance effects of air emissions due to a lack of implementation of dust suppression activities could impact on communities.
- Dust generated on haul roads reduces visibility, representing a safety hazard.
- Dust can retard vegetation growth and reduce the palatability of vegetation.
- The cumulative effect of a rise in the ambient noise levels or high noise levels in specific areas that exceed specified levels would impact on communities in close proximity.
- Noise disturbance and light pollution would result from night-time activities (if applicable) in areas that are in close proximity to communities.

9.1.6 Potential Risks associated with the socio-economic environment.

- Disturbance of local communities in urban and rural areas caused by noise and dust emissions and increase in heavy vehicles along transport routes.
- Safety of personnel operating large earth-moving equipment.
- Dust, noise and vibration associated with mining activities, in relation to surrounding communities.
- An influx of people into the local communities looking for work, with an increase in demand for housing, schooling and services. Such an influx of workers into a community often results in a change in social dynamics.
- Positive impacts include, for example, the creation of both formal and informal businesses to supply additional needs, whilst negative social impacts include, for example, an increase in substance abuse, HIV transmission and unwanted pregnancies.
- Staff losing their jobs at mine closure can have devastating effects on communities that are reliant on mine-based income.
- Job losses of secondary industries, businesses and contractors and contractual agreements with service providers surpassing mine closure date.
- Lack of compliance with the approved EMPr and a lack of auditing of the EMPr.
- Closure stalled due to non-compliance with relevant legislation (national, provincial and local).
- Insufficient funds for complete rehabilitation.

9.1.7 Potential Risks associated with regard archaeological, cultural heritage or paleontological sites

- Disturbance of identified surface, or unknown sub-surface sites, if mitigation and monitoring is not implemented as per mitigating measures in the specialist assessments.
- Progressive development can encroach upon or disturb identified sites.

9.1.8 Potential Risks associated with the Preferred Alternative.

Refer to Section 3, Section 5 and Section 6 above, which describes the location, type of activity, design or layout, technology and operational alternatives, and the preliminary result of having a preferred and only alternative. The potential impact from this preferred and only alternative are listed in Table 11 below.

9.1.9 Potential Risks associated with the No-Go Alternative

There would be no change to the biophysical environment with the No-Go Alternative. The No-Go Alternative implies that the Applicant would forgo an opportunity to provide employment opportunities in an area and sector identified for opportunities for job provision and economic growth, and the sourcing of minerals. This potential would not be reached with the "no-go" option.

Table 11: Preferred Alternative: Potential Risks per Phase and Activity

Phase	Activities	Potential Impacts
CONSTRUCTION PHASE	Site access	Disturbance to river bank at access point
		Dust generation from vehicles using existing access and haul roads
		Disturbance of vegetation and fauna
		Soil compaction from repeated use of access track
	Site Establishment Activities (Including associated infrastructure, Water and wastewater infrastructure, Electricity infrastructure, Waste management, Storm water control, Topsoil stripping and stockpiling for lay down areas, Waste generation and management)	Contamination and disturbance of soil from compaction and soil disturbance due to topsoil stockpiling
		Soil and sand contamination from hydrocarbons
		Change in topography due to excavations and stockpiles
		Biodiversity (wildlife and vegetation) disturbance from vehicles and offroad driving
		Removal of alien invasive plant species such as Prosopis sp. (positive impact)
		Destruction of Aquatic biodiversity from activities within drainage channels and wetlands Altering Water Resources (Quality & Quantity) water abstraction and groundwater pollution from hydrocarbons
		Emissions (Dust and light), Noise and Vibration causing nuisance from topsoil stripping, site establishment activities and vehicles & visual intrusion from development
		Socio-economic impact on job security, employment creation and economic spin-offs (positive impact)
		No impact on heritage artefacts, heritage sites or grave yards – **Refer to Annexure 3**
OPERATIONAL PHASE	Removal of sand to a depth of 1.5 metres in the river bed; movement of trucks on site to collect sand for removal; waste generation and management	Soil and sand contamination from hydrocarbon spills
		Compaction of soil on access tracks and in river bed due to sand mining activities
		Wildlife and vegetation disturbance from front end loader and trucks
		Ongoing removal of alien invasive plant species such as Prosopis sp. (positive impact)
		Removal of sand from river bed impacting on river ecosystem
		Dust emissions from general site activities (vehicle entrained dust)
		Socio-economic impact on job security, employment creation and economic spin-offs (positive impact)
		No impact on heritage artefacts, heritage sites and grave yards – **Refer Annexure 3**

DECOMMISSIONING PHASE	Rehabilitation of the sand mining area, scarifying compacted areas and vehicle tracks	Shaping of river profile and replacing topsoil
		Ongoing removal of alien invasive plant species such as Prosopis sp. (positive impact)
		Closure stalled due to non-compliance with relevant legislation (national, provincial and local).
		Insufficient funds for complete rehabilitation
		Staff losing their jobs at mine closure can have devastating effects on communities that are reliant on mine-based income.
		Job losses of secondary industries, businesses and contractors and contractual agreements with service providers surpassing mine closure date.
		Socio-economic impact on job security, employment creation and economic spin-offs (positive impact)

9.2 Methodology used in assessing potential environmental impacts

Refer to Table 12 below, which provides the impact assessment criteria applied in the rating of the impacts associated with each phase of the proposed mining activity for the Preferred and Only Alternative.

Table 12: Impact Assessment Criteria

ASSESSMENT CRITERIA	
Nature	
Rating	**Criteria**
Positive	Beneficial to the receiving environment
Negative	Harmful to the receiving environment
Neutral	Neither beneficial or harmful
Severity	
Rating	**Criteria**
6 Very High	The impact is result in a complete loss of all resources. Irreparable damage to highly valued species, habitat or ecosystem.
5 High	The impact will result in significant loss of resources. Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate.. Very serious widespread social impacts. Irreparable damage to highly valued items.
4 Medium	The impact will result in marginal loss of resources. Serious medium term environmental effects. Environmental damage can be reversed in less than a year. On-going social issues. Damage to structures/items of cultural resources of low significance, mostly repairable.
3 Low	Moderate, short- term effects but not affecting ecosystem function. Rehabilitation requires no intervention of external specialists and can be done in less than a month. On-going social issues. Some damage to insignificant cultural resiurces.
2 Very low	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Low-level repairable damage to commonplace historical structures
1 None	The impact will not result in the loss of any resources. Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the social environment. Cultural functions and processes not affected.
Spatial Scale	
Rating	**Criteria**
6 Very High	Will affect areas across international boundaries
5 High	Will affect the entire country
4 Medium	Will affect the entire province or region
3 Low	Will affect the local area or district
2 Very low	The impact will only affect the site
1 None	The impact will only affect portions of the site
Duration	
Rating	**Criteria**
6 Very High	Permanent no mitigation possible
5 High	Permanent but mitigation possible
4 Medium	Long term (6-15 years)
3 Low	Medium term (1-5 years)
2 Very low	Short term (Less than 1 year)
1 None	Immediate (Less than 1 month)

Probability	
Rating	**Criteria**
6 Very High	Certain/Definite Impact will certainly occur (100% probability of occurring)
5 High	Almost certain/ High probability Impact will occur (>75% probability of occurring)
4 Medium	Impact likely to occur (50 - 75% probability of occurring)
3 Low	Impact may occur (25-50% probability of occurring)
2 Very low	Unlikely/ Low probability. Impact unlikely to occur (0 - 25% probability of occurring)
1 None	Highly Unlikely/ None Impact unlikely to occur (0% probability of occurring)
SIGNIFICANCE Consequence x Probability Presented as a score out of 108	
Rating	**Criteria**
84-108 High	Long-term environmental change with great social importance.
50-83 Medium	Medium to long term environmental change with fair social importance.
27-49 Low	Short to medium term environmental change with little social importance.
12-26 Very low	Short-term environmental change with no social importance
3-11 None	No environmental change
Unknown	Due to lack of information

		Consequence = Severity + Spatial Scale +Duration Presented as a score out of 18															
		3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Probability	**1**	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	2	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
	3	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54
	4	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
	5	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
	6	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108

CUMULATIVE EFFECTS	
Rating	**Criteria**
High	The impact would result in significant cumulative effects
Medium	The impact would result in moderate cumulative effects
Low	The impact would result in minor cumulative effects
REVERSIBILITY	
Rating	**Criteria**
Reversible	Impacts can be reversed though the implementation of mitigation measures
Irreversible	Impacts are permanent and can't be reversed by the implementation of mitigation measures
DEGREE TO WHICH IMPACT COULD BE AVOIDED/MANAGED/MITIGATED	
Rating	**Criteria**
High	The impact could be significantly avoided/managed/mitigated.
Medium	The impact could be fairly avoided/managed/mitigated.
Low	The impact could be avoided/managed/mitigated to a limited degree.
Very Low	The impact could not be avoided/managed/mitigated; there are no mitigation measures that would prevent the impact

9.3 Positive and negative impacts of proposed activity and alternatives

9.3.1 Positive impacts

- Creation of employment and job security and economic spin-offs (positive impact)
- Provision of materials for construction industry to support local and regional economic growth related to the renewable energy industry.
- Removal of alien invasive plant species, such as Prosopis spp.

9.3.2 Negative impacts

The key potential negative impacts associated with the sand mining activity include the following:

- Site access:
  - Disturbance of onsite fauna and flora
  - Soil compaction from repeated use of access tack
- Site Establishment Activities (including: topsoil stripping and stockpiling, erection of temporary equipment laydown area, waste generation and management)
  - Noise Generation
  - Visual intrusion
  - Dust fall and nuisance from activities, dust emission from top soil stripping
  - Wildlife and vegetation disturbance from site preparation
  - River bed contamination from hydrocarbons
  - Contamination and disturbance of river sand from compaction and soil disturbance due to topsoil stockpiling
- Removal of sand to an average depth of 2 metres in the river bed; movement of trucks on site to collect sand for removal; waste generation and management:
  - Noise caused by the machinery and vehicles on site, and by vehicles going to and from the mining site
  - Visibility of the sand mining operations
  - Dust emissions from general site activities (vehicle entrained dust)
  - Removal of sand from river bed impacting on river ecosystem
  - Wildlife and vegetation disturbance from front end loader and trucks
  - Vegetation clearing.
  - Proliferation of alien and invasive plant species.
  - Impact of storm water run-off during infrequent rainfall events
  - River sand contamination from hydrocarbon spills
  - Compaction of soil on access tracks and in river bed due to sand mining activities. Sheet runoff from hardened surfaces.
- Rehabilitation of the sand mining area, scarifying compacted areas and vehicle tracks
  - Dust emission from decommissioning activities (vehicle entrained dust)
  - Soil erosion of topsoil
  - Ongoing removal of alien invasive plant species such as Prosopis sp. (positive impact)
  - Socio-economic impact on job security, employment creation and economic spin-offs (positive impact)

9.4 The mitigation measures and the level of risk.

Refer to Table 14 for the impact assessment and Table 15 for the key measures to mitigate the potential impacts.

9.4.1 Soil and Land Capability:

The impacts of soil and land capability have been assessed as being of low significance even before mitigation. The activities and actions associated with achieving a stable, free draining

post mining landform, which is compatible with the surrounding landscape and which is capable of a productive land use that achieves a land capability equal to that of pre-mining conditions are discussed below. It is important to note that for the mine to meet the key objective of economically viable and sustainable grazing, it is imperative that its other key objectives, viz. a safe post-mining area with limited residual impacts and optimal post-mining social opportunities are met.

The building block of viable and sustainable small stock production on the disturbed areas created by excavations is the shaping of the slope and ripping of compacted areas. All remaining unsafe areas like excavations needs to be profiled to form an even depression to prevent injury to humans and animals.

The risks associated with stability are the formation of erosion gulley's and a collapsing slope of any remaining excavations. The risk can be regarded as insignificant given the extremely low rainfall in the area (outside forces) and small size and even slope of any remaining excavation. The risk will be mitigated by the shaping of excavation and ripping of compacted areas due to stockpiling and movement to facilitate natural re-vegetation. Furthermore, no overburden or product stockpiles will remain on site.

The impact on soil compaction can be reduced to very low by limiting the activities and clearance to the smallest area that is necessary. No clear scraping (dozing) will be carried out unless absolutely necessary and in this case the compacted area will be scarified and any topsoil stockpiled removed will be spread over the disturbed area immediately after completion of the activity. Incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces. Where clear scraping (dozing) or removal of vegetation cannot be avoided areas should be kept to an absolute minimum. All compacted areas that are not required for aftercare access shall be scarified. All tracks (twee-spoor) will be scarified and any topsoil stockpiled removed to be spread over the disturbed area. Dual use access roads must be handed back to the landowner in a good state of repair. The impact can be further reduced only using existing farm roads and tracks.

The impact on soil contamination can be reduced to very low by the mitigating measure applicable to waste management. In order to ensure that waste classes are kept in separate streams, communication will be passed on and people will be trained on the different waste classes. Separation of wastes into classes will ensure that waste is disposed of safely and according to the correct procedure. Implementation of the following tasks to manage the risks associated with mining activities will ensure that waste management practices do not create and/or leave legacies and will limit the residual impact of mine closure. Regular inspections and audits will be used as management system to ensure compliance.

All equipment and other items used during the mining operation needs to be removed from the site. Waste material of any description, including receptacles, scrap, rubble and tires, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be buried or burned on the site. Implementing screening as part of the cleaning activities before materials are moved from the mine. The infrastructure area will be screened for petrochemical spills and cleaned and waste from the temporary storage facility will be removed and the area cleaned. Any compacted movement areas will be screened for petrochemical spills and cleaned before it is ripped and levelled. Redundant structures will be removed for use elsewhere or demolished and discarded. All steel structures and reinforcing will be discarded or sold as scrap. All equipment and other items used during the mining operation needs to be

removed from the site. Remove all power and water supply installations not to be retained by landowner in terms of section 44 of the MPRDA. Final walk through of complete mining lease area to ensure no mining related waste and of re-usable infrastructure remain on site.

9.4.2 Topography

The impacts of topography have been assessed as being of very low significance before mitigation. As part of ensuring slope stability re-shaping (sloping) of any remaining excavations will be done where required and the land-use plan will be to create an even depression and prepare the area for natural re-vegetation by implementing erosion control measures including waterways, drainage lines and storm water infrastructure if necessary. Actions to mitigate the risk also include restricting the depth of the excavations to an average depth of 1.5m and ensuring stability of the bank of the drainage channel by re-shaping and backfilling of the access point with suitable material where required.

Another potential risk arising from the mining area after mine closure are changes in the quantity of surface water compared to pre-mining quantities that may negatively affect the area. To prevent significant negative effects arising from changes in post-mining surface water quantities, the post-mining topography will be adjusted where possible to minimise the effect on water flow and increase potential for re-vegetation. Actions to mitigate the risk of erosion will be through implementation of practices such as leaving the profiling contours. All spoils and leftover product need to be returned to the excavations for backfilling. Having these actions in place should ensure that there is no negative effect on surface water flow and will assist in achieving the aim of limited residual impact.

The focus of topographic rehabilitation may not be obvious at the time of mine planning and must be addressed as the mine develops and the Final Rehabilitation, Decommissioning and Closure Plan must be reviewed periodically for continued relevance in the light of changed prospecting path or long-term plans.

9.4.3 Biodiversity Flora and Fauna:

The wetland vegetation group is listed as Least Threatened, therefore the loss of vegetation within the project footprint is not considered as significant as loss of portions of threatened vegetation groups would be. None the less, historical impact on the ephemeral drainage line has been minimal, therefore it is important that any impact on biota associated with the watercourse and immediate surroundings is affectively addressed.

Impact on biota would most likely be a result of the clearing of vegetation from the watercourse prior to sand removal taking place. It is deemed likely that seeds will be washed into the project footprint during rainfall events together with sediment after mining activities have been concluded and that the vegetation will re-establish naturally. However, ongoing monitoring and management will be required to ensure that alien vegetation does not proliferate within disturbed areas and that an indigenous vegetation community does indeed establish.

Vegetation found adjacent to the watercourse presently plays an important role with management of sheet runoff as well as erosion and sediment control. It should therefore be ensured that the area to be disturbed as part of the development of the access road is as small as practically possible.

The probability of impact on faunal species is not considered as high when compared to vegetation, mainly as a result of the drainage line being ephemeral and therefore not providing diverse habitat for faunal species. In addition, the isolated setting of the drainage line would decrease its importance as migration corridor. None the less, it should be ensured that the project footprint is rehabilitated to resemble pre-mining conditions, as best as possible.

The impact significance was determined to be medium prior to mitigation for both phases of the proposed mining related activities and post mitigation significance was determined to be low for the operational phase and very low for the rehabilitation phase.
The impact can be further reduced to very low significance by prior delineation of the area via geophysical characterisation in order to limit the activities and clearance to the smallest area that is necessary and rehabilitating the disturbed area as soon as possible.
The concomitant impacts on soil, land capability, topography and vegetation will be addressed through the reshaping of the landscape and the protection of the area until fully re-vegetated. Unnecessary destruction of vegetation should be avoided by ensuring that traffic and personnel movement be restricted to demarcated areas. Movement and stockpile areas must be rehabilitated by scarifying trampled and compacted areas to a dept of ±300mm areas. Windrows created by scarifying needs to be left in place to create a rough surface that can act as seed trap and create a micro-habitat to promote natural re-vegetation. No traffic should be allowed on the rehabilitated areas and vehicle's speed must take into account the possibility of collisions with fauna.

9.4.4 Aquatic Biodiversity and Water Resources:

Impact on the Flow Regime

The operational phase of the sand mining procedure would entail the removal of sand up to 1.5m, thereafter the sand will be taken to the company premises for stockpiling. Machinery and equipment will only be kept onsite during the operational phase, with no construction of permanent infrastructure required. Disturbance to the bed and banks will therefore be confined to the entry point as well as the operational footprint from which sand will be removed. Due to the complete removal of bed material, no residual sand will be available for rehabilitation. The operational footprint will be left as is, until sediment is naturally deposited from upstream during rainfall events.
Impact on the flow regime would be definite, for the duration of the operational phase during which excavation equipment is required within the watercourse itself. In addition, any compacted areas such as roads and operational footprint areas would result in an increase of sheet runoff that would in turn increase the volume of water reaching the ephemeral drainage line. Due to the topography of the surrounding area, it is highly likely that the accumulated sheet runoff would enter the drainage line at the access road.
Due to the ephemeral nature of the drainage line water flow will likely be restricted to directly after sufficient rainfall events. Areas excavated during sand mining activities would therefore act as impoundments during the wet months, restricting water movement within the system and in return resulting in less water reaching the area downstream of the project footprint. Should the excavation activities be undertaken during the dry months, impact on the water flow within the system can be partially mitigated. However, the excavated area will not be infilled after mining activities have taken place and would therefore still act as an impoundment within the system until such a time as sufficient sediment has replaced that which has been lost. The adequate replacement of sediment is only likely to occur after a number of rainfall events.
Disturbance due to temporary placement of machinery and ongoing excavation within the watercourse, the development of a new access road as well as increased sheet runoff for compacted areas are all aspects/activities that would contribute to impact on the natural flow regime. All these aspects would be difficult to mitigate for the duration of the operational phase and would continue until sufficient replacement of sediment within excavated areas has taken place.
The impact significance was therefore determined to be medium prior to mitigation and very low after mitigation for both the operational phase as well as the rehabilitation phase.

Impact on Water Quality

The term water quality is used to describe the concentration of dissolved salts (solutes) and of particulate (clastic) sediment (Macfarlane et al., 2007).

All the activities discussed as part of the water flow impact are also likely to result in erosion and sedimentation. The banks would only be stabilised with adequate re-establishment of vegetation. Therefore, ongoing monitoring and management will be required for at least two growing seasons once mining has ceased. In addition, ongoing alien vegetation eradication will also be needed to ensure exotics such as *Prosopis sp*. do not proliferate.

Extraction of bed material in excess of natural replacement will result in stream bed degradation. The gravel within a watercourse protects the bed and stabilises the banks, removing the gravel could result in excessive scouring and sediment movement. High levels of sediment deposition in turn have the potential to result in transformation of habitat supporting facultative species. The latter is not considered as significant in the context of the drainage line, due to it being ephemeral and naturally not supporting a diverse aquatic habitat.

Due to the removal of sand a steepened stream gradient will be created which in turn could result in headcutting and erosion as well as increased velocities and concentrated flows after rainfall events. Both headcutting and ponding would result in impact beyond the area where the removal of sand is proposed. Landscaping, with the aim to re-instate natural terrain units as part of the rehabilitation phase is therefore considered important.

In addition to sedimentation that could result in impact on water quality, oil and fuel spillages are also possible for the duration of the operational phase. However, no processing is taking place except for limited stockpiling, therefore no mining waste or overburden will be created. As a result, it is deemed possible that impact due to change in water quality (solutes) could be effectively mitigated.

It is considered highly likely that both the intensity as well as probability can be decreased with the implementation of effective mitigation. Therefore, the significance for impact on water quality was determined to be low prior to mitigation and very low after mitigation for the operational phase. Impact significance for the rehabilitation phase was determined to be very low before and after mitigation.

The impact can be further avoided by ensuring that measures are put in place to prevent contamination of surface and groundwater with hydrocarbons.

The mine will not produce any residue that could lead to water contaminated. Should the attenuation measures for prevention of soil pollution as described be implemented, the effect on surface water will be insignificant. The most important of these is that any oil or fuel leaks caused during operations must be removed immediately with the saturated soil and placed in bags or drums for disposal at a suitable site.

Fuel storage must be contained in mobile bowsers and refuelling will be done with care to minimise the chance of spillages. Only re-fuel machines at fuelling station, if possible, and construct structures to trap fuel spills at fuelling station. Oils and lubricants must be stored within sealed containment structures and minimise storage of hazardous substances onsite.

Only emergency repairs to mechanical equipment will take place onsite. Maintaining all equipment as per supplier specification and using drip trays or UPVC sheets to prevents spills/ leaks onto the soil. When not in use, a drip tray must be placed beneath mechanical equipment and vehicles. Ensure vehicles and equipment are in good working order and regularly inspected for leaks and drivers and operators are properly trained. Any spillages will be cleaned up immediately and dispose contaminated material (soil, etc.) at licensed sites only. A spill kit will be available on each site where prospecting activities are in progress. No water will be abstracted in terms of section 21(a) of National Water Act, 1998 (Act no. 36 of 1998) without the necessary authorisations

9.4.5 Emissions (Air quality, visual intrusion & Noise Generation):

The impact of emissions is assessed as being of low significance before mitigation. If the mitigation measure below is put in place the significance rating can be reduced to insignificant. It is important to note that people experience dust deposition as a nuisance effect, and that there are no direct human health implications because the dust is not inhaled. Heavy dust deposition can have detrimental effects on plants if the leaves are smothered to the extent where transpiration and photosynthesis are affected.

The impact of dust generated by vehicles travelling over unpaved areas can be readily mitigated by enforcement of low vehicle speeds and wet suppression.

Acceptable dust fall rates in terms of the National Dust Control Regulations (GN R. 827 of 1 November 2013) are presented in the table below. In terms of these regulations, the local air quality officer may prescribe a dust fall monitoring programme, the implementation of dust control measures and continuous ambient air quality monitoring. The method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739: 1970, or equivalent method. Acceptable dust fall rates are provided in the table below.

Restriction Areas	Dust fall rate (D) (mg/m^2/Day, 30- day average)	Permitted frequency of exceeding dust fall rate
Residential area	D < 600	Two within a year, not sequential months
Non-residential area	600 < D < 1 200	Two within a year, not sequential months

The nuisance (visual) impact of the mining activities is also assessed as being of Low Significance. The nuisance (visual) impact can be reduced by taking into account available vegetation screening, the locations of visual receptors on the mining area and adjacent properties and locating the equipment in a way that it is screened from points of visual reception wherever possible. Visual impact can be reduced to one of insignificance by appropriate location of visually prominent items on the site and placement in consultation with the landowner.

Taking into account the existing background noise levels of the general area which is rural in nature, the significance of the noise caused by the earth moving equipment, vehicles going to and from the mining area is also rated as low significance before mitigation. Typical noise levels generated by various types of construction equipment are listed in the table below.

Equipment	Typical operational Noise level at given offset (dBA)							
	5m	10m	25m	50m	100m	250m	500m	100m
Dozer	95	89	81	75	69	61	55	49
Trucks	87	81	73	67	64	60	57	54

In South Africa, the noise impact on human receptors is evaluated in terms of the SANS 10103 guidelines for sound pressure levels as listed in the table below.

Type of District	Equivalent continuous rating level for ambient noise - dBA					
	Outdoors			Indoors with windows open		
	Day-night	Daytime	Night	Day-	Daytime	Night-
Rural districts	45	45	35	35	35	25
Suburban district	50	50	40	40	40	30
Urban traffic	55	55	45	45	45	35
Urban districts	60	60	50	50	50	40
Central business district	65	65	55	55	55	45
Industrial district	70	70	60	60	60	50

Daytime and night-time refer to the hours from 06h00 to 22h00 and 22h00 to 06h00 Respectively

Mitigation if required will include limiting the site establishment activities to daylight hours (06h00 to 18h00) and not undertaking such activities at all on Sundays and public holidays. If mining on Sundays and public holidays cannot be avoided then agreements with any potential noise recipient must be put in place at least 7 days before activities. The vehicles on site will be limited to the absolute minimum required. It must be noted that the speed limit for driving within the prospecting area shall be limited to 40Km/h.
If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, or it will be placed in an acoustic enclosure, or an acoustic barrier will be erected between the source and the recipient.

9.4.6 Socio- economic impact

The impact on Socio- economic impact is of medium significant and even with mitigation, the impact will remain one of medium significance due to the impact off job losses, ccontractual agreements with service providers surpassing mine closure date.
Job creation and local economic spin offs through increased income earned, and through purchasing of local materials is a positive impact and outweigh the insignificant negative impacts below. The mining area is located in a rural farming area with farm dwellings.
Some landowners cherish the peaceful and quiet lifestyle of the area and friction between local residents and a crew of strangers is very possible. Conflict with other mining companies or land users on the same property is also a possibility. The potential for conflict is assessed as being significant. The impact can be reduced to one of medium significance by taking appropriate social management measures.
All access will be arranged beforehand with landowner and a supervisor will be present at all times. Indemnity will be signed by all mining personnel entering the property to protect the landowner against claims regarding personal loss and injury. Landowner will be updated with regard to the progress of mining and concurrent rehabilitation will be planned in consultation with landowner. Agreements between any existing mining operations or other land users and landowner will be respected and adopted as part of this operation.
Other impacts like not undertaking environmental management according to approved EMPr and plans and no auditing of the environmental management systems as well as insufficient funds for complete rehabilitation can however be mitigated to some degree as follow.
A review of the final rehabilitation, decommissioning and closure plan must be done annually to ensure all outstanding environmental liabilities are covered and sufficient funds is available to implement the closure plan.
Contract durations with service providers will be limited to address the risk of contractual agreements with service providers surpassing the mine closure date. Maintain positive and transparent relationships with stakeholders as well as maintaining communication channels and undertaking environmental management in accordance with the approved EMPr and Closure Plan.

9.4.7 Palaeontological, Archaeological and Cultural Heritage Resources

The field assessment (Annexure 3) provided no above-ground evidence of prehistoric structures, buildings older than 60 years, or material of cultural significance or in situ archaeological and palaeontological sites within the study area. The proposed development footprint and existing access roads are not considered paleontologically or archaeologically vulnerable and is assigned a rating of Generally Protected C (GP.C). Since the site is very remote, has low visibility from the surrounding area and does not impact on any tangible aspects of living heritage, the potential impacts are rated as being of low significance.

The impact on Cultural and Heritage Resources is assessed as being of low significance before mitigation. The impact can be avoided by ensuring that recommendations from specialist studies listed below are implemented.

- Cemeteries must be protected by a buffer zone of at least 20 meters.
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Regardless of the above recommendations, all mining areas should be carefully inspected by project staff to ensure that no heritage features are present. Equipment moving on site will, where ever possible, be confined to established roads and tracks. Where this is not possible, access routes will be walked prior to entry of equipment to ensure that there are no graves present. Should graves be identified, the access route will be realigned to avoid such heritage resources, which will then be clearly marked to minimise risk of accidental damage

All personnel including contractors involved in the construction activities will be made aware of the locations of all identified heritage resources, the necessity of avoiding impacts on such resources and the penalties for damaging them. Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites. It will be emphasised that archaeological artefacts such as potsherds, stone tools, grinding stones, etc. must be left in situ and undisturbed.

No areas of particular palaeontological sensitivity were identified in the Project Area. The proposed site lies on Quaternary sand, scree and sandy soil that has a very low palaeontological sensitivity but might have fragments of transported robust fossils from farther upstream. Therefore, a Fossil Chance Find Protocol is included in the EMPr. The procedures below are in general terms, to be adapted as befits a context. They are couched in terms of finds of fossil bones that usually occur sparsely. However, they may also serve as a guideline for other fossil material that may occur.

Bone finds can be classified as two types: isolated bone finds and bone cluster finds.

Isolated Bone Finds

In the process of sampling and excavations, isolated bones may be spotted in the hole sides or bottom, or as they appear on the spoil heap. By this is meant bones that occur singly, in different parts of the excavation. If the number of distinct bones exceeds 6 pieces, the finds must be treated as a bone cluster (below).

Response by personnel in the event of isolated bone finds

- Action 1: An isolated bone or tooth exposed in an excavation or spoil heap must be retrieved before it is covered by further spoil from the excavation and set aside. This also applies to potential fossils of any kind embedded in broken chunks of cemented deposit.
- Action 2: The Project Manager/Geologist/Environmental Control Officer (ECO) must be informed.
- Action 3: The responsible field person (geologist or ECO) must take custody of the fossil. The following information to be recorded:
  - Location co-ordinates (such as obtained by GPS in decimal degrees).
  - Digital images of excavation showing vertical section (mine face) and position of the find.
  - Digital images of fossil.
  - Geological context obtained from the mine geologist.

- Action 4: A loose fossil should be placed in a bag (e.g., a Ziplock bag), along with any detached fragments. A label must be included with the date of the find, position info., depth. Cemented deposit chunks with an embedded fossil must also be labelled (e.g., with a paint marker) and appropriately stored for safekeeping.
- Action 5: Geologist/ECO contacts the standby palaeontologist and/or SAHRA to describe the occurrence and provide images asap. by email.

Cluster Finds

A bone cluster is a major find of bones, i.e., several bones in close proximity or bones resembling part of a skeleton. These bones will likely be seen in broken sections of the sides of the hole and as bones appearing in the bottom of the hole and on the spoil heap.

On the basis of existing observations of the fluvial deposits it is unlikely that a major bone cluster find will be encountered.

Response by personnel in the event of a bone cluster find

- Action 1: Immediately stop excavation in the vicinity of the potential material. Mark (flag) the position and also spoil that may contain fossils.
- Action 2: Inform the pit foreman and the ECO.
- Action 3: ECO contacts the standby archaeologist and/or palaeontologist. ECO to describe the occurrence and provide images asap. by email.

9.4.8 Assessment of potential cumulative impacts

Cumulative impacts are the successive, incremental and combined impacts of one, or more, activities on society, the economy and the environment. Cumulative impacts result from the aggregation and interaction of impacts on a receptor and may be the product of past, present or future activities.

Due to the isolation of the ephemeral watercourse, existing/historical impact is marginal. None the less, it is still considered important to effectively mitigate the direct impacts, as identified for the operational phase.

The duration of impact during the rehabilitation phase has the potential to remain long term or even permanently in severe circumstances. Therefore, if rehabilitation is not successful, there is a possibility that the proposed sand mining activities could contribute to the present impact on water flow and habitat already present due to the upstream impoundment of the watercourse.

9.5 Motivation where no alternative sites were considered

Alternatives have been considered for this project, as described in Section 6 above. Where alternatives are not likely to be considered in the Impact Assessment Phase, reasons have been provided in Section 6 above.

9.6 Statement Motivating the Preferred Sites

The site was selected as it contains good quality building sand located in a convenient position in close proximity to transport routes. The layout and technology of this sand mining project has been determined by the shape, position and orientation of the mineral resource which is the sand in the drainage line. Refer to the Site Plan attached as Figure 2 and 3 and Photo 1 and 2.

10. Environmental impact assessment

10.1 Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site

This BAR and EMPr were compiled through a detailed desktop investigation and site assessment in order to determine the environmental setting in which the project is located. Input from stakeholders during the public participation process will also assist the EAP in the identification of any additional impacts associated with the proposed sand mining activities.
The methodology described above was used to assess the significance of the potential impacts of the sand mining activities. The assessment of impacts is based on the experience of the EAP. The mitigation measures proposed are considered to be reasonable and based on the location of the mining area and must be implemented in order for the outcome of the assessment to be accurate.

10.2 Assessment of each identified potentially significant impact and risk

The supporting impact assessment is provided in Table 14.

10.3 Summary of specialist reports.

The Screening Report in terms of Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014 was developed to allow a proponent intending to submit an application for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended to screen their proposed site for any environmental sensitivity and enable the applicant to manipulate the development footprint on a site to avoid environmental sensitivities before submitting the application. The Screening Report also identify specialist assessments for inclusion in the assessment report based on the environmental sensitivities of the proposed development footprint.

It is however the responsibility of the EAP to confirm the list of specialist assessments and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation. The site sensitivity assessment report form part of section 8.2 in this BAR and the specialist studies identified is listed in table 13 (to be confirmed by the competent authority).

For mining operations, the position of the mineral resource to be mined is fixed therefore the Screening Report required to accompany any application for Environmental Authorisation is not applicable as there are no alternative footprints for screening and comparison.

For small scale mining and prospecting operations where there will be no permanent infrastructure development and where the location of development is informed by historical prospecting and production records for the area, as well as the most likely position of potential mineral deposits no reasonable and feasible alternatives can be investigated.

In the case of prospecting the location of these sample sites will also not be known at the time that the application for EA is lodged. For prospecting areas, that normally covers a large area it is accepted that some areas will be of high or even very high sensitivity and no specialist assessments is needed to verify this. For this reason, mining operations that is a short-term change in land use must provide mitigation measures and financial provision to return the site to as close as possible to its pre-mining state during the closure phase not applicable to other development.

For this mining operation, the initial list of environmental attributes was compiled based on experience of the EAP in similar development types and through site visits and appraisals,

desktop screening via Geographical Information System (GIS) and aerial photography, incorporating existing information from previous studies, and input received from authorities and I&APs.

Further to this, the Screening Tool identifies related exclusions e.g., industrial development zones that is not applicable to minerals as the state is the custodian of all minerals and is responsible for the screening process as part of the acceptance process of applications taking into account any section 53 applications by other land users.

Table 13: Summary of specialist studies

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	RECOM. INCLUDED IN THE EIA REPORT	SECTION WHERE INCLUDED.
Heritage Impact Assessment (Attached as Appendix 3a)	Precolonial/Stone Age material noted at the portion of Jannelsepan investigated in this study was found to be generally of low significance, where present at all. Minimal isolated archaeological finds found in the sand source area within the dry bed of the spruit are in secondary context. Criteria used here for impact significance assessment for archaeological traces rate the impacts as not worthy of further mitigation. Mining should however be limited to the intended zone within the bed of the spruit so as not to disturb possible materials in in situ sediments alongside the spruit. Mitigation measures: Action 1: Provision for on-going heritage monitoring in an environmental management plan which also provides guidelines on what to do in the event of any major heritage feature being encountered during any phase of mining. Responsibility 1: Environmental management provider with on-going monitoring role set up by the mining company for the mining phase and for any instance of periodic or on-going land surface modification thereafter. Timeframe 1:	Yes	Section 8 Section 9 Table 14 Impact Assessment

	Environmental management plan to be in place before commencement of mining. Action 2: Should unexpected finds be made (e.g. precolonial burials; ostrich eggshell container cache; or localised Stone Age sites with stone tools, pottery; military remains), the relevant Heritage Authority should be contacted. Responsibility 2: Environmental Control Officer should become acquainted at a basic level with the kinds of heritage resources potentially occurring in the area and should report to the Heritage Authority as needed Timeframe 2: In the event of finding any of the features mentioned (Action 2) reporting by the developer to relevant heritage authority should be immediate. Contact: SAHRA Ms N. Higgins 021-4624502 or NC Heritage Resources Authority Mr Andrew Timothy 053-8312537/8074700. Performance Indicator: Inclusion of further heritage impact consideration in any future extension of mining or any infrastructural elements. Monitoring: Officials from relevant heritage authorities (National, Provincial or Local) to be permitted to inspect the site at any time in relation to the heritage component of the management plan.		
Palaeontological Impact Assessment (Annexure 4)	Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely any fossils would be identified in the proposed site. No further palaeontological assessment is required. As far as the palaeontology is concerned the project may continue.	Yes	Section 8 and Section 9

Table 14: Significance of Impacts per Activity per Phase

Site Access and Site Establishment - Impacts on other land uses	**Significance**	**Before**	**After**
No Wind and Solar developments with an approved Environmental Audi orisa don orapplcations under consideration within 8.8 km of the proposed area identified.	**Nature**	Neutral	Neutral
	Severity		
No intersection with Environmental Management Frameworks relevant to the application Development incentives, restrictions, exclusions or prohibitions and their implications are not applicable to mining operations as the state is the custodian of all minerals and is responsible for the screening process as part of fee acceptance process of applications taking into account any section 53 applications by other land users.	**Spatial Scale**		
	Duration		
	Consequence	NA	NA
	Probability		
The inpact on CivilAviation and Defence although rated as medium sensitivity is also not applicable to this application as no hkh structures will be constructed and no defence installations or test areas are present in close proximity to this project.	**Significance**	NA	NA
	Cumulative Effects		NA
Potential impacts:			
None	**Reversibility**		NA
Indirect impacts:	**Degree to which the impact can be avoided, managed or mitigated:**		NA
None			
Residual impacts:			
Mitigation • None as mining will only be a temporary change in land use			
Site Access and Site Establishment -Impacts on Soil (contamination, erosion, compaction) & Land capability	**Significance**	**Before**	**After**
Regarding Land capability for Agriculture the sensitivity of the area is regarded as low and is used for livestock grazing and production.	**Nature**	Negative	Negative
The clearing of laydown areas for site establishment and clearing of site access points will result in the removal of existing vegetation, which will disturb the soil increasing the potential for soil erosion by "ind and loss of soil in the event of rainfall.	**Severity**	3	2
	Spatial Scale	2	1
Potential impacts:	**Duration**	3	1
Soil compaction will result from repeated use of access tracks.	**Consequence**	8	4
Potential contamination of soil from unmanaged use of hydrocarbons on-site, and incorrect storage of hazardous substances. Accidental spills not cleaned up immediately.	**Probability**	5	1
	Significance	40	4
Indirect impacts:	**Cumulative Effects**	Low	Insignificant
Windblown litter will cause visual blight. Hydrocarbons are toxic and will cause vegetation die-back and soil poisoning. A lack of waste food management encourages vermin. Dust impacting on adjacent vegetation and causing a nuisance to workers. Compaction of topsoil where vehicles drive outside demarcated areas damages seed bank and habitat for invertebrates.	**Reversibility**		Reversible
Residual impacts:			
Recycling of waste material creates employment. Potential loss of invertebrates that live in the top layers of the soil. Current land cover indicators do not tale into account degradation due to. for example, spread of alien plan ts. sec on dary impacts of mining (e.g,..sand mobilization) or overgrazing by livestock.	**Degree to which the impact can be avoided, managed or mitigated:**		High

Mitigation

• After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly.
• Incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces.
• Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and stormwater run-off.
• Top soil shall be removed separately and stockpiled separately from other soil base layers.
• Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material.
• Topsoil storage areas must be convex and should not exceed 2m in height.
• Topsoil must be treated with care, must not be buried or in any other way be rendered unsuitable for further use (e.g. by mixing with spoil) and precautions must be taken to prevent unnecessary handling and compaction.
• In particular, topsoil must not be subject to compaction greater than 1 500 kg/m² and must not be pushed by a bulldozer for more than 50 metres. Trucks may not be driven over the stockpiles.
• Reduce drop height of material to a minimum. Temporarily halt material handling in windy conditions.
• A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit.
• Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation.
• Contaminated soil must be treated by first removing the source of contamination - removing the source of contamination should allow the system to recover without further clean-up required.
• Petrochemical spillages to be collected in a drum and store excavated spill affected soil for disposal at a registered facility or onsite treatment.
• Fuel storage must be contained in mobile bowsers and refuelling will be done with care to minimise the chance of spillages
• The most promising techniques for in on-site treatment involve bioremediation. Bioremediation involves the use of microorganisms to destroy hazardous contaminants.

Waste Management

• Separation of wastes into classes will ensure that waste is disposed of safely and according to the correct procedure. In order to ensure that waste classes are kept in separate streams, people will be trained on the different waste classes. Recycling and reusing materials may reduce garbage haul fees or generate income through the sale of scrap metal and old equipment.
• All waste should be stored in a temporary waste storage area with pollution prevention measures and unwanted steel, sheet metal and equipment need to be stored in a demarcated salvage yard.
• Used oils / hydrocarbons fuels / liquids are to be collected in sealed containers (stored on concrete slabs) and removed from site for recycling by a reputable company.
• All waste in the temporary storage area for used lubrication products and other hazardous chemicals will be disposed of at a collection point from where it will be collected by a waste recycling company.
• Mobile generators or fuel bowser to be supplied with bunded facility or necessary pollution control measures (drip trays).
• Clean out content of oil traps and dispose of waste at registered and purpose designed landfill sites.
• Tyres to be return to supplier or a company that uses old tyres for making door mats, shoes, swings, etc.
• Batteries to be return to supplier or dispose at a permitted hazardous waste facility.
• Fluorescent tubes to be collected in sealed containers (stored on concrete slabs) and removed from site for disposal at a permitted hazardous waste facility.
• Chemical containers to be returned to supplier or disposed of at a legal, permitted facility that is capable of disposing of the waste. (DO NOT sell chemical containers to workers or communities).
• Laboratory waste (chemicals) - Returned to supplier or disposed of at a permitted facility that is capable of disposing of the waste. These liquid wastes cannot be disposed of on the waste dumps.
• Domestic waste (i.e., waste that is generated from the accommodation and offices) separated at source into recyclable products. These must then be removed and recycled by recognised contractors. (Note that the mine is responsible for the waste from cradle to grave). Domestic waste generated by workers needs to be sorted and all biodegradable waste must be stored in separate drums. This biodegradable waste will be dumped in a landfill provided for onsite.
• Disposal non-biodegradable waste at a registered and officially permitted commercial or municipal landfill site is the most cost-effective option for materials that cannot be recycled.

Site Access and Site Establishment - Impacts on topography	Significance	Before	After
No change in topography during Site Access and Site Establishment **Potential Impact:** None **Indirect impacts:** None **Residual impacts:** None	**Nature**	Neutral	Neutral
	Severity		
	Spatial Scale		
	Duration		
	Consequence	NA	NA
	Probability		
	Significance	NA	NA
	Cumulative Effects		NA
	Reversibility		NA
	Degree to which the impact can be avoided, managed or mitigated:		NA
Mitigation • None requiered			
Site Access and Site Establishment - Impacts on Biodiversity, Flora & Fauna	**Significance**	**Before**	**After**
Only a small portion <1% is coverd by an ESA and the rest of the area is transformed by historic mining activities and open pit mine. The vegetation group is listed as Least Threatened, therefore the loss of vegetation within the project footprint is not considered as significant. The probability of impact on faunal species is also insignificant mainly as a result of the area not providing diverse habitat for faunal species and the transformation due to historic mining. According to the Northern Cape PAES the area is not included as primary focus area for protected area expansion and is not located within 5Km from any protected area. **Potential Impacts:** Limited loss of natural vegetation and ecological functioning in an small portion identifird as ESA **Indirect impacts:** Soil disturbance caused by vegetation clearing will provide suitable conditions for the establishment and spreading of alien invasive vegetation. Removal of alien invasive vegetation is a positive impact, and will benefit the ecological functioning. **Residual impacts:** Laydown areas have been earmarked for existing disturbed areas where clearing would be minimal, resulting in little impact on ecological functioning at a local level during the construction process.	**Nature**	Negative	Negative
	Severity	2	2
	Spatial Scale	1	1
	Duration	2	1
	Consequence	5	4
	Probability	6	6
	Significance	30	24
	Cumulative Effects	Low	Very Low
	Reversibility		Reversible
	Degree to which the impact can be avoided, managed or mitigated:		Medium

Mitigation

Mitigation measures for soil erosion & soil compaction will also be applicable to promote natural revegetation:

- The project footprint must be rehabilitated to resemble pre-mining conditions, as best as possible.
- Identify existing disturbed patches for laydown areas, and demarcate areas for clearing. Existing farm tracks will be used as access and haul roads.
- Remove alien invasive vegetation and ensure ongoing alien vegetation clearing in the area. No indigenous plants outside of the demarcated work areas may be damaged.
- The noise and vibration caused by the earthmoving equipment will disturb smaller animals (e.g. snakes). These will move away whilst operations are in progress. Should any animals be encountered these should be moved away by a suitably trained nature conservation officer, if necessary.
- Movement of vehicles and machinery will be restricted to demarcated areas and roads with no off-road driving permitted. Vehicles speed must take into account the possibility of collisions with fauna.
- Provide all workers with environmental awareness training. Ensure all workers comply with the requirements of the EMPr.

Site Access and Site Establishment - Potential Impacts on Aquatic biodiversity & Water Resources	**Significance**	**Before**	**After**
Mining will take place within a ephemeral drainage line not classified as a NFEPA River with no wetlands therefore not identified as very high sensitivity.The removal of sand from the drainage line could impact on flow regime, water quality and quantity, and aquatic biota.The removal of sand from the river bank at the access points could impact on flow regime, water quality and quantity, and aquatic biota.	**Nature**	Negative	Negative
	Severity	2	1
	Spatial Scale	1	1
Indirect impacts:	**Duration**	2	1
None	**Consequence**	5	3
Residual impacts:	**Probability**	6	2
None	**Significance**	30	6
	Cumulative Effects	Low	Insignificant
	Reversibility		Reversible
	Degree to which the impact can be avoided/managed/mitigated:		High

Mitigation

- Provide mobile ablution facilities and take care that temporary onsite sanitation facilities are well maintained and serviced regularly.
- Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials and ensure that good housekeeping rules are applied. Minimise storage of hazardous substances onsite
- Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only.
- Fuel storage must be contained in mobile bowsers and refuelling will be done with care to minimise the chance of spillages
- Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevents spills/ leaks onto the soil.
- A spill kit will be available on each site where mining activities are in progress.
- Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. Waste separation must be undertaken if practical for recycling.
- Provide all workers with environmental awareness training and comply with the requirements of the EMPr.
- By keeping contaminated and clean water separate and establishing controlled runoff at washing bays, the flow and end destination of decontamination washing water will be controlled.

Site Access and Site Establishment - Potential Impacts from Emissions (Air Quality, Visual intrusion & Noise Generation)	Significance	Before	After
Visual intrusion caused by the front end loader, topsoil stockpiles, cleared areas, and movement of trucks on site during preparation of site access and site establishment. The site is however, remote and rural in nature with no receptors (people) as it is located on private property. Noise and dust will be created by mining equipment (e.g. front end loaders) and vehicles, which will emit Greenhouse Gases. Indirect impacts: There are few indirect impacts as the area is remote and rural, with no people (receptors) living near the site. Residual impacts: Good housekeeping will ensure a neat and well-maintained construction area reducing visual impact. Carbon emissions have impact on climate change.	**Nature**	Negative	Negative
	Severity	2	1
	Spatial Scale	3	1
	Duration	1	1
	Consequence	6	3
	Probability	4	2
	Significance	24	6
	Cumulative Effects	Low	Insignificant
	Reversibility		Reversible
	Degree to which the impact can be avoided/managed/mitigated:		High

Mitigation

• The laydown areas shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly.

• The Applicant shall adhere to the local by-laws and regulations regarding the noise and associated hours of operations and limit noise levels (e.g. install and maintain silencers on machinery). The provisions of SANS 1200A Sub clause 4.1 regarding "built-up" area shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas.

• Activities generating output of 85dB or more, shall be limited to normal working hours and not allowed during weekends to limit the impact of noise on neighbours. No amplified music shall be allowed on site. Engines shall be turned off when the vehicle is temporarily parked or stationery for long periods.

• Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition.

• Minimise use of reverse alarms by proper route planning

• If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, or it will be placed in an acoustic enclosure, or an acoustic barrier will be erected between the source and the recipient.

• On public roads the vehicles shall adhere to municipal and provincial traffic regulations including speed limits. At the mining area a speed limit of 40km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. The wetting of the roads helps reduce dust generation as will applying dust suppression and/or hardening compound.

• Stockpiles must be maintained (covered where necessary) to avoid wind erosion of the material and incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces.

• Temporarily halt material handling in windy conditions. Health and safety equipment is required for workers.

• Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions.

• The earth moving or sampling equipment and other visually prominent items on the site will be located in consultation with the landowner.

• Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material.

Site Access and Site Establishment - Potential Impacts on Socio-economic features	Significance	Before	After
Conflict with landowner and other land users Employment can be lost by an individual due to non-performance but the loss of job provision is irreversible Indirect impacts: Upskilling Local economic spin-offs through increased income earned, and through purchasing of local materials Income generation for landowners in a time of severe drought where livestock farming is not sustainable. Residual impacts: The upliftment of unemployed people, with positive impact on standard of living for their families. Local and regional economic spin-offs from investment through Social Labour Plan.	**Nature**	Negative	Negative
	Severity	5	1
	Spatial Scale	5	1
	Duration	6	1
	Consequence	16	3
	Probability	4	1
	Significance	64	3
	Cumulative Effects	Medium	Insignificant
	Reversibility		Irreversible
	Degree to which the impact can be avoided/managed/mitigated:		High

Mitigation

• All access will be arranged beforehand with landowner and a supervisor will be present at all times and will report to the landowner when accessing and leaving the property.
• Indemnity will be signed by all mining personnel entering the property to cover the landowner against any claims regarding injuries or damage to equipment.
• Any other mining companies or land users operating legally will be regarded as affected parties and consulted. Areas of operations will be demarcated and no overlapping will be allowed or agreements regarding environmental liabilities need to be put in place.
• Agreements between any existing mining operations or other land users and landowner will be respected and adopted as part of this operation.
• Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling)

Site Access and Site Establishment - Potential Impacts on Paleontological, Archaeological and Cultural Heritage Resources	Significance	Before	After
The proposed development footprint and existing access roads are not considered paleontologically or archaeologically vulnerable and is assigned a rating of Generally Protected C (GP.C). Since the site is very remote, has low visibility from the surrounding area and does not impact on any tangible aspects of living heritage, the potential impacts are rated as being of low significance. No areas of particular palaeontological sensitivity were identified in the Project Area. The proposed site lies on Quaternary sand, scree and sandy soil that has a very low palaeontological sensitivity but might have fragments of transported robust fossils from farther upstream. Indirect impacts: Loss of archaeological resources, graves and precolonial cultural landscape The material fossil evidence of "deep time" is embedded in the creation of the sacred landscape and contributes to the "sense of place" cultural aesthetic of the region. The loss of fossils and concomitant interpreted knowledge impoverishes the tangible testimony of the prehistoric landscape and ecological context of ancient humans. Residual impacts: Negative residual impact arises from the unavoidable loss of fossils of unknown significance in spite of mitigation efforts. Positive residual impact arises from the successful rescue of fossil material for posterity, resulting in material for future research, employment opportunities for budding, young researchers and enhanced insights into the prehistory of the Northern Cape.	**Nature**	Negative	Negative
	Severity	5	1
	Spatial Scale	5	1
	Duration	1	1
	Consequence	11	3
	Probability	1	1
	Significance	11	3
	Cumulative Effects	Insignificant	Insignificant
	Reversibility		Irreversible
	Degree to which the impact can be avoided/managed/mitigated:		High

Mitigation

The impact can be avoided by ensuring that recommendations from specialist studies listed below are implemented.

• Cemeteries must be protected by a buffer zone of at least 20 meters

• If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

• A fossil Chance Finds Procedure must be implemented in the event of any chance finds of fossils

Regardless of the above archaeological opinion the following mitigation measures will also be implimented:

• All development sites should be carefully inspected by project staff to ensure that no heritage features especially unmarked graves are present;

• Equipment moving on site will, where ever possible, be confined to established roads and tracks.

• Any identified heritage feature will be cordoned off . All personnel including contractors involved in the construction activities will be made aware of the locations of all identified heritage resources, the necessity of avoiding impacts on such resources and the penalties for damaging them.

• Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites. It will be emphasised that archaeological artefacts such as potsherds, stone tools, grinding stones, etc. must be left in situ and undisturbed.

• A safe distance of at least 100 metres will be maintained between identified heritage resource and any development associated with the mining activities.

Operational Phase - Potential Impacts on other land uses	**Significance**	**Before**	**After**
No Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 8.8 km of the proposed area identified.	**Nature**	Neutral	Neutral
	Severity		
No intersection with Environmental Management Frameworks relevant to the application	**Spatial Scale**		
Development incentives, restrictions, exclusions or prohibitions and their implications are not applicable to mining operations as the state is the custodian of all minerals and is responsible for the screening process as part of the acceptance process of applications taking into account any section 53 applications by other land users.	**Duration**		
	Consequence		
	Probability		
The impact on Civil Aviation and Defence is also not applicable to this application as no high structures will be constructed and no defence installations or test areas are present in close proximity to this project.	**Significance**		
	Cumulative Effects		
Indirect impacts:	**Reversibility**		
None	**Degree to which the impact can be avoided/managed/mitigated:**		
Residual impacts:			

Mitigation

• None

Operational Phase - Potential Impacts on Soil (contamination, erosion, compaction) & Land capability	**Significance**	**Before**	**After**
Mining is taking place in an drainage line devoid of vegetation and the limited extend of mining 5Ha will not lead to a loss of agricultural production.	**Nature**	Negative	Negative
Potential contamination of soil from unmanaged use of hydrocarbons on-site, and incorrect storage of hazardous substances and accidental spills not cleaned up immediately.	**Severity**	4	2
	Spatial Scale	1	1
The clearing of areasoutside the drainage line for stockpiles with movement areas will result in the removal of existing vegetation and topsoil, which will disturb the soil increasing the potential for soil erosion by wind and loss of soil in the event of rainfall. Soil compaction will result from ongoing repeated use of access tracks.	**Duration**	3	1
	Consequence	8	4
	Probability	4	4
Indirect impacts:	**Significance**	32	16
Windblown litter will cause visual blight. Hydrocarbons are toxic and will cause vegetation die-back and soil poisoning. A lack of waste food management encourages vermin.	**Cumulative Effects**	Low	Very low
	Reversibility		Reversible
Dust impacting on adjacent vegetation and causing a nuisance to workers or residents.			
Compaction of topsoil where vehicles drive outside demarcated areas damages seed bank and habitat for invertebrates.	**Degree to which the impact can be avoided/managed/mitigated:**		Medium
Residual impacts:			
Recycling of waste material creates employment.			
Potential loss of invertebrates that live in the top layers of the soil.			

Mitigation

The same mitigating measures as for Site Access and Site Establishment and topography below will be applicable as well as the following:

- After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly.
- Incremental clearing of vegetation in river bed should take place to avoid unnecessary exposed surfaces.
- Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and stormwater run-off.
- Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material.
- Reduce drop height of material to a minimum.
- Temporarily halt material handling in windy conditions.
- A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit.
- Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation.
- To ensure long-term stability, the restored topsoil cover should attempt to mimic the pre-mining distribution of soil texture and thickness.

Operational Phase - Potential Impacts on topography	**Significance**	**Before**	**After**
Change in topography due to excavations and overburden dumps if not backfilled.	**Nature**	Negative	Negative
With mitigation the change in topography from mining activities would be slight depressions created in the landscape. The excavated area will not be infilled after mining activities have taken place and would therefore still act as an impoundment within the system until such a time as sufficient sediment has replaced that which has been lost. The adequate replacement of sediment is only likely to occur after a number of rainfall events.	**Severity**	2	1
	Spatial Scale	1	1
	Duration	1	1
Indirect impacts:	**Consequence**	4	3
None	**Probability**	6	1
Residual impacts:	**Significance**	24	3
Very slight visual change in landscape and topography following rehabilitation.	**Cumulative Effects**	Very low	Insignificant
	Reversibility		Reversible
	Degree to which the impact can be avoided/managed/mitigated:		Medium

Mitigation

- All spoils and leftover product need to be returned to the excavations for backfilling.
- Remaining excavation slopes needs to be profiled to form an even depression 18°

Operational Phase - Potential Impacts on Biodiversity, Flora & Fauna	**Significance**	**Before**	**After**
Refer site establishment above regarding potential impact on CBA's and SCC	**Nature**	Negative	Negative
Indirect impacts:	**Severity**	5	2
Soil disturbance caused by vegetation clearing will provide suitable conditions for the establishment and spreading of alien invasive vegetation.	**Spatial Scale**	1	2
Removal of alien invasive vegetation is a positive impact, and will benefit the ecological functioning.	**Duration**	3	2
Residual impacts:	**Consequence**	9	6
The noise and vibration caused by the earthmoving equipment will disturb smaller animals (e.g., snakes). These will move away whilst operations are in progress.	**Probability**	6	2
	Significance	54	12
	Cumulative Effects	Medium	Very low
	Reversibility		Reversible
	Degree to which the impact can be avoided/managed/mitigated:		Medium

Mitigation

Mitigation measures for soil erosion & soil compaction will also be applicable to promote natural revegetation:

- The project footprint must be rehabilitated to resemble pre-mining conditions, as best as possible.
- Ensured that the area to be disturbed as part of the development is as small as practically possible
- Identify existing access tracks. Demarcate areas for clearing in the river bed.
- The mining area and stockpile areas must be demarcated and the footprint contained within the demarcated area.
- Mining areas to be limited to blocks of 500m at a time with rehabilitation of the bank and access areas required before moving upstream to the next block.
- Delineation of the area via geophysical characterisation in order to limit the activities and clearance to the smallest area that is necessary and rehabilitating the disturbed area as soon as possible
- The annual rehabilitation plan must be implemented.
- Remove alien invasive vegetation, and ensure ongoing alien vegetation clearing in the area.
- No indigenous plants outside of the demarcated work areas may be damaged.
- Identify protected tree species, and leave these intact.
- Ongoing monitoring and management will be required to ensure that alien vegetation does not proliferate within disturbed areas and that an indigenous vegetation community does indeed establish.
- Should any animals be encountered these should be moved away by the ECO, if necessary
- Unnecessary destruction of vegetation should be avoided by ensuring that traffic and personnel movement be restricted to demarcated areas.
- Movement and stockpile areas must be rehabilitated by scarifying trampled and compacted areas to a dept of ±300mm areas. Windrows created by scarifying needs to be left in place to create a rough surface that can act as seed trap and create a micro-habitat to promote natural re-vegetation.
- No traffic should be allowed on the rehabilitated areas and vehicle's speed must take into account the possibility of collisions with fauna.

Operational Phase - Potential Impacts on Aquatic biodiversity & Water Resources	**Significance**	**Before**	**After**
Disturbance to the bed and banks will be confined to the entry point as well as the operational footprint from which sand will be removed. Due to the complete removal of bed material, no residual sand will be available for rehabilitation. The operational footprint will be left as is, and the excavated area will not be infilled after mining activities have taken place and would therefore still act as an impoundment within the system until such a time as sufficient sediment has replaced that which has been lost. The adequate replacement of sediment is only likely to occur after a number of rainfall events.	**Nature**	Negative	Negative
	Severity	5	2
	Spatial Scale	2	1
	Duration	2	1
Impact on the flow regime would be definite, for the duration of the operational phase during which excavation equipment is required within the watercourse itself. In addition, any compacted areas such as roads and operational footprint areas would result in an increase of sheet runoff that would in turn increase the volume of water reaching the ephemeral drainage line.	**Consequence**	9	4
	Probability	6	2
	Significance	54	8
Water flow impact are also likely to result in erosion and sedimentation. The banks would only be stabilised with adequate re-establishment of vegetation. Extraction of bed material in excess of natural replacement will result in stream bed degradation. The gravel within a watercourse protects the bed and stabilises the banks, removing the gravel could result in excessive scouring and sediment movement.	**Cumulative Effects**	Medium	Very Low
	Reversibility		Reversible
Due to the removal of sand a steepened stream gradient will be created which in turn could result in headcutting and erosion as well as increased velocities and concentrated flows after rainfall events			
Indirect impacts:			
Water uses that require authorisation will take place.			
Potential contamination of groundwater from unmanaged use of hydrocarbons on-site, and incorrect storage of hazardous substances or accidental spills not cleaned up immediately.	**Degree to which the impact can be avoided/managed/mitigated:**		High
Rainfall is very seldom and evaporation rate is very high therefore indirect impacts on surface water are very unlikely.			
Residual impacts:			
Both headcutting and ponding would result in impact beyond the area where the removal of sand is proposed			

Mitigation

Impact on the natural flow regime would be difficult to mitigate for the duration of the operational phase and would continue until sufficient replacement of sediment within excavated areas has taken place. The same mitigating measures as for Site Access and Site Establishment will be applicable especially waste management.

• No water will be abstracted in terms of section 21(a) of the National Water Act, 1998 (Act no. 36 of 1998) without the necessary permission. Potable and process water to be obtained from legal source and brought on site.

• A Water Use Authorisation (License or GA) in terms of Sec 21 of the NWA for Impeding or diverting the flow of water in a watercourse (Sec 21c) and Altering the Bed, Banks, Course or Characteristics of a Watercourse (Sec 21i) is required.

• Implement and follow water saving procedures and methodologies.

• Landscaping, with the aim to re-instate natural terrain units

• Shaping of river bed to avoid diversion of stormwater towards banks to prevent erosion of river banks, and to prevent channeling of water that would increase erosive capacity of stormwater.

• No equipment may be parked within the drainage channel when not in use.

• No stockpiling to take place within the drainage channel.

Operational Phase - Potential Impacts from Emissions (Air Quality, Visual intrusion & Noise Generation)	**Significance**	**Before**	**After**
Visual intrusion caused by the front end loader, topsoil stockpiles, cleared areas, and movement of trucks on site during preparation of site access and site establishment. The site is however, remote and rural in nature with no receptors (people) as it is located on private property. Noise and dust will be created by mining equipment (e.g. front end loaders) and vehicles, which will emit Greenhouse Gases. Indirect impacts: There are few indirect impacts as the area is remote and rural, with no people (receptors) living near the site. Carbon emissions from vehicle exhausts have a negative impact on the ozone layer. Residents and occupants of work places along the access tracks and roads would be impacted on by noise, dust and vehicle Residual impacts: Good housekeeping will ensure a neat and well-maintained construction area reducing visual impact.	**Nature**	Negative	Negative
	Severity	2	1
	Spatial Scale	3	1
	Duration	1	1
	Consequence	6	3
	Probability	4	2
	Significance	24	6
	Cumulative Effects	Low	Insignificant
	Reversibility		Reversible
	Degree to which the impact can be avoided/managed/mitigated:		High

Mitigation

•The laydown areas shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly.

• Restrict working hours to normal work day hours with no work over weekends when holidays occur to minimize hauling trucks along access roads. Minimise use of reverse alarms by proper route planning

• Temporarily halt material handling in windy conditions and or reduce drop height of material to a minimum.

• Incremental clearing of ground cover should take place to minimise exposed surfaces.

• No amplified music shall be allowed on site.

• On public roads the vehicles shall adhere to municipal and provincial traffic regulations including speed limits.

• Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions.

• Trucks shall have tarpaulins to prevent sand from blowing off in transit.

Operational Phase - Potential Impacts on Socio-economic features	Significance	Before	After
Conflict with landowner and other land users Creation Of Employment & Job Security During Operational Phase with Local And Regional Economic Spin-Offs Indirect impacts: Upskilling Local economic spin-offs through increased income earned, and through purchasing of local materials required for operational activities. Income generation for landowners in a time of severe drought where livestock farming is not sustainable. Residual impacts: The upliftment of unemployed people, with positive impact on standard of living for their families. Local and regional economic spin-offs from investment through Social Labour Plan.	**Nature**	Negative	Negative
	Severity	5	1
	Spatial Scale	5	1
	Duration	6	1
	Consequence	16	3
	Probability	4	1
	Significance	64	3
	Cumulative Effects	Medium	Insignificant
	Reversibility		Irreversible
	Degree to which the impact can be avoided/managed/mitigated:		High
Mitigation • Co-ordinate invasive activities with existing mining activities or land uses to reduce the time of disturbances • All operations will be carried out under the guidance of strong, experienced manager and ECO with proven skills in public consultation and conflict resolution. • All personnel will be made aware of the local conditions and sensitivities in the mining area and the requirements of the local residents. • There will be a strict requirement to treat local residents with respect and courtesy at all times. • Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling)			

Operational Phase - Potential Impacts on Paleontological, Archaeological and Cultural and Heritage Resources	Significance	Before	After
Cultural and Heritage Resources Direct impacts to archaeological resources would occur primarily during the construction phase y (e.g. if an excavator drives beyond the demarcated area during construction). Impacts to graves could occur during the construction phase. The impact on paleontological resources takes place during all earthmoving activities. Indirect impacts: Loss of archaeological resources, graves and precolonial cultural landscape The material fossil evidence of "deep time" is embedded in the creation of the sacred landscape and contributes to the "sense of place" cultural aesthetic of the region. The loss of fossils and concomitant interpreted knowledge impoverishes the tangible testimony of the prehistoric landscape and ecological context of ancient humans. Residual impacts: Negative residual impact arises from the unavoidable loss of fossils of unknown significance in spite of mitigation efforts. Positive residual impact arises from	**Nature**	Negative	Negative
	Severity	5	1
	Spatial Scale	5	1
	Duration	6	1
	Consequence	16	3
	Probability	4	1
	Significance	64	3
	Cumulative Effects	Medium	Insignificant
	Reversibility		Reversible
	Degree to which the impact can be avoided/managed/mitigated:		Medium
Mitigation The same mitigating measures as for Site Access and Site Establishment will be applicable.			

Decommissioning and closure - Potential Impacts on other land uses	Significance	Before	After
No Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 2 km of the proposed area identified. No intersection with Environmental Management Frameworks relevant to the application Development incentives, restrictions, exclusions or prohibitions and their implications are not applicable to mining operations as the state is the custodian of all minerals and is responsible for the screening process as part of the acceptance process of applications taking into account any section 53 applications by other land users. The impact on Civil Aviation and Defence is also not applicable to this application as no high structures will be constructed and no defence installations or test areas are present in close proximity to this project. <u>Indirect impacts:</u> After closure certificate has been issued the area will once again be available for other land uses <u>Residual impacts:</u> None	**Nature** **Severity** **Spatial Scale** **Duration** **Consequence** **Probability** **Significance** **Cumulative Effects** **Reversibility** **Degree to which the impact can be avoided/managed/mitigated:**	Neutral 0 0	Neutral 0 0
<u>Mitigation</u> • None			
Decommissioning and closure - Potential Impacts on Soil (contamination, erosion, compaction) & Land capability	**Significance**	**Before**	**After**
Implementation of Rehabilitation, Decommissioning and Mine Closure Plan <u>Indirect impacts:</u> None. <u>Residual impacts:</u> Increase in natural habitat following rehabilitation processes.	**Nature** **Severity** **Spatial Scale** **Duration** **Consequence** **Probability** **Significance** **Cumulative Effects** **Reversibility** **Degree to which the impact can be avoided/managed/mitigated:**	Positive 0 0	Positive 0 0
<u>Mitigation</u> • Compacted areas that are not required for aftercare access shall be scarified. Dual use access roads must be handed back to the landowner in a good state of repair. • Implementing screening as part of the cleaning activities before materials are moved from the mine. The infrastructure area will be screened for petrochemical spills and cleaned and waste from the temporary storage facility will be removed and the area cleaned. Any compacted movement areas will be screened for petrochemical spills and cleaned before it is ripped and levelled. • Redundant structures will be removed for use elsewhere or demolished and discarded. • All steel structures and reinforcing will be discarded or sold as scrap. • All equipment and other items used during the mining operation needs to be removed from the site. • Remove all power and water supply installations not to be retained by landowner in terms of section 44 of the MPRDA. • Final walk through of complete mining lease area to ensure no mining related waste and of re-usable infrastructure remain on site.			

Decommissioning and closure - Potential Impacts on topography	Significance	Before	After
Implementation of Rehabilitation, Decommissioning and Mine Closure Plan	**Nature**	Positive	Positive
Indirect impacts:	**Severity**		
Historic disturbances rehabilitated	**Spatial Scale**		
Residual impacts:	**Duration**		
Increase in natural habitat following rehabilitation processes.	**Consequence**	0	0
	Probability		
	Significance	0	0
	Cumulative Effects		
	Reversibility		
	Degree to which the impact can be avoided/managed/mitigated:		

Mitigation

• All mitigation will be addressed as part of the annual rehabilitation plan as part of the operational phase.

• The focus of topographic rehabilitation may not be obvious at the time of mine planning and must be addressed as the mine develops and the Final Rehabilitation, Decommissioning and Closure Plan must be reviewed periodically for continued relevance in the light of changed mining path or long-term plans.

Decommissioning and closure - Potential Impacts on Biodiversity, Flora & Fauna	Significance	Before	After
Implementation of Rehabilitation, Decommissioning and Mine Closure Plan	**Nature**	Positive	Positive
Indirect impacts:	**Severity**		
Biodiversity of area will improve due to removal of alien invasive vegetation.	**Spatial Scale**		
Fauna will return to the disturbed areas.	**Duration**		
Sand will move into the mined areas from upstream areas over time.	**Consequence**	0	0
Residual impacts:	**Probability**		
Net loss of river sand in the mined area, until sand from upstream is brought downstream by storm events over time.	**Significance**	0	0
	Cumulative Effects		
	Reversibility		
	Degree to which the impact can be avoided/managed/mitigated:		

Mitigation

- All outstanding rehabilitation not completed as part of the Annual Rehabilitation plan needs to be completed as part of the final Rehabilitation, Decommissioning and Mine Closure Plan
- Compacted areas shall be scarified after use during decommissioning and rehabilitation.
- Any stored topsoil shall be spread over the scarified surface.
- Shaping of river bed to avoid steep profiles and hollows.
- Ongoing removal of alien invasive vegetation

Decommissioning and closure - Potential Impacts on Aquatic biodiversity & Water Resources	Significance	Before	After
None during decommissioning activities	Nature	Neutral	Neutral
Indirect impacts:	Severity		
None	Spatial Scale		
Residual impacts:	Duration		
None	Consequence	0	0
	Probability		
	Significance	0	0
	Cumulative Effects		
	Reversibility		
	Degree to which the impact can be avoided/managed/mitigated:		
Mitigation None			
Decommissioning and closure - Potential Impacts from Emissions (Air Quality, Visual intrusion & Noise Generation)	**Significance**	**Before**	**After**
None during decommissioning activities or less than for operational phase	Nature	Neutral	Neutral
Indirect impacts:	Severity		
None	Spatial Scale		
Residual impacts:	Duration		
None	Consequence	0	0
	Probability		
	Significance	0	0
	Cumulative Effects		
	Reversibility		
	Degree to which the impact can be avoided/managed/mitigated:		
Mitigation None			
Decommissioning and closure - Potential Impacts on Socio-economic features	**Significance**	**Before**	**After**
Staff losing their jobs	Nature	Negative	Negative
Contractual agreements with service providers surpassing mine closure date	Severity	4	4
Poorly defined transition from mining to farming activities within different legislation	Spatial Scale	3	3
Not undertaking environmental management according to approved EMPr and plans and no auditing of the environmental management system.	Duration	3	3
Insufficient funds for complete rehabilitation	Consequence	10	10
Indirect impacts:	Probability	3	3
Job losses of secondary industries, businesses and contractors	Significance	30	30
Mine closure stalled due to non-compliance with South African legislation (national, provincial and local)	Cumulative Effects	Low	Low
Residual impacts:	Reversibility		Irreversible
Closure standards not accepted and/or are changing Mine closure being jeopardised by other land uses	Degree to which the impact can be avoided/managed/mitigated:		Medium

Mitigation

• Contract durations with service providers will be limited to address the risk of contractual agreements with service providers surpassing the mine closure date.
• Maintain positive and transparent relationships with stakeholders and maintaining communication channels.
• Undertaking environmental management in accordance with the approved EMPr and Closure Plan.

Decommissioning and closure - Potential Impacts on Paleontological, Archaeological and Cultural and Heritage Resources	**Significance**	**Before**	**After**
None during decommissioning activities or less than for operational phase	**Nature**	Neutral	Neutral
Indirect impacts:	**Severity**		
None	**Spatial Scale**		
Residual impacts:	**Duration**		
None	**Consequence**	0	0
	Probability		
	Significance	0	0
	Cumulative Effects		
	Reversibility		
	Degree to which the impact can be avoided/managed/mitigated:		

Mitigation

None

11. Environmental impact statement

11.1 Summary of the key findings of the environmental impact assessment

The assessed impact ratings are as follows:

Site Access and Site Establishment

- Potential Impacts on other land uses - No impact (Neutral)
- Potential Impacts on Soil (contamination, erosion, compaction) & Land capability - Low significance, reduced to Very Low with mitigation
- Potential Impacts on topography - No impact (Neutral)
- Potential Impacts on Biodiversity, Flora & Fauna - Medium significance, reduced to Very Low with mitigation
- Potential Impacts on Aquatic biodiversity & Water Resources – Low significance, reduced to insignificant with mitigation
- Potential Impacts from Emissions (Air Quality, Visual intrusion & Noise Generation) – Low significance, reduced to Insignificant with mitigation
- Socio - economic impact - medium significance, reduced to Insignificant with mitigation
- Potential Impacts on Paleontological, Archaeological and Cultural Heritage Resources – Insignificant, stay Insignificant with mitigation

Operational Phase

- Potential Impacts on other land uses - No impact (Neutral)
- Potential Impacts on Soil (contamination, erosion, compaction) & Land capability - Low significance, reduced to Very Low with mitigation
- Potential Impacts on topography - Very Low, reduced to Insignificant with mitigation
- Potential Impacts on Biodiversity, Flora & Fauna - Medium significance, reduced to Very Low with mitigation
- Potential Impacts on Aquatic biodiversity & Water Resources - Medium significance, reduced to Very Low with mitigation
- Potential Impacts from Emissions (Air Quality, Visual intrusion & Noise Generation) - Low significance, reduced to Insignificant with mitigation
- Socio - economic impact - medium significance, reduced to Insignificant with mitigation
- Potential Impacts on Paleontological, Archaeological and Cultural Heritage Resources – Medium significance, reduced to Insignificant with mitigation

All of the identified impacts will occur for a limited period and the extent of the impacts will be localised. All of the identified impacts can be suitably mitigated with the residual impact ratings being of Insignificant to Very Low. The main impacts associated with mining can be suitable mitigated. After mining have been completed and rehabilitated, the impacts will cease to exist.

11.2 Final Site Map

Please refer to **Figure 3 to 12** for the Environmental Sensitivities Map including the target area of interest for proposed mining activities.

11.3 Summary of the positive and negative impacts and risks of the proposed activity and identified alternatives

11.4 Positive Impacts

Mining would contribute to employment in the building sector of the Local Municipality.

11.5 Negative Impacts

- Noise Generation from construction / set-up and operational activities;
- Visual intrusion caused by the mining activities in the largely rural setting;

- Dust fall & nuisance from construction and site establishment;
- Wildlife and vegetation disturbance during the construction / set-up and operational phase;
- Surface water and groundwater contamination from hydrocarbons during the construction/set-up and operational activities; and
- Socio-Economic impact due to conflicting land uses during the construction / set-up and operational phase.

11.6 Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

11.6.1 Management Objectives

The impact management objectives are listed below:

- Objective 1 - To create a safe and rehabilitated post-mining environment.
  - Ensure safe mining area with no potentially dangerous areas like deep excavations.
  - The site in the river bed is to be shaped and levelled at each stage of closure and rehabilitation.
  - Topsoil to be stockpiled and replaced during decommissioning and closure, and rehabilitation.
- Objective 2 - To minimise pollution or degradation of the environment
  - Provide sufficient information and guidance to plan the sand mining activities in a manner that would reduce impacts as far as practically possible.
  - Limit residual environmental impact with no surface water or soil contamination by ensuring that no fuel or oil spills occur in the mining area.
  - Ensure that no solid waste or rubble is dumped on the site.
  - Ensure that portable toilets are used.
- Objective 3 – To minimise impacts on the community and to provide optimal post-mining social opportunities
  - Ensure that workers remain within the mining permit area.
  - Ensure access control measures are implemented.
  - Operate during normal working hours only.
  - Minimise the generation of noise and dust.
  - Respond rapidly to any complaints received.
  - Minimal negative aesthetic impact
  - Optimised benefits for the social environment

11.6.2 Outcomes

- By providing sufficient information to strategically plan the sand mining activities, unnecessary social and environmental impacts be avoided.
- Ensure an approach that will provide the necessary confidence in terms of environmental compliance.
- Provide a management plan that is effective and practical for implementation.
- Through the implementation of the proposed mitigation measures it is anticipated that the identified social and environmental impacts can be managed and mitigated effectively.
- Noise generation can be managed through consultation and restriction of operating hours and by maintaining equipment and applying noise abatement equipment if necessary.
- Dust fall can be managed by reducing driving speeds when driving on unpaved roads.
- Wildlife disturbance and clearance of vegetation will be limited to the absolute minimum required and disturbed areas will be re-vegetated with locally indigenous species as soon as possible.

- Surface water and groundwater contamination by hydrocarbons can be managed by conducting proper vehicle maintenance, refueling with care to minimise the chance of spillages and by having a spill kit available on each site where sand mining activities are in progress.

11.7 Description of any assumptions, uncertainties and gaps in knowledge.

This report has been completed to the best of the EAPs ability, based on his experience and on information currently available to the EAP as well as provided by the applicant.

- The desk-top research included reference to the SANBI BGIS database map viewer for the various baseline environmental attributes, and any assumptions or gaps in knowledge expressed by SANBI in the provision of this information would be applicable to this information as referenced.
- The latest Google Earth™ reference available is outdated (2016) for purposes of current land use identification in close proximity to the proposed site on adjacent properties upstream and downstream of the site.
- It is assumed that the proposed mitigation measures as listed in this report and included in the EMPr will be implemented and adhered to. Mitigation measures are proposed which are considered to be reasonable and must be implemented in order for the outcome of the assessment to be accurate.

11.8 Reasoned opinion as to whether the proposed activity should or should not be authorized

11.8.1 Reasons why the activity should be authorized or not

It is the opinion of the EAP that the proposed sand mining activity should be authorised. In reaching this conclusion the EAP has considered that:

- The "preferred alternative" takes into account location alternatives, activity alternatives, layout alternatives, technology alternatives and operational alternatives.
- The approach taken is that it is preferable to avoid significant negative environmental impacts, wherever possible.
- The site is not located in a Freshwater Ecosystem Priority Area (FEPA) and no high or very high impacts on the aquatic environment are expected from the proposed sand mining activities. It is also the opinion of the EAP that the underlying biodiversity objectives and ecological functioning will not be compromised, subject to the strict adherence to the EMPr and Closure Plan.
- No negative impacts have been identified that are so severe as to prevent the proposed mining activity from taking place. The activity has been assessed to have a positive socio-economic impact, especially in terms of the creation of employment and the provision of building sand at a local and district level for the construction sector.
- Provided the recommended mitigation measures are implemented and mining activities are managed in accordance with the stipulations of the EMPr, and Rehabilitation, Decommissioning and Mine Closure Plan (Annexure 1), in an environmentally sound manner, the potential negative impacts associated with the implementation of the preferred alternative can be reduced to acceptable levels.

11.8.2 Conditions that must be included in the authorisation

- All mining and rehabilitation to be conducted as per the approved EMPr, and Rehabilitation, Decommissioning and Closure Plan (Annexure 1).
- Concurrent mining and rehabilitation must be done according to the annual rehabilitation plan.
- The proposed mining area must be clearly demarcated with semi-permanent markers.

- Eradicate all alien vegetation in the area regularly during and after mining.
- The sand mining operator must appoint a suitably qualified ECO who will be responsible for ensuring compliance with the requirements of the EMPr during the mine operation and decommissioning.
- Should any burials, fossils or other historical material be encountered during construction, work must cease immediately and SAHRA must be contacted.
- The mine operation must follow an Integrated Waste Management approach. Control measures must be implemented to prevent pollution of any water resource or soil surface by oil, grease, fuel or chemicals. Appropriate pollution prevention measures must be implemented to prevent dust.
- A speed limit of 40km/hour will be displayed and enforced through a fining system. All vehicle drivers will be informed of the speed limit applicable to the length of the access road off the N14 where after the national speed limits will be applicable for hauling trucks. The access road will be maintained during operational activities.

11.8.3 Period for which the Environmental Authorisation is required

The authorisation is required for the duration of the sand mining permit which is an initial 2 years plus a potential to extend the permit by an additional 3 years. Normally there is also a time delay in the granting of applications for renewal therefore a total period of 10 years may be required.

11.8.4 Undertaking

It is confirmed 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 (BAR) and the Environmental Management Programme report (EMPr).

12. Financial Provision

12.1 Legal Framework

Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations under section 44, read with sections 24 of the National Environmental Management Act, 1998 (Act No.107 of 1998) were issued in 2015.

According to the Financial Provisioning regulations, 2015 as amended (Reg. 7) the applicant or holder of a right or permit must ensure that the financial provision is, at any given time, equal to the sum of the actual costs of implementing the plans and report contemplated in regulation 6 and regulation 11.

In terms of regulation 11(1) the holder of a right or permit must ensure that a review is undertaken of the requirements for (a) annual rehabilitation, as reflected in an annual rehabilitation plan; (b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations as reflected in a final rehabilitation, decommissioning and mine closure plan; and (c) remediation of latent or residual environmental impacts which may become known in the future, as reflected in an environmental risk assessment report.

12.2 Calculation

Financial provision in terms of Regulation 6 of the Financial Provisioning Regulations, 2015 as amended, is covered by the requirements for the actual costs of implementation of the measures required for final rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations as reflected in the final rehabilitation, decommissioning and mine closure plan attached as Annexure 1.

12.3 Explain how the aforesaid amount was derived.
According to regulation 6 an applicant must determine the financial provision through a detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for— (a) annual rehabilitation, as reflected in an annual rehabilitation plan; (b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan; and (c) remediation of latent or residual environmental impacts which may become known in the future, as reflected in an environmental risk assessment report (Refer Annexure 1).

12.4 Confirm that this amount can be provided for from operating expenditure.
The amount needed for the implementation of the final rehabilitation, decommissioning and closure plan will be provided to DMR in the form of a bank guarantee and the plan will be revised on an annual basis in terms of regulation 11(1) of the Nema Financial Provisioning Regulations 2015 as amended.
Provision for implementation of annual rehabilitation plan to be provided as part of the environmental audit report in terms of Regulation 34 (1)(b) of the NEMA EIA Regulations (2014) will be provided as part of the operational budget and proof of access to the necessary fund were provided as part of the PWP together with proof of access to the necessary financial resources.

13. Specific Information required by the competent Authority
13.1 Compliance with sections 24(4)(a) and (b) of NEMA
According to the National Environmental Management Act (Act 107 of 1998). the EIA report must include the impact on:
<u>The socio-economic conditions of any directly affected person</u>
A full consultation process was implemented during the environmental authorisation process. The purpose of the consultation is to provide affected persons the opportunity to raise any potential concerns. Concerns raised have been captured and addressed within the public participation section of this report to inform the decision-making process.
<u>Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act</u>
The potential impact on heritage resources is unlikely due to the nature of the sand mining activity in a river bed, as confirmed by specialist reports attached at annexure 3.

13.2 Other matters required in terms of sections 24(4)(a) and (b) of the Act.
A motivation for not investigating reasonable and feasible alternatives is provided in Section 9.4 above.

14. Environmental Management Program
14.1 Details of the EAP,
This has already been covered. Refer Section 1 of this document.

14.2 Description of the Aspects of the Activity
This has already been covered. Refer Section 9 & 10 of this document.

14.3 Composite Map
This has already been covered. Refer Figure 1 to 3.

14.4 Description of Impact management objectives including management statements

This has already been covered. Refer Section 10 of this document.

14.5 Determination of closure objectives.

This has already been covered. Refer Annexure 1 and Section 15 of this document.

14.6 Volumes and rate of water use required for the operation.

The proposed sand mining activity does not require water for operation

14.7 Has a water use license been applied for?

A general authorisation for section 21 c & 21i water uses of the NWA (36, 1998) were obtained for Impeding or diverting the flow of water in a watercourse (21c) and Altering the Bed, Banks, Course or Characteristics of a Watercourse (21i) (Annexure 4).

14.8 Impacts to be mitigated in their respective phases

Table 15: Measures to rehabilitate the environment affected by the undertaking of any listed activity

ACTIVITY 1	SITE ACCESS (use of existing farm tracks; access points to river bed) & SITE ESTABLISHMENT	**PHASE** CONSTRUCTION	**SIZE AND SCALE of disturbance** Total footprint is 5ha
COMPLIANCE WITH STANDARDS	NEMA Section 2 Principles Environmental Authorisation	**TIME PERIOD FOR IMPLEMENTATION**	Start of activity and continuous as mining progresses over the site during construction period (site access and site establishment activities) Upon cessation of each activity where applicable. Immediately in the event of spills
MITIGATION MEASURES	**Impact 1: Soil (contamination, erosion, compaction) & Land capability** • After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly. • Incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces. • Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and stormwater run-off. • Top soil shall be removed separately and stockpiled separately from other soil base layers. • Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material. • Topsoil storage areas must be convex and should not exceed 2m in height. • Topsoil must be treated with care, must not be buried or in any other way be rendered unsuitable for further use (e.g., by mixing with spoil) and precautions must be taken to prevent unnecessary handling and compaction. • In particular, topsoil must not be subject to compaction greater than 1 500 kg/m² and must not be pushed by a bulldozer for more than 50 metres. Trucks may not be driven over the stockpiles. • Reduce drop height of material to a minimum. Temporarily halt material handling in windy conditions. • A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. • Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation. • Contaminated soil must be treated by first removing the source of contamination - removing the source of contamination should allow the system to recover without further clean-up required. • Petrochemical spillages to be collected in a drum and store excavated spill affected soil for disposal at a registered facility or onsite treatment. • Fuel storage must be contained in mobile bowsers and refuelling will be done with care to minimise the chance of spillages • The most promising techniques for in on-site treatment involve bioremediation. Bioremediation involves the use of microorganisms to destroy hazardous contaminants.		

MITIGATION MEASURES	**Impact 2: Biodiversity, Flora & Fauna** • Mitigation measures for soil erosion & soil compaction will also be applicable to promote natural revegetation: • The project footprint must be rehabilitated to resemble pre-mining conditions, as best as possible. • Identify existing disturbed patches for laydown areas, and demarcate areas for clearing. Existing farm tracks will be used as access and haul roads. • Remove alien invasive vegetation and ensure ongoing alien vegetation clearing in the area. No indigenous plants outside of the demarcated work areas may be damaged. • The noise and vibration caused by the earthmoving equipment will disturb smaller animals (e.g., snakes). These will move away whilst operations are in progress. Should any animals be encountered, these should be moved away by a suitably trained nature conservation officer, if necessary. • Movement of vehicles and machinery will be restricted to demarcated areas and roads with no off-road driving permitted. Vehicles speed must take into account the possibility of collisions with fauna. • Provide all workers with environmental awareness training. Ensure all workers comply with the requirements of this EMPr.
MITIGATION MEASURES	**Impact 3: Aquatic biodiversity & Water Resources** • Provide mobile ablution facilities and take care that temporary onsite sanitation facilities are well maintained and serviced regularly. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials and ensure that good housekeeping rules are applied. Minimise storage of hazardous substances onsite • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Fuel storage must be contained in mobile bowsers and refuelling will be done with care to minimise the chance of spillages • Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevents spills/ leaks onto the soil. • A spill kit will be available on each site where mining activities are in progress. • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. Waste separation must be undertaken if practical for recycling. • Provide all workers with environmental awareness training and comply with the requirements of this EMPr. • By keeping contaminated and clean water separate and establishing controlled runoff at washing bays, the flow and end destination of decontamination washing water will be controlled.

MITIGATION MEASURES	**Impact 4: Emissions (Air Quality, Visual intrusion & Noise Generation)** • The laydown areas shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly. • The Applicant shall adhere to the local by-laws and regulations regarding the noise and associated hours of operations and limit noise levels (e.g., install and maintain silencers on machinery). The provisions of SANS 1200A Sub clause 4.1 regarding "built-up" area shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas. • Activities generating output of 85dB or more, shall be limited to normal working hours and not allowed during weekends to limit the impact of noise on neighbours. No amplified music shall be allowed on site. Engines shall be turned off when the vehicle is temporarily parked or stationery for long periods. • Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition. • Minimise use of reverse alarms by proper route planning • If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, or it will be placed in an acoustic enclosure, or an acoustic barrier will be erected between the source and the recipient. • On public roads the vehicles shall adhere to municipal and provincial traffic regulations including speed limits. At the mining area a speed limit of 40km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. The wetting of the roads helps reduce dust generation as will applying dust suppression and/or hardening compound. • Stockpiles must be maintained (covered where necessary) to avoid wind erosion of the material and incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces. • Temporarily halt material handling in windy conditions. Health and safety equipment is required for workers. • Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions. • The earth moving or sampling equipment and other visually prominent items on the site will be located in consultation with the landowner. • Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material. **Impact 5: Socio-economic features** • All access will be arranged beforehand with landowner and a supervisor will be present at all times and will report to the landowner when accessing and leaving the property. • Indemnity will be signed by all mining personnel entering the property to cover the landowner against any claims regarding injuries or damage to equipment. • Any other mining companies or land users operating legally will be regarded as affected parties and consulted. Areas of operations will be demarcated and no overlapping will be allowed or agreements regarding environmental liabilities need to be put in place. • Agreements between any existing mining operations or other land users and landowner will be respected and adopted as part of this operation. • Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling)

MITIGATION MEASURES	**Impact 6: Paleontological, Archaeological and Cultural Heritage Resources** • If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution. • A fossil Chance Finds Procedure must be implemented in the event of any chance finds of fossils • Regardless of the above archaeological opinion the following mitigation measures will also be implemented: • All development sites should be carefully inspected by project staff to ensure that no heritage features especially unmarked graves are present; • Equipment moving on site will, where ever possible, be confined to established roads and tracks. • Any identified heritage feature will be cordoned off. All personnel including contractors involved in the construction activities will be made aware of the locations of all identified heritage resources, the necessity of avoiding impacts on such resources and the penalties for damaging them. • Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites. It will be emphasised that archaeological artefacts such as potsherds, stone tools, grinding stones, etc. must be left in situ and undisturbed. • A safe distance of at least 100 metres will be maintained between identified heritage resource and any development associated with the mining activities.

ACTIVITY 2	Mining of sand material (extraction, loading and hauling)	PHASE OPERATION	SIZE AND SCALE of disturbance Total footprint is 5ha: average depth of 2 metres
COMPLIANCE WITH STANDARDS	NEMA Section 2 Principles Environmental Authorisation	**TIME PERIOD FOR IMPLEMENTATION**	During the estimated 5-year lifespan of the mine. Start of activity and continuous as mining progresses over the site during operational period. Upon cessation of each activity where applicable. Immediately in the event of spills.
MITIGATION MEASURES	**Impact 1: Soil (contamination, erosion, compaction) & Land capability** • After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly. • Incremental clearing of vegetation in river bed should take place to avoid unnecessary exposed surfaces. • Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and stormwater run-off. • Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material. • Reduce drop height of material to a minimum. • Temporarily halt material handling in windy conditions. • A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. • Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation. • To ensure long-term stability, the restored topsoil cover should attempt to mimic the pre-mining distribution of soil texture and thickness. **Impact 2: Topography** • All spoils and leftover product need to be returned to the excavations for backfilling. • Remaining excavation slopes needs to be profiled to form an even depression 18°		

MITIGATION MEASURES	**Impact 3: Biodiversity, Flora & Fauna** • The project footprint must be rehabilitated to resemble pre-mining conditions, as best as possible. • Ensured that the area to be disturbed as part of the development is as small as practically possible • Identify existing access tracks. Demarcate areas for clearing in the river bed. • The mining area and stockpile areas must be demarcated and the footprint contained within the demarcated area. • Mining areas to be limited to blocks of 500m at a time with rehabilitation of the bank and access areas required before moving upstream to the next block. • Delineation of the area via geophysical characterisation in order to limit the activities and clearance to the smallest area that is necessary and rehabilitating the disturbed area as soon as possible • The annual rehabilitation plan must be implemented. • Remove alien invasive vegetation, and ensure ongoing alien vegetation clearing in the area. • No indigenous plants outside of the demarcated work areas may be damaged. • Identify protected tree species, and leave these intact. • Ongoing monitoring and management will be required to ensure that alien vegetation does not proliferate within disturbed areas and that an indigenous vegetation community does indeed establish. • Should any animals be encountered, these should be moved away by the ECO, if necessary • Unnecessary destruction of vegetation should be avoided by ensuring that traffic and personnel movement be restricted to demarcated areas. • Movement and stockpile areas must be rehabilitated by scarifying trampled and compacted areas to a dept of ±300mm areas. Windrows created by scarifying needs to be left in place to create a rough surface that can act as seed trap and create a micro-habitat to promote natural re-vegetation. • No traffic should be allowed on the rehabilitated areas and vehicle's speed must take into account the possibility of collisions with fauna. **Impact 4: Aquatic biodiversity & Water Resources** • No water will be abstracted in terms of section 21(a) of the National Water Act, 1998 (Act no. 36 of 1998) without the necessary permission. Potable and process water to be obtained from legal source and brought on site. • A Water Use Authorisation (License or GA) in terms of Sec 21 of the NWA for Impeding or diverting the flow of water in a watercourse (Sec 21c) and Altering the Bed, Banks, Course or Characteristics of a Watercourse (Sec 21i) is required. • Implement and follow water saving procedures and methodologies. • Landscaping, with the aim to re-instate natural terrain units • Shaping of river bed to avoid diversion of stormwater towards banks to prevent erosion of river banks, and to prevent channelling of water that would increase erosive capacity of stormwater. • No equipment may be parked within the drainage channel when not in use. • No stockpiling to take place within the drainage channel.

MITIGATION MEASURES	**Impact 5: Emissions (Air Quality, Visual intrusion & Noise Generation)** • The laydown areas shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly. • Restrict working hours to normal work day hours with no work over weekends when holidays occur to minimize hauling trucks along access roads. Minimise use of reverse alarms by proper route planning • Temporarily halt material handling in windy conditions and or reduce drop height of material to a minimum. • Incremental clearing of ground cover should take place to minimise exposed surfaces. • No amplified music shall be allowed on site. • On public roads the vehicles shall adhere to municipal and provincial traffic regulations including speed limits. • Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions. • Trucks shall have tarpaulins to prevent sand from blowing off in transit. **Impact 6: Socio-economic features** • Co-ordinate invasive activities with existing mining activities or land uses to reduce the time of disturbances • All operations will be carried out under the guidance of strong, experienced manager and ECO with proven skills in public consultation and conflict resolution. • All personnel will be made aware of the local conditions and sensitivities in the mining area and the requirements of the local residents. • There will be a strict requirement to treat local residents with respect and courtesy at all times. • Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling) **Impact 7: Paleontological, Archaeological and Cultural and Heritage Resources** • Cemeteries must be protected by a buffer zone of at least 20 meters • If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution. • A fossil Chance Finds Procedure must be implemented in the event of any chance finds of fossils • Regardless of the above archaeological opinion the following mitigation measures will also be implemented: • All development sites should be carefully inspected by project staff to ensure that no heritage features especially unmarked graves are present; • Equipment moving on site will, where ever possible, be confined to established roads and tracks. • Any identified heritage feature will be cordoned off. All personnel including contractors involved in the construction activities will be made aware of the locations of all identified heritage resources, the necessity of avoiding impacts on such resources and the penalties for damaging them. • Personnel will be informed about the consequences of unlawful removal of cultural and historical remains and artefacts associated with heritage sites. It will be emphasised that archaeological artefacts such as potsherds, stone tools, grinding stones, etc. must be left in situ and undisturbed.

	• A safe distance of at least 100 metres will be maintained between identified heritage resource and any development associated with the mining activities.		
ACTIVITIES 3	Final Rehabilitation and removal of temporary infrastructure	**PHASE** DECOM-MISIONING	**SIZE AND SCALE of disturbance** Less than 5ha
COMPLIANCE WITH STANDARDS	NEMA Section 2 Principles Environmental Authorisation	**TIME PERIOD FOR IMPLEMENTATION**	During the estimated 5-year lifespan of the mine. Start of activity and continuous as mining progresses over the site during operational period. Upon cessation of each activity where applicable. Immediately in the event of spills.

MITIGATION MEASURES	**Impact 1: Soil (contamination, erosion, compaction) & Land capability** • Compacted areas that are not required for aftercare access shall be scarified. Dual use access roads must be handed back to the landowner in a good state of repair. • Implementing screening as part of the cleaning activities before materials are moved from the mine. The infrastructure area will be screened for petrochemical spills and cleaned and waste from the temporary storage facility will be removed and the area cleaned. Any compacted movement areas will be screened for petrochemical spills and cleaned before it is ripped and levelled. • Redundant structures will be removed for use elsewhere or demolished and discarded. • All steel structures and reinforcing will be discarded or sold as scrap. • All equipment and other items used during the mining operation needs to be removed from the site. • Remove all power and water supply installations not to be retained by landowner in terms of section 44 of the MPRDA. • Final walk through of complete mining lease area to ensure no mining related waste and of re-usable infrastructure remain on site. **Impact 2: Topography** • All mitigation will be addressed as part of the annual rehabilitation plan as part of the operational phase. • The focus of topographic rehabilitation may not be obvious at the time of mine planning and must be addressed as the mine develops and the Final Rehabilitation, Decommissioning and Closure Plan must be reviewed periodically for continued relevance in the light of changed mining path or long-term plans. **Impact 3: Biodiversity, Flora & Fauna** • All outstanding rehabilitation not completed as part of the Annual Rehabilitation plan needs to be completed as part of the final Rehabilitation, Decommissioning and Mine Closure Plan • Compacted areas shall be scarified after use during decommissioning and rehabilitation. • Any stored topsoil shall be spread over the scarified surface. • Shaping of river bed to avoid steep profiles and hollows. • Ongoing removal of alien invasive vegetation **Impact 4: Socio-economic features** • Contract durations with service providers will be limited to address the risk of contractual agreements with service providers surpassing the mine closure date. • Maintain positive and transparent relationships with stakeholders and maintaining communication channels. • Undertaking environmental management in accordance with the approved EMPr and Closure Plan.

14.9 Impact Management Outcomes

Table 16: Impact Management Outcomes

ACTIVITY	POTENTIAL IMPACT	ASPECTS AFFECTED	PHASE In which impact is anticipated	MITIGATION TYPE	STANDARD TO BE ACHIEVED
Site access	Disturbance of river bank at access points	Water resources functionality	Construction	Remedy through restriction and rehabilitation.	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Disturbance of fauna and flora	Biodiversity in an CBA 2		Remedy through restriction and rehabilitation	
	Soil compaction and erosion	Soil resource		Control through monitoring and management	
Site establishment, including waste generation and management	Visibility	Visual intrusion	Construction	Control through monitoring and management	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Emissions (dust, noise & vehicles)	Noise & Air quality		Control through monitoring and management	
	Disturbance of fauna and flora	Biodiversity in an CBA 2		Remedy through restriction and rehabilitation	
	Soil, sand contamination, soil compaction and disturbance	Soil resource		Remedy through restriction and rehabilitation & control through monitoring and management	
	Destruction or loss of Heritage resources	Cultural and Heritage		Avoidance by relocation of activity if required. Refer to **Appendix 3** – no mitigation required for project site assessed	Impact avoided
Removal of sand, loading and hauling, waste generation ad management	Visibility	Visual	Operation	Control through monitoring and management	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Emissions (dust, noise & vehicles)	Noise & Air quality		Control through monitoring and management	
	Disturbance of fauna and flora	Biodiversity in an CBA 2		Remedy through restriction and rehabilitation	
	Soil and sand contamination, soil compaction and disturbance	Soil resource		Remedy through restriction and rehabilitation & control through monitoring and management.	
	Disturbance of river bed; sand extraction	Water resources functionality			
	Destruction or loss of Heritage resources	Cultural and Heritage		Refer to **Appendix 3** – no mitigation required for project site investigated.	Impact avoided

Removal of temporary infrastructure and site rehabilitation	Dust emissions (vehicle entrained dust)	Soil resource	Decommissioning	Control through monitoring and management	Impacts minimised and mitigated. End use objectives achieved through rehabilitation.
	Soil erosion due to slow recovery of vegetation	Soil resource & biodiversity		Remedy through restriction and rehabilitation & control through monitoring and management.	
	River bed profile	Water resources functionality in a FEPA			

14.10 Impact Management Actions

Table 17: Impact Management Actions

ACTIVITY	POTENTIAL IMPACT	MITIGATION TYPE	TIME PERIOD FOR IMPLEMENTATION	COMPLIANCE WITH STANDARDS
Site access	Disturbance of river bank at access points	Remedy through restriction and rehabilitation Control through monitoring and management	Concurrently with site access activities Upon cessation of activity	Remain within the ambit of the Mining Permit Programme and Environmental Authorisation
	Disturbance of fauna and flora			
	Soil compaction and erosion			
Site establishment, including waste generation and management	Visibility	Control through monitoring and management		
	Emissions (dust, noise & vehicles)			
	Disturbance of fauna and flora	Remedy through restriction and rehabilitation		
	Soil and sand contamination, soil compaction and disturbance	Remedy through restriction and rehabilitation & control through monitoring and management		
	Destruction or loss of Heritage resources	Avoidance by relocation of activity if required		
Removal of sand, loading and hauling, waste generation and management	Visibility	Control through monitoring and management	Concurrently with site access activities Upon cessation of activity	Remain within the ambit of the Mining Permit Programme and Environmental Authorisation
	Emissions (dust, noise & vehicles)	Control through monitoring and management		
	Disturbance of fauna and flora	Remedy through restriction and rehabilitation		
	Soil and sand contamination, soil compaction and disturbance	Remedy through restriction and rehabilitation & control through monitoring and management		
	Disturbance of river bed; sand extraction			
	Destruction or loss of Heritage resources	Avoidance by relocation of activity if required.		

Removal of temporary infrastructure and site rehabilitation	Dust emissions (vehicle entrained dust)	Control through monitoring and management	Upon cessation of activity	Remain within the ambit of the Mining Permit Programme and Environmental Authorisation
	Soil erosion due to slow recovery of vegetation	Remedy through restriction and rehabilitation & control through monitoring and management		
	River bed profile			

15. Financial Provision

15.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.

- Objective 1 - To create a safe and healthy post-mining environment
  - Safe mining area
    - Maintain affected environment in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof.
    - No potentially dangerous areas; secured if required
  - Limited residual environmental impact
    - No surface and/or groundwater contamination
    - Waste management practices not creating or leaving legacies
    - Develop a landscape that reduces the requirement for long term monitoring and management
- Objective 2 - To create a stable, free draining post mining landform, which is compatible with the surrounding landscape
  - Economically viable and sustainable land fit for grazing, as close as possible to its natural state.
    - Improve Land use with an increased production with regard to grazing.
    - Minimise disturbance of ecology due to loss of habitat and noise/visual/dust
    - Minimise risk of erosion from either increased base flow or prospecting operations:
    - Management of air emissions to minimise nuisance effects; implementation of dust suppression activities.
    - Increase of land with agricultural potential: profiling and sloping of remaining drill sumps and removal of all drill spoils and ripping of all compacted areas to facilitate recovery of natural vegetation through colonization by dispersing species (patch dynamics)
    - Prevent long term changes in land use: revert back to mainly stock farming (grazing).
    - Prepare area to promote natural re-establishment of vegetation that is self-sustaining, perpetual and provides a sustainable habitat for local fauna and successive flora species
- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
    - Maintain positive and transparent relationships with stakeholders: maintaining communication channels to all stakeholders and forums.
    - Provide stakeholders with relevant information: making all information available to stakeholders and providing information to authorities as per legislative requirements.
    - Undertaking environmental management in accordance with the implementation, maintenance and auditing of an environmental management system.
  - Minimal negative aesthetic impact
    - Maintain affected environment in an improved state containing no foreign debris or other materials.

The legal framework within which all the above lies entails:

- Defining and meeting closure standards.
- Complying with legislation.

- Sufficient financial provision for mine closure activities.
- Monitoring and plan for latent environmental impact.

15.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

The closure objectives were reported in the draft BAR as well as the Final Rehabilitation, decommissioning and mine closure plan Including Environmental Risk Assessment and was made available to all registered interested and affected parties.

15.3 Rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities

Refer Final Rehabilitation, decommissioning and mine closure plan Including Environmental Risk Assessment Annexure 1.

15.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The closure objectives are to return the land disturbed by sand mining activities back to its original condition. The rehabilitation plan provides the detail on how this will be achieved as detailed in Annexure 1.

15.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

As per Paragraph 11 of this report and Annexure 1.

15.6 Confirm that the financial provision will be provided as determined.

As per Paragraph 11 of this report and Annexure 1.

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

Table 18: Mechanisms for Monitoring Compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
All mining activities	All commitments contained in the BA Report and accompanying EMP.	Ensure commitments made within the approved BAR and EMPr are being adhered to.	Site Manager and EAP.	**Annual** Undertake and submit an environmental performance audit to DMR Report incidents in terms of the relevant legislation, including the MPRDA, NWA and NEMA.
Site access and site establishment	Visual inspection of soil erosion and/or compaction	All exposed areas, access roads and soil stockpiles must be monitored for erosion on a regular basis, specifically after rainfall events.	Site Manager and Independent EAP	**Monthly** Site diary including reporting on Health & Safety, EMP compliance, adherence to speed limits, dust, damage to vegetation, litter, pollution, noise etc Monitoring reports to be signed-off by the Site Manager Corrective action to be confirmed and signed-off by the Site Manager. ECO/ESO consolidated monthly monitoring reports (including confirmation of corrective action taken, with photographic evidence) Reports by the ECO/ESO to DMR if required
Sand Mining	Visual inspection of biodiversity impacts Visual inspection of water resource functionality Visual inspection of waste management, housekeeping and maintenance.	Visual inspection of sand mining activities and other possible secondary impacts • Control and prevent the development of new access tracks. • Control and prevent growth of alien vegetation in cleared areas and on stockpiles. • Standard waste management practices must be implemented to prevent contamination and littering. • All spill incidents will be reported and corrective action taken in accordance with an established spill response procedure.	Site Manager & Contractor (or sub-contractors)	
Closure & Rehabilitation	Revegetation; Stability; River profile; Soil erosion; Alien invasive species	Inspection of all rehabilitated areas to assess whether soil erosion is occurring and to implement corrective action where required.	Site Manager	A final audit report for site closure must be submitted to the DMR for approval.

15.8 Indicate the frequency of the submission of the performance assessment/ environmental audit report.

An external environmental performance audit shall be conducted annually by an independent environmental assessment practitioner that include an annual rehabilitation plan for implementation during the next reporting period. A review of the Final decommissioning, rehabilitation and mine closure Plan will also be done on an annual basis together with an update of the quantum calculations for financial provision for rehabilitation.

16. Environmental Awareness Plan

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

Training is part of its Induction process and environmental Management System (EMS). The induction includes:

- Awareness training for contractors and employees;
- Job specific training – training for personnel performing tasks which could cause
- potentially significant environmental impacts;
- EMS training;
- Comprehensive training – on emergency response, spill management, etc;
- Specialised skills; and
- Training verification and record keeping

Before commencement of the mining activities all employees and contractors who are involved with such activities should attend relevant induction and training. It is standard practice for employees and the employees of contractors that will be working on a new project or at a new site to attend an induction course where the nature and characteristics of the project and the site are explained.

The training course should include key information abstracted from the EMP pertaining to the potential environmental impacts, the mitigation measures that will be applied, the monitoring activities that will be undertaken and the roles and responsibilities of contractors' and personnel.

The full EMP document is also made available to attendees.

16.2 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

Environmental risks and how to manage them are dealt with in the induction course referred to in section (m) (i) above. If an incident of environmental pollution or damage does occur it is analysed and appropriate prevention and/or mitigation measures are developed. These measures are added to the EMP and conveyed to the relevant personnel.

All unplanned incidents with the potential to cause pollution or environmental degradation or conflict with local residents will be reported to the Mineral Resources Manager within 24 hours.

Hydrocarbon Spills

Hydrocarbon spills that are considered to be emergency incidents are large-scale spills (cover a surface area >1m2), resulting from situations such as; a leaking diesel bowser, an oil drum that is knocked over, large spillages from equipment, etc.

Activities that are involved in the clean-up of such instances include:

- The containment of the spill,
- The removal of all contaminated material, and
- The disposal (at a licenced hazardous disposal facility) or bioremediation (at a licenced facility) of this material.

Fire

There is the potential for fire to occur in the following locations of the drill site:

- Veld fires across vegetated areas; and
- Vehicles and equipment.

Veld fires: Any person who observes the fire must report it to the fire brigade immediately and then to their supervisor. If possible, additional personnel may be sent to contain the fire, but only if the lives of the personnel will not be endangered.

Vehicles and Equipment: Fire extinguishers will be available at the site where drilling activities will take place and in the vehicles. All staff members will be trained in the use of fire-fighting equipment.

16.3 Specific information required by the Competent Authority

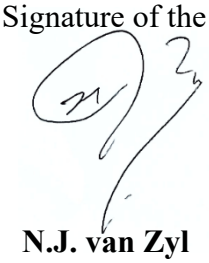
Not applicable at this stage

17. Undertaking

The EAP herewith confirms

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

Signature of the environmental assessment practitioner:



N.J. van Zyl
Reg. EAP (EAPASA 2019/2034)
September 2023

-END-

Annexure 1: Final Rehabilitation, decommissioning and mine closure plan Including Environmental Risk Assessment and quantum calculations

~~**Annexure 2: PPP summary**~~

Annexure 3: HIA

Annexure 4: PIA