



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT
And
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: Saxon Heavy Minerals Pty Ltd

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FILE REFERENCE NUMBER SAMRAD: NC 30/5/1/1/2(12111) PR

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1. IMPORTANT NOTICE

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

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

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

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

It is 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.

2. Objective of the basic assessment process

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

- (a) determine the policy and legislative context within which the 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 the 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.

PART A
SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

3. Contact Person and correspondence address

a) Details of

i) Details of the EAP

Name of The Practitioner: PHS Consulting - Paul Slabbert

Tel No.: 0827408046

Fax No. : 0865083249

e-mail address: paul@phsconsulting.co.za

ii) Expertise of the EAP.

(1) The qualifications of the EAP

(with evidence). Honours degree B Art Et Scien, Environmental Planning

- Professional Certified Member of the of the Interim Certification Board for Environmental Impact Practitioners (EAPSA)
- Professional Certified Member of the Association of Professional Heritage Practitioners (APHP)
- Corporate Member of the South African Planning Institute (SAPI) & Professional Member of the International Association for Impact Assessment (IAIA)

(2) Summary of the EAP's past experience.

(In carrying out the Environmental Impact Assessment Procedure) 18 years experience as an EAP & mining related application

b) Location of the overall Activity.

Farm Name:	Farm Lang Klip no.489; Farm Michells Bay no. 495; Farm Kliphuis no. 496; - Namaqualand Rd, Northern Cape
Application area (Ha)	7437,21 ha but footprint of collective drilling will not exceed 20 ha
Magisterial district:	Namaqualand
Distance and direction from nearest town	Between Hondeklip Bay and Spoeg River Mouth
21 digit Surveyor General Code for each	LPI: 0000048900000; 0000049500000; 0000049600000;

c) Locality map

(show nearest town, scale not smaller than 1:250000). Appendix 1, Area is south of Hondeklip Bay along the coastline for approx. 15 km south to the Spoeg River Mouth. Prospecting will take place along the coastline up to a maximum distance of 7 km inland. Find maps attached.

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

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

The application (Appendix 1; Locality) is for a Prospecting Right for Heavy Minerals. No bulk sampling will take place. The Applicant proposes to prospect for heavy minerals by means of non-invasive methods such as desktop analyses, remote sensing, surface mapping and surveying of the deposit, and by means of invasive methods such as truck-mounted RC drills and hand-held auger drilling.

The proposed non-invasive prospecting methods will cover the entire prospecting lease area, while invasive prospecting (drilling) will be concentrated in those areas recognised as having potential for the concentration of heavy minerals. Where possible, existing mine roads and tracks will be utilised for access to the various prospecting sites and environmentally sensitive areas will be avoided as far as is practically possible. All prospecting will be conducted in terms of the directives as contained in this Environmental Management Programme (EMP), which will be submitted to the DMR as part of the Prospecting Right Application process. No processing of materials will take place on site and all sample preparation and analyses will take place in off-site laboratories and other existing off-site facilities

Prospecting will take place over a 60-month (five year) period, and will initially comprise of non-invasive methods (Phase 1), which will include surface mapping and surveying of the deposit(s). Phase 2 will comprise of invasive prospecting methods, and will respectively include auger and RC drilling of material. Phases 3 and 4 will respectively comprise of off-site sample processing and data analysis, and decision making. Phase 5 will include rehabilitation. Some of these phases will be undertaken in parallel.

The 7437,21 ha prospecting area consists of 3 farms, this was narrowed down to approx. 6800 ha suitable prospecting area after the exclusion of no-go areas. These areas are indicated on the constraints plan attached under Appendix 2. Large parts of the area proposed for prospecting was already subject to mining and other prospecting activities over many years, therefore the activity does not intrude into virgin and undisturbed areas.

Wrt NEMA triggers, no infrastructure will be developed, it will be a small team with a 4x4 vehicle/ drill rig truck. No permanent new roads will be constructed only limited off-road driving will take place. Existing tracks will be used, and where none exist the 4x4 vehicle will drive in the open veld along route of least resistance. In Highly sensitive ecological areas, only hand drilling will take place and no new tracks will be made, of none exist the team will walk. After drilling, the compacted area will be destabilised and the tracks will be raked. Sampling within 300 m of the sea will take place by hand only and collectively more than 5 cubic meters of material will be removed. When sampling has been completed the drill site will immediately be rehabilitated and any new tracks raked and closed. The rehabilitation team will inspect all sites 3 months after the initial rehabilitation action.

(i) Listed and specified activities

NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY Mark with an X where applicable or affected.	APPLICABLE LISTING NOTICE (GNR 544, GNR 545 or GNR 546)
Prospecting right - Phase 1 involve surveying and pegging of the anticipated deposit determined by surface mapping. The information gained from the above non-invasive prospecting may result in a review of the proposed drilling positions/prospecting grid. Phase 2 will comprise of invasive prospecting methods, and will respectively include auger and RC drilling of material. Depending on the results there will be two drilling sessions within this phase. Phases 3 and 4 will respectively comprise of off-site sample processing and data analysis, and decision making.	7437,21 ha cadastral area, narrowed down to 6 800 ha suitable prospecting area but footprint of collective drilling impact will be 5 ha approx.	x	GN No. R327 Activity 20
Phase 5 will include rehabilitation and closure. Please note this phase will run concurrent with the drilling phase 2. Rehabilitation will take place when drill site is completed after 3hours of work.	7437,21 ha cadastral area, narrowed down to 6 800 ha suitable prospecting area but footprint of collective drilling impact will be 5 ha approx..	x	GN No. R327 Activity 22
Some hand drilling will take place within 100 m from the high water mark of the sea and it is estimated that more than 5 cubic meter of sand will be removed as samples	The coastline identified for prospecting is approx 13 km long, 130 ha of prospecting fall within the 100 m zone. Hand sampling will take place in this zone. No driving within this zone.	x	GN No. R327 Activity 19A

(ii) Description of the activities to be undertaken

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

Find the prospecting work plan attached under Appendix 3. Prospecting will be for the following Heavy Minerals.

Mineral /Commodity	Code	Type Code
Heavy Minerals (General)	HM	HM
Rutile (Heavy Mineral)	Rt	HM
Ilmenite (Heavy Mineral)	Il	HM
Zircon (Heavy Mineral)	Zr	HM
Monazite (Heavy Mineral)	Mz	HM
Leucoxene (Heavy Mineral)	Lx	HM

The proposed prospecting activities will be undertaken in six main phases as described below.

G.1 Phase 1: Non-invasive Prospecting

Non-invasive prospecting will cover the coastal reaches of the three farms, and will include the following sub-phases:

- Phase 1a will involve the following desk-top activities: data acquisition from government and private sources, and analysis of any existing/previous prospecting and drilling data, satellite (Landsat and ASTER) imagery, aerial photos, and terrain data, as well as geological map interpretation. The synthesis and interpretation of such information will contribute towards providing a clear picture of the location and characteristics of the heavy mineral deposit/s, and will guide the in-field prospecting programme.
- Phase 1b: Surface mapping will be conducted by the project geologist (Dr J Hattingh) and assistants, and will take place over a period of 2 months. Such mapping will encompass GPS controlled traverses, and aerial photo mapping.
- Phase 1c will involve surveying and pegging of the anticipated deposit. This sub-phase will include the following activities:
 - o Surveying of the mapped area to be prospected. A grid (250m x 250m) will be marked on the map, after which those positions will be marked in the field by a surveyor with labelled droppers (pegs). Shallow (12m depth) hand-held auger drilling will take place at these positions (see Phase 2a below).
 - o Access routes to the drill sites will also be located (existing roads will be used wherever possible, new tracks will be rehabilitated).
- Phase 1d: The information gained from the above non-invasive prospecting may result in a review of the proposed drilling positions/prospecting grid. These specific areas cannot be determined at the time of writing of this report. In order to expedite this procedure, the following is recommended as a way forward:
 - o This EMP has identified no-go areas based on information such as sensitive vegetation etc. The constraints map attached under Appendix 2 has eliminated certain areas and reduced the prospecting area.

- o Within this identified target area, a specialist botanist and heritage practitioner has confirmed the presence of ecological and heritage resources and procedures to apply.
- o If the prospecting auger drill hole grid requires adjustment, then such amendments/appendices (to both the Prospecting Work Programme and the EMP) will be lodged with the DMR. Note however that although the positions of the drill holes may alter slightly, the method and environmental impact mitigation measures are not expected to require any revision.

G.2 Phase 2: Invasive Prospecting (Drilling)

Phase 2 will be initiated after the detailed analysis of all the Phase 1 results have been collated, and by convening the appropriate persons to conduct the following task:

- Educate/train the staff conducting the prospecting programme on environmental and heritage issues (the details of which are discussed in the EMP).

Invasive prospecting includes the following sub phases:

- Phase 2a: Drilling will either be conducted by a truck-mounted RC drill rig or by a hand-held engine-powered auger drill (inside littoral active zone). Approximately 175 RC drill holes are anticipated to be drilled as subphase I to a maximum depth of approximately 40 m each. The RC drill uses compressed air that raises the drilled material to the surface for sampling purposes. The hand-held auger has a 30cm core barrel at the end of the drill rods that catches the sediment as it progresses in a batch approach. Hand drilling will take place in the littoral active zone and sensitive areas, no beach driving will take place.
- Phase 2b: This sub-phase will involve a second round of infill drilling. Additional drill holes will be drilled in feasible areas to check for continuity of the heavy mineral deposits. The number of additional holes required will be determined by the results of the first phase of drilling (Phase 2a). Normally 2/3 of the initial hole total is drilled, therefore approx. 110 holes could follow. The same drilling methods will be implemented as described for Phase 2a above.

G.2.1 Drilling Grid Layout

The Applicant's consulting geologists have, through past experience and aerial photo interpretation, been able to roughly delineate the heavy mineral reserve and as such will reduce the application area to encompass specific portions of the farms. Access to the drill sites will be by existing farm roads or fence line tracks wherever possible.

G.2.2 Drilling Programme

The prospecting right is required for a period of five years (60 months). Note that this application has been lodged for 60 months to allow for any delays which may occur or any further amendments which may be required.

Drilling is proposed to take place in two 1-month periods separated by an analysis phase. The first phase of drilling will require the drilling of approximately 175 drill holes, followed by a second round of infill drilling of approx. 110 holes if deemed feasible. This will allow for phased chemical analyses of the samples, and a decision after each period as to whether to continue with the prospecting programme or not. It is anticipated that the drill rig will require between two and three hours to complete drilling activities on each drill site. Note that only one of each drill type (auger and one reverse circulation) will be on site at any one time. Only hand held drill will be used in the littoral active zone (100 - 300 m from the sea) and highly sensitive ecological areas and inside the 2km cave buffer areas. The 4x4 drill rig relate to a truck and compressor impacting on a 64 sqm area per hole over a 2-3 hour period before moving on to the next hole. See Appendix 3 for the proposed prospecting schedule.

The contract(s) to conduct the aforementioned drilling and bulk sampling programme/s will be put out to tender once the Prospecting Right approval has been granted by the DMR.

No bulk sampling will be conducted as the drilling provides sufficient sample for the test work required for heavy minerals chemical and metallurgical analyses.

G.3 Phase 3: Sample Processing and Data Analysis

Drill samples will be taken from the material raised by the drilling process before the hole is backfilled in reverse order. Samples will be removed by a 4x4 “bakkie”.

This phase will also consist of an analysis of all the information received from the invasive and non-invasive prospecting activities. The economic feasibility studies, required to determine the economic and metallurgical viability of the project will be conducted by analysing the results of the data gathered from the prospecting programme, and the pre-feasibility studies will be finalised.

The sample processing will serve to assess the expected mine yield and will guide the design aspects for potential future mining, if a measured resource is the outcome of this processing programme.

G.4 Phase 4: Decision-making

The following activities will be undertaken as part of this final phase (Phase 4) of the proposed Prospecting Work Programme:

- The results of the non-invasive and invasive prospecting methods will be fully assessed and analysed to obtain a detailed understanding of the geology of the project area. This will entail computer generation of models to simulate the deposit.
- Various reports, as are required in terms of the MPRDA, will be submitted to the DMR throughout the prospecting process.
- The Applicant (in consultation with the project team) will make a decision regarding the way forward. The Applicant will have three possible options to choose from regarding the way to proceed, namely:
 1. Submit a Mining Right Application: Should prospecting yield positive results, a Mining Right Application may be lodged with the DMR.
 2. Continue prospecting: If the prospecting results are non-conclusive, the Applicant might decide to continue prospecting. Should such a course of action be chosen, an application for a Prospecting Right Renewal may have to be lodged with the DMR, if required. Continued prospecting could include additional auger drilling and/or bulk sampling.
 3. Discontinue the entire operation: If the results of the prospecting activities are negative, the Applicant will most likely decide to discontinue the entire operation. Should this option be chosen, the Applicant will be required to conduct full rehabilitation of the drill and sampling sites and any other disturbed areas. A Closure Application will, in this event, be lodged with the DMR.

G.5 Phase 5: Rehabilitation

Each drill hole site (approx. 64 sqm) will be rehabilitated as prospecting proceeds. Rehabilitation will be in accordance with the directives contained in the EMP. Sensitive areas where hand drilling and limited driving takes place will experience limited impact and rehabilitation need. Compacted area will be raked and if off an existing track the tracks will be raked, covered and blocked. The EMP also describes mitigation measures for the environmental impacts that might be associated with the proposed drilling activities. It should be noted that some of the proposed prospecting phases will be undertaken in parallel, as are reflected in the prospecting schedule. Rehabilitation follow-up will take place 3 months after the initial round.

e) Policy and Legislative Context

<p>APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT</p> <p>(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)</p>	<p>REFERENCE WHERE APPLIED</p>	<p>HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.</p> <p>(E.g. In terms of the National Water Act a Water Use License has/ has not been applied for)</p>
<p>MINERALS AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT 28 OF 2002)</p>	<p>NC30/5/1/1/2/12111</p>	<p>Prospecting Right in process</p>
<p>NEMA and associated guidelines</p>	<p>NC30/5/1/1/2/12111</p>	<p>Duty of Care, PPP, Alternatives and EMP's</p>
<p>Control of Vehicles in the Coastal Zone</p>	<p>No vehicles will drive in the coastal zone</p>	<p>Vehicles will park outside the littoral active zone and drilling will be by hand.</p>
<p>Municipality IDP & PSDF</p>		<p>Identifies needs, desirability and constraints of the area and Community.</p>
<p>National Environmental Management: Biodiversity Act , 2004</p>		<p>The EMPr will regulate the applicant’s implementation of biodiversity management measures. This is particularly relevant by avoiding the no-go areas</p>
<p>National Heritage Resources Act, 25 of 1999 (“NHRA”)</p>	<p>SAHRA Commenting Case ID to be issued</p>	<p>HIA conducted; Archaeological and Palaeontological awareness plan and training and fossil finds procedure to be implemented. SAHRA comment will be forwarded to DMR once in hand.</p>
<p>National Environmental Management: Waste Act, Act 59 of 2008 (NEMWA)NEM: WA (as amended</p>	<p>Management measures environmental awareness plan</p>	<p>The generation of potential waste will be minimised through ensuring employees of the drilling contractor are subjected to the appropriate Environmental</p>

		awareness campaign before commencement of drilling. All waste generated during the drilling activities will be disposed of in a responsible legal manner.
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f) Need and desirability of the proposed activities.

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

Heavy Minerals sand deposits are the main source of zirconium, titanium and a very good source of rare earth elements. South Africa has been a major supplier of zirconium and titanium and has a well-developed heavy mineral mining sector supplying the world market with some 25% of its zirconium demand. Increase in heavy mineral prices and the availability of new markets has rendered previously marginal heavy mineral deposits such as this Alexkor deposit potentially viable at present. Long term forecasts show an increasing deficit in the supply of zirconium, titanium and rare earths. A need for South African mining companies to position itself to satisfy this expected demand is of utmost strategic importance.

Prospecting activities are therefore needed to:

1. Confirm and obtain additional information concerning potential targets through minimally invasive activities (e.g. desktop studies) and invasive (e.g. drilling) activities.
2. Assess if the resource can be extracted through future mining in an environmentally, socially and economically viable manner. Should prospecting activities prove that there are feasible minerals to allow for mining, a new mine may be developed which would generate extensive employment opportunities in an area where employment is needed.

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

The proposed site was selected based on extensive research and also following on information from previous prospecting activities in the area.

This area has been extensively mined and explored for diamonds in the past and present. This development resulted directly in the establishment of good infrastructure with two large well serviced towns of Hindeklip Bay and Koinaas. Many of these inhabitants are directly dependant on the jobs provided by the mine or service industries to the mine.

However, the general consensus is that the diamonds are fast becoming a depleted resource as can be seen in not only the down scaling of activities during the past decade. This has led to major job losses and economic down turn in the area. The economies of the towns in the area have started to change its focus from mining to tourism. However, this change is slow and can only accommodate a small percentage of inhabitants.

Heavy mineral mining will most definitely give the communities in the area a new lease of life and will see to the further development of infrastructure of the area that will be to the advantage of the greater community. A very important aspect is that heavy mineral mining will result in the systematic rehabilitation of the area including the slimes and coarse tailing dumps that will be mined and eradicated from the landscape presently littered by large dumps.

Its technology drilling machinery is tied to either be a truck-mounted RC drill rig or by a hand-held engine-powered auger drill. The RC drill uses compressed air that raises the drilled material to the surface for sampling purposes. The hand-held auger has a 30cm core barrel at the end of the drill rods that catches the sediment as it progresses in a batch approach.

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

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

i) Details of the development footprint alternatives considered.

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

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

Pls Note: Each of the phases is dependent on the results of the preceding one. As such, mapping of the prospecting activities could thus not be undertaken for inclusion in this report. The stakeholder comment period has not been undertaken yet, and therefore comments raised by I&APs have not been included in this section. However, the sections will be updated in the final report to be submitted to DMR.

- (a) the property or location where it is proposed to undertake the activity; was selected based on existing knowledge of Heavy Mineral deposits in the area. The mine area has been identified based on knowledge of these mineral deposits and as such, no site alternatives have been considered for the proposed activities. However, we determined a constraints analysis where no-go areas were identified and buffers were in order to refine the final site selection for drilling. Find the constraints analysis attached under Appendix 2. Therefore reducing the initial area and the potential impacts to sensitive ecological and heritage resources.
- (b) the type of activity to be undertaken; In terms of the technologies proposed, these have been chosen based on the known long term success of the selected drilling method and prospecting process. The prospecting activities proposed in the Prospecting Works Programme is dependent on the preceding phase as previously discussed; therefore no alternatives are indicated, but rather a phased approach of trusted prospecting techniques.
- (c) the design or layout of the activity; The preferred drill layout is considered based on preceding phases and site constraints to minimise impacts. Each hole will take 2-3 hours to complete then the machine moves on to the next. Site establishment are done with closure in mind to ensure that only the required size is disturbed. Intact vegetation or animal burrow/nest and archaeological resources will be avoided by the geologist selecting the on-site drill position. Due to the location of the proposed drilling in relation to existing roads and the protocol in the current mining area no camp site will be required. The drilling contractor can make use of existing accommodation within the area.
- (d) the technology to be used in the activity; The method and techniques employed for the investigation of potential targets and deposits are suitable for the proposed prospecting activities. They have been selected based on their minimal invasiveness which is envisaged to have minimal impact on the receiving environment.
- (e) the operational aspects of the activity; The drilling will be done over periods of 5 days at a time, where drilling activities will be conducted during daylight hours to minimize exposure to the risks. If necessary the drilling can be timed to accommodate the current mine operation if necessary. The time of implementing drilling activities during the course of the day may also be reconsidered in consultation with mine operator. Ideally drill activities will occur continuously until such time that a hole is completed, with no drilling occurring during the night.
- (f) the option of not implementing the activity. Drilling is required in order to investigate the potential and feasibility of a resource as well as being used to generate a DMR compliant mineral resource statement.

There is no potential for any future investment in a mine without the confirmation of the mineral resources which can only be obtained from drilling activities. Should the prospecting right be refused, effectively a Heavy Mineral resource will be sterilised. The socio-economic benefit and most notably the future employment potential of mine development will also be lost if the prospecting activities are not implemented in order to determine the feasibility of deposit that may occur within the area.

ii) Details of the Public Participation Process Followed

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

The Draft Basic Assessment Report was submitted or made available for comment to the competent authority, commenting authorities, landowners, surrounding property owners and other identified stakeholders for review (see list of identified stakeholders attached under Appendix 4). Comments received were recorded and will be reflected in the Final Basic Assessment Report to be submitted to DMR. (Refer to Appendix 4 for the detailed public participation process and the Consultation Report).

The following public participation is intended for the proposed project:

- Identification of stakeholders, including occupiers of the property, owners and occupiers of land adjacent to the site, municipal officials and relevant State Departments as part of the Public Participation Process. All respondents will then be placed on the project database. The database will be used throughout the process to inform the stakeholders of the project.
- In order to canvass the issues and concerns of the broader public and to ensure that all IAPs are afforded the opportunity to comment on the application, the proposed project was announced as follows:
 - o Erection of notices at the municipal pay points and public points in the area; advertising the proposed development and displaying the contact details of the EAP. The notices serve the purpose of informing potential IAPs of the project and therefore afford them the opportunity to comment.
 - o Distribution of the notification letters to I&AP's via registered mail or e-mail or SMS with basic background and the locality map.
 - o An advert was placed in Die Plattelander newspaper on 16 February 2018 to notify the public about the Basic Assessment process, invite members of the public to register as I&APs on the project's database and notify the public of the availability of the Draft Basic Assessment Report and date of the public meeting.
 - o A public & landowners meeting will be held on 2 March 2018 at 11h00 in Hondeklip Bay Municipal Community Hall. (Please refer to Appendix 4 for comments recorded and meeting notes)
 - o A copy of the Draft Basic Assessment Report was made available for public review for a 30 day review period from 16 February to 19 March 2018 .
 - o The Draft Basic Assessment was available at the Hondeklip Bay Municipal Service Paypoint.
 - o An attendance register for the Draft BAR disclosure will be available at the paypoint.
 - o All comments received during the review period of the draft Basic Assessment as well as responses provided will be captured and recorded within the Comments and Response Report in Appendix 4
 - o A request for additional consultation will be gaged during the first round of PPP
- o Once DMR has made a decision an Environmental Authorisation will be issued, all registered I&APs will be notified of the outcome of the application. To date, the I&APs identified is attached under Appendix 4.

iii) **Summary of issues raised by I&As**
 (Complete the table summarising comments and issues raised, and reaction to those responses)

Interested and Affected Parties		Date	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Comments Received			
<u>AFFECTED PARTIES</u>			Find the proof of public consultation attached to this document. Due to the nature of comments detail issues and responses form part of the attached PPP document		
Landowner/s	X				
Emerald Panther INV 78 PTY LTD - West Coast Resources (Pty) Ltd & Yolandy Trust	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 and landowner was informed by registered mail and e-mail notice of available DBAR.	Await comment	Appendix 4
Lawful occupier/s of the land					
West Coast Resources (Pty) Ltd	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 and mine operator was informed by registered mail and e-mail notice of available DBAR.	Await comment	Appendix 4

Landowners or lawful occupiers on adjacent properties	X				
National Parks Trust of SA - SANPARKS	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 and neighbour was informed by registered mail and e-mail notice of available DBAR.	Await comment	Appendix 4
Asan Resource Sa Pty Ltd	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 and neighbour was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
JJ Mostert M.M Engelbrecht NS Gottlieb	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 and neighbour was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
Heuningnes Eiendomme CC Trans Hex Operations Pty ltd De Beers Consolidated Mines Pty Ltd National Government of the Republic of South Africa	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 and neighbour was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
Municipal councillor	X	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
Municipality	X	16 February to 19	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available	Await comment	Appendix 4

		March 2018	DBAR		
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA e					
Communities					
Hondeklipbaai Ward Committee	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
Dept. Land Affairs					
Department of Agriculture, Land Reform and Rural Development	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
Traditional Leaders					
Dept. Environmental Affairs					
Department of Environment and Nature Conservation	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4

Other Competent Authorities affected					
Department of Agriculture	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
Department of Water Affairs	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
SAHRA - Northern Cape Provincial Heritage Resource Agency	x	16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4 & 8
<u>OTHER AFFECTED PARTIES</u>					
Namakwa District Municipality		16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
Kamiesberg Municipality		16 February to 19 March 2018	Public consultation 16 February to 19 March 2018 was informed by registered mail and e-mail notice of available DBAR	Await comment	Appendix 4
<u>INTERESTED PARTIES</u>					

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

(1) Baseline Environment

(a) Type of environment affected by the proposed activity.

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

Please refer to the attached specialist reports and maps

Geology

The application properties are situated just south of Hondeklip Bay approximately 150km south-west of Springbok, along the Northern Cape West Coast. The Spoeg River Mouth is situated to the north of the properties. This river was, at the time of deposition, an embayment with a westward opening to the Atlantic Ocean. The substrate geology of Mitchell's Bay and surroundings consists of Precambrian and Palaeozoic basement rocks. The most prominent is volcano-sedimentary metamorphites and gneisses of the mid-Proterozoic Namaqua Metamorphic Complex. Tertiary marine, lacustrine and aeolian sand overlie the basement rocks. The surficial sands and dunes are white to pale yellow in colour. The palaeo-geography of the Palaeo-river mouth (Rooiwal Bay) and the coastal area to the south was a dominant controlling factor for heavy mineral enrichment. The west-facing bays south of the river mouth, bounded by a southern headland, formed the ideal environment for heavy mineral deposition. Terraces that were formed during fluctuating sea level conditions during the last 15 million years established distinct units of Lower (0 – 10m above mean sea level), Middle (17 - 26m amsl), Upper (37 – 47m amsl) and Grobler (64 – 84m amsl) terraces represent palaeo- beaches. These palaeo-beaches with palaeo-embayments experienced extremely high concentrations of heavy mineral accumulations. The two beach deposits are overlain by a sequence of aeolian sand that accreted onto the margin of the regressing sea-levels. Garnet and ilmenite are the dominant heavy minerals found in the area, followed by pyroxene, zircon, rutile, monazite and titaniferous alteration products after ilmenite. The high titanium content of the ilmenite (51%) and predominantly almandine garnet suggest metamorphic source rocks. The heavy minerals within the project area are therefore most likely derived from the Namaqualand Metamorphic Complex, which is their primary source.

The inferred high concentrations of heavy mineral deposits are located within a matrix of unconsolidated superficial sands and dunes. The heavy minerals were most likely sourced from rocks of the Namaqualand Metamorphic Complex comprising migmatite, gneiss, and ultramafic rocks, which are present in the northern sector of the proposed prospecting area. Rocks of the Namaqualand Metamorphic Complex form the footwall of the deposit and is overlain by intermittent marine gravel deposits, and a continuous sheet deposit of marine sand and aeolian sand forming a succession of unconsolidated gravel and sand ranging between 1 and 30m in thickness. The heavy minerals occur in the sand fraction in the gravels and sand deposits

Catchment hydrology

The mean annual precipitation (MAP) varies from 44 mm in the coastal zone area to 480 mm in the Kamies Mountains some 70km east of the project area. Higher rainfall in the higher lying areas is a result of orographic rainfall. Rainfall mostly occurs during the winter months and thus falls within the Mediterranean climate zone of Southern Africa. High incidences of fog days on the West Coast of South Africa contribute significant moisture to the coastal areas of Namaqualand

The prospecting area falls within Water Management Area (WMA) 6 – Lower Orange, and straddles the catchment divide between quaternary catchments F40D and F40F (DWAf 2004). The natural mean annual runoff of all the coastal catchments in the WMA, which stretch some 285km from Strandfontein in the south to Alexander Bay at the mouth of the Orange River in the north, is estimated to be 24 million cubic metres (Mm³). All rivers in the area except the Orange River are ephemeral / episodic, and flow only sporadically in response to high rainfall events, mostly in their upper catchments, remote from the coast, where annual rainfall exceeds 400mm. As a result, available reliable yield from surface water sources in

all the coastal catchments is estimated to be zero, while reliable yield from groundwater from the catchments is estimated to be a total of 3 Mm³/a.

Spoeg River

The South African National Biodiversity Institute (SANBI) National Wetland Classification system, classifies the Spoeg River as an Inland system falling within the Western Coastal Belt Ecoregion. According to the National Freshwater Ecosystem Priority Areas (NFEPA) database (2011), the Spoeg River and its tributaries are considered to be valley floor wetland features. The Spoeg River is indicated as a channelled valley bottom wetland feature which is in a good condition (Class AB).

The Spoeg River flows from east to west just south of the project area without transecting it (Figure 1). The mouth of the Spoeg River is situated 19 km south of Hondeklip Bay and 47 km north of the Groen River mouth (1:50 000 Sheet 3017 AD; 1:250 000 Topographical Sheet 3017). The total catchment area is 682 km² and the total river length from the Kamiesberg in the catchment to the mouth is approximately 95 km (1:250 000 Topographical Sheet 3017). The mean annual rainfall in the upper reaches of the catchment ranges between 200 and 400 mm, whilst in the lower reaches it varies from 40 to 100 mm (Le Roux and Ramsey 1979; Heydorn and Tinley 1980). Rainfall in arid areas produces sporadic runoff that seldom reaches the valley bottom. Rainfall in topographically distinct areas will be higher in areas of higher altitude (orographic effect). Bare rock outcrops produces runoff under most rainfall conditions and only infiltrates once it reaches alluvial or colluvial cover. There is no recorded information on flood history, but the nature of the river and the valley through which it flows indicate that strong flood flows have occurred in the past. The nature of the riverbed vegetation suggests that there had been no flooding in recent times. Fine brown silt covers much of the riverbed, but in the last 2 to 3 km, this is largely overlain by sands. The nature of the vegetation suggests availability of underground water and it is probable that there is considerable underground flow in the sandy riverbed. A meandering flow channel is indicated along the length of the estuary by the predominant occurrence of the sedge *Juncus kraussii*.

The ephemeral Spoeg River has a relatively small catchment area and probably only flows into the sea at times of extreme rain storm events in the catchment. As the dune covered catchment readily absorbs the run-off, the mouth does not appear to be subject to heavy fluvial sediment deposition. This can be seen from aerial photography of the Spoeg, particularly that taken soon after heavy rainfall e.g. Job No. 12 of 1943. The older dune plumes on the northern banks of the estuary have probably originated from the river-borne sands being blown northwards out of the riverbed by the predominant south-westerly winds. These winds predominate in the summer months when there is very little rainfall and most rivers in Namaqualand are dry. The positions of these dune plumes probably reflect periods when sandblows were possible due to dying off of vegetation in the river bed.

Despite low annual runoff totals in arid regions, peak flood discharges are often high in periods of peak rainfall. This was the case during the 1997 rainy season when the rainfall for the period was extremely high in the higher lying regions of the area. The drainage system of the Spoeg River catchment shows a large variation in drainage characteristics, channel width, depth, Groundwater Recharge Assessment of the Basement Aquifers of Central Namaqualand sediment thickness, drainage density and the development of river terraces. Negligible soil cover exists in the tributaries, a major pathway of direct groundwater recharge. In the lower lying areas the alluvial thickness' increase due to the change in topography (i.e. decrease in gradient) and the concomitant decrease in sediment transport.

Rivers in semi-arid to arid regions generally show a decrease in discharge volume downstream as a result of mainly evaporation and infiltration into the alluvium and channel boundaries. In the coastal rivers such as the Spoeg River, for example, most of the water flows along the base of the alluvial aquifer and is stored in the channel banks during the drier months.

Spoeg River mouth and estuary The Spoeg River enters the Atlantic Ocean immediately south of the project area through a small estuary. The water surface area in the estuary as measured from satellite imagery, was estimated at approximately 1, 3 ha. However, the lower valley area with evidence of estuarine vegetation up to 3 km from the mouth is approximately 53 ha as measured from satellite imagery. A buffer zone of at least 350m was left between the project area and the northern limit of the estuary.

A well developed longitudinal dune cordon blocks the surface water flow from the estuary to the ocean on an almost permanent basis. This dune only gets breached during exceptional short lived flood events with minimum return period of 12 to 15 years. There is a long straight valley in the upper estuary area, with an almost flat floor and steeply sloping sides, particularly in the southern bank. Cliffs form the northern bank in the Kliphuis farm area. A wandering channel which probably carries low flow water can be observed clearly. The width of the valley varies from 100 to 400 m. Generally, the water depth in the estuary is greater than 1 m and the channel width from 6 to 10 m. This gives a tidal range between MLWS and MHWS of 1,57 m and between Lowest Astronomical Tide and Highest Astronomical Tide of 2,24 m (South African Tide Tables 1980). These values represent a typical no-flow situation which is likely to be prevalent in this estuary for prolonged periods. Overtopping of the sandbar by storm waves during high-tide conditions, may influence the salinity, as would rare instances of river flow. Under the circumstances it seems obvious that groundwater seepage must be responsible for maintaining water levels and also for imparting at least some measure of stability to the physico-chemical characteristics of this system and furthermore, that the groundwater must be of relatively low salinity. This was confirmed by elevated salinity observed in pools in the riverbed by in the Spoeg. Here salinities ranging from 6 parts per thousand, to 31 parts per thousand were measured by Heydorn & Grindley (1981). It can be assumed that the replenishment of low salinity water through groundwater seepage probably gives this system its unusual ability to support a wide diversity of plant and animal life, either permanently or at least for prolonged periods in the arid environment of the Namaqualand coast.

The Spoegrivier riparian zone and a buffer of 600 m is regarded as a no-go area

Groundwater

The geological conditions at the project area comprise an uncomplicated arrangement of aquifers and related hydrological units. The hydrogeology of the Namaqualand coastal area consists of unconsolidated surface deposits and crystalline basal aquifers. The surface aquifers are host to intergranular aquifers. These aquifers have low yield due to the presence of fine and clayey materials and are dependent on rainfall for recharge. Major recharge events generally occur every 12 to 15 years and natural draw down occurs between periods of recharge. The crystalline basal aquifers are fracture aquifers comprising joint sets and fault systems with higher yield potential. Groundwater is one of the most important water sources in the Namaqualand region. It plays a major role in the provision of water to urban and rural areas. Groundwater extraction impacts on the natural rate of draw down. Indications are that presently boreholes at Garies, Kamieskroon, Hondeklip Bay and Koingnaas are at levels lower than observed in 1990. Where aquifers have been de-watered, this may lead to surface instability. The alteration of aquifer structure arising from de-watering could limit the possibility for future recharge.

Groundwater quality in the Lower Orange WMA ranges from good to unacceptable, the latter due to contamination by total dissolved solids, nitrates and fluorides caused by pollution from agriculture, lack of sanitation and algal blooms. Areas of high nitrate concentration have been measured at Garies and the surrounding areas. Groundwater on a regional scale generally flows towards the coast and there is usually little connection between surface water flows and the groundwater aquifer, mainly due to low quantities of surface water. There are therefore not many aquifer dependent ecosystems in the project area and it is likely that groundwater contamination does not pose a major risk to floral and faunal communities.

Aquifers on site can be divided into two main units as follows:

Unconsolidated primary aquifer: This aquifer consists of the surface aeolian sands, marine sands and basal grits and conglomerates overlying the granitic bedrock. The presence of damp sands and minor mud at the base of a number of exploration boreholes, most notably in areas corresponding to topographic lows in the surface of the bedrock, are indicative of a minor concentration of groundwater in the north western part of the project area. Although minor kaolinisation and cementation from the weathering of the feldspars in the underlying granite and gneiss exists, the unit is generally unconsolidated and relatively permeable. The unit has a relatively high clay content constituting some 20% of the overall volume on average with local values up to 35%. The undulating nature of the bedrock contact means that only local perched aquifers with limited aerial extent may form, separated by palaeo-highs in the bedrock contact.

Fractured secondary aquifer: This aquifer underlies the primary aquifer and comprises predominantly fractured bedrock within gneiss and granitic, which underlie the site. The bedrock geology consists of

high-grade metamorphic rocks of the Namaqua-Natal Mobile Belt, which are generally massive and highly deformed. The topography of the bedrock contact with the overlying weathered material has been shown to correspond with structures in the bedrock such as faults and fractures, which are generally oriented north-north-west – south-south-east, northeast - south-west and west-north-west - east-south-east. Although significant groundwater flow may be encountered in faults and fracture zones, overall storativity is likely to be very limited with a resultant decrease in long-term sustainability of abstraction, particularly at the relatively high rates that would be required for production. Based on the apparent depths of drilling, it is clear that all the water boreholes in the area are drilled into fracture or fault zones in the bedrock.

Aquifer characterisation Due to the low potential of appreciable ground water yield in the area, ground water has been ruled out as a source of water for prospecting at the project area. Historic exploration and mining indicated the presence of a thick layer of weathered bedrock material with elevated proportions of kaolinite clay between the upper aeolian sands aquifer and the lower fractured bedrock aquifer. This relatively impermeable layer probably may act as an aquitard, which restricts water flow between the two aquifers and, importantly, influences the volume and rate of seepage from backfilling operations to the groundwater resource.

Geologically there are no distinct structural or lithological boundaries within the site, and as a result it is assumed that the Spoeg River to the south act as a boundary to flow in this direction. High ground to the east acts as a watershed for surface water, and is assumed to coincide with the boundary between groundwater units, while the Atlantic Ocean to the west acts as a natural boundary. The proximity of the site to the coastline, and the surface elevation of the bedrock and groundwater levels, does pose a risk of seawater intrusion as a result of groundwater abstraction.

Groundwater Recharge and Discharge Groundwater recharge in the area is approximately 2% of mean annual precipitation. It is expected that actual recharge may be less than this figure owing to the relatively high levels of evaporation in the area. However, for the purposes of determining contribution of recharge to the aquifers, the value is not considered unrealistic. The relatively high clay content of the unconsolidated aquifer serves to retard vertical flow and may result in a significant reduction in recharge. It is thought that the recharge to the fractured rock aquifer is more regionally sourced than locally, due to the retarded vertical flow of infiltrating rainwater. The retardation is a result of both the high evaporation in the area, and the aquitard effect of the weathered, kaolinite-rich weathered bedrock contact zone. This recharge occurs in the topographically higher areas to the east of the site with the resultant high head causing flow to the west. Lateral recharge of groundwater from the east follows the overall topographic gradient towards the Atlantic Ocean. The ephemeral Spoeg River probably act as a losing stream as is common in arid zones, but more detailed data from groundwater elevations around the riverbeds is required to determine this.

Infiltration and evapotranspiration are related to water table depth. Recharge is related to the distribution of rainfall into infiltration, runoff and evapotranspiration. Recharge will be less if the water table is deep and higher when water tables are shallow in arid to semi-arid areas. Evapotranspiration will dominate under both cases but will be significantly higher if the water table is close to the surface. When the water table is shallow, infiltration reaches the saturated zone fairly fast, so that most of the individual rainfall events correspond to isolated infiltration events with small time lags. As the depth to groundwater increases the potential for rainfall to percolate to the saturated zone decreases.

Groundwater flow and depth Groundwater levels on site vary from 1.4m below surface in the Spoeg River bed to the south of the site, and more than 90m below surface up gradient topographically towards the eastern border. According to DWAF's Groundwater Resource Assessment Phase 2 project (2005), the average groundwater depth in the quaternary catchment F40F is approximately 48 mbgl. On a regional scale, groundwater flow is from east to west, flowing towards the Atlantic Ocean. On a local scale, groundwater flows from the project area towards the Spoeg River in the south where flow emanates from the watersheds and flows towards the river channels.

Vegetation

Namaqualand Strandveld (SKs7) (which is part of the Namaqualand Sandveld bioregion) occurs in the Northern and Western Cape Provinces and is characterised by a flat to slightly undulating landscape of coastal peneplain. It is found on Quaternary stabilised deep aeolian red or yellow sands and on stable

dunes and deep sand overlying marine sediments and gneisses. These sands are alkaline or neutral, as opposed to the Sand Fynbos sands which are usually slightly acidic. Sometimes weakly defined scattered heuweltjies (circular, abandoned termite mounds) are found further away from the sea. Although predominantly coastal, this vegetation may penetrate as far as 40 km inland from the sea, especially where coastal dune plumes extend inland and where there is a high incidence of coastal fog. Strandveld vegetation structure is highly variable, ranging in height from an average 30 cm to an average 1.2 m, but it is typically low, species-rich shrubland dominated by a variety of erect and creeping succulent and often deciduous shrubs. This widespread vegetation type could perhaps be divided into at least 6 or 8 distinct forms based on morphology and species composition, but this has not yet been done on a formal basis.

Namaqualand Strandveld is classified as a Least Threatened vegetation type on a national basis (DEA 2011), with a conservation target of 26% of its total original extent, and about 10% of its total extent has been transformed (Rouget et al. 2004). Relatively little was formally conserved until recently, although the nearby Namaqua National Park does now include significant areas of this vegetation type (>60 000ha, or >15% of the total original extent, being over half of the conservation target of 26%). This vegetation type covers about 46% of the total prospecting area, and about 40% of the proposed mining area.

Namaqualand Coastal Duneveld (SKs8) vegetation type occurs in the Western and Northern Cape along the coastal plains. The vegetation is typically dwarf shrubland dominated by erect succulent shrubs and non-succulent shrubs. Spiny grasses are common on the windblown semi-stable dunes. The Namaqualand Coastal Duneveld is classified as Least Threatened with a conservation target of 26%. As of 2004 none was statutorily conserved, but the Namaqua National Park has recently incorporated a significant but unknown area of this vegetation type (estimated at about 20% of its total original extent). Some 8% of its original extent has been transformed through diamond mining, mainly in the Hondeklipbaai area (Mucina & Rutherford 2006). This vegetation type occurs in the study area along the coast between Hondeklip Bay and the Spoeg River Mouth.

Namaqualand Seashore Vegetation (AZd2) is distributed along the Northern Cape coastline, in a very narrow strip above the high water mark, from Holgat River to Olifants River. It is typically found on alkaline coastal dunes, and is typically a sparse vegetation community of partly succulent hummock-forming and spreading dwarf shrubs, grasses and herbs. Namaqualand Seashore Vegetation is classified as Least Threatened with a conservation target of 26%. As of 2004 none was statutorily conserved, but the Namaqua National Park has recently incorporated a significant but unknown area of this vegetation type. About 5% has been transformed through diamond mining (Mucina & Rutherford 2006). This widespread vegetation type occurs between the high water mark and the Namaqualand Coastal Duneveld, along the coast.

A sensitivity analysis was provided by ecologist to inform the constraints analysis, a detail report will be provided with the Final BAR

Relevant Fauna subject to veld driving and drilling

Southern Africa has one of the richest amphibian diversities, comprising 157 species (Du Preez and Carruthers 2009). The arid western region of the Northern Cape Province holds the lowest amphibian diversity (25 species). Only one threatened amphibian species (Desert Rain Frog - *Breviceps macrops*: VU) occurs on the white coastal dunes from Luderitz (Namibia) to Klien-zee (South Africa) and is highly threatened by mining and housing developments (Channing and Wahlberg 2011). It is unlikely that this species will occur in the project and associated coastal areas. Amphibians are the least specious group of terrestrial vertebrates in the project area, where only seven species may occur in the study area

South Africa has one of the highest reptile diversities in the world, and the highest in Africa, with the highest diversity occurring in the more arid parts of the country (Branch, 1998). Of the 488 reptile species recorded from South Africa (Bates et al. 2013), at least one third (139 species) occur in the Northern Cape (Branch, 1998, plus subsequent studies). Reptile diversity in the study region is high, with 54 species known or likely to occur (Branch 1998); this includes 17 snakes, 32 lizards, and 4 chelonians.

The area shares most of its bird species with the wider Karoo regions of Bushmanland and the Tanqua Karoo. The Karoo supports a particularly high diversity of bird species endemic to southern Africa. Its avifauna characteristically comprises ground-dwelling species of open habitats. The study area is not

situated in or near an Important Bird Area (IBA - Birdlife International, 2013). However, the Namaqua National Park lies adjacent to the study area. Species in the park include Cinnamon-breasted Warbler, Cape Long-billed Lark, Karoo Lark, Black-headed Canary, Cape Bulbul, and Black Harriers scan the ground in search of rodents.

Cultural & Historic

Archaeological evidence points to occupation of the West Coast region of South Africa, including the Namakwa coast from the Early Stone Age, through to the Middle and Later Stone Age, up until the arrival of early European travellers, farmers and missionaries from the 18th century onward (Hart 2016, NID 384358). The rocky shoreline attracted hunter-gatherers during the Holocene, in particular, resulting in rich archaeological deposits in the form of shell middens that “typically occur within 1 km of the coast and tend to be prolific near estuaries and in dune fields, and adjacent to rocky shores... Areas close to sheltered bays contain so many middens that at times it is difficult to distinguish one from the next. Inland of the coast the frequency of shell middens drops away, however, the pattern is not always predictable as an area with good game and a source of fresh water can result in middens existing kilometres inland” (Ibid.). In the past 2 000 years, early herders began arriving in the area, introducing livestock and new material culture (Ibid.). Unmarked human burials occur, but these are seldom found by archaeologists, and are more commonly unearthed by mining operations.

According to the SAHRIS Palaeosensitivity Map, the area proposed for prospecting is underlain by geological formations ranging from very high significance to insignificant or zero heritage significance, with several formations of as yet undetermined significance. The formations of little to no palaeontological significance include granites and gneisses, while surficial alluvium accounts for the low significance deposits. Shelly, aeolian sands of the Witzand Formation are present, and considered to be of moderate significance, while the West Coast Group, here represented by red, aeolian sands of the Koekenaap Formation, and semi-consolidated sands of the Graauw Duinen Formation, are considered to hold very high palaeontological significance. These deposits have been accorded very high palaeontological sensitivity as they form part of the known Coastal Cenozoic Deposits. According to the Fossil Heritage Browser on SAHRIS, fossil bone finds during research on the Northern Cape coast mines have enabled age estimations based on correlations with African vertebrate biochronology. Fossil data associated with the aeolian record overlaps with the presence of hominids eg. at Elandsfontein, Duinefontein and Swartklip archaeological sites, making these very significant findings.

The 370 identified heritage resources within 2kms of the prospecting zone serve to characterise the heritage of the area. These sites all confirm the expected pattern of high concentrations of Holocene sites in the form of artefact scatter sites and shell middens within close proximity of the coast. Sites include a large Later Stone Age shell scatter on the crest of a dome-shaped dune containing mixed *Patella* species, stone artefactual material and potsherds. Large areas containing several discrete LSA shell scatters were also recorded. Archaeological material in these scatters included black mussel and mixed *Patella* species as well as a few pieces of quartz and ostrich eggshell. Recent remains were represented by potsherds and an old brass flint striker. Further sites also showed the presence of historic material in association with stone artefacts although it was not possible to determine whether these finds represented contact sites, deflated accumulations or later intrusions. The location of the sites recorded thus far supports the expected distribution pattern, i.e. that most sites are confined to a narrow strip along the coastline and are concentrated near rocky shores. The greatest concentration of sites exists within 300m of the high tide line. Closest to shore, the sites are extensive and overlapping, and it is difficult to resolve individual sites archaeologically. These sites tend to be middens that comprise of shellfish remains almost entirely. Sites located further inland are more likely to have visible site boundaries, show greater variety of artefactual remains and even exhibit spatially differentiated activity areas. It is also clear, however, that some sites are located further inland (SID 87407), likely in areas that previously had access to fresh water, although there is no way to reliably predict the location of such sites. The vicinity of Spoegrivier Cave contains many archaeological sites, and should be considered a high sensitivity zone.

The Precambrian granite-gneisses and other highly-deformed metasediments of the Namaqua-Natal Metamorphic Province are entirely unfossiliferous, while strata of the Palaeozoic and Mesozoic eras have been mostly eroded from the western margin of the subcontinent during and subsequent to the rifting of the Gondwana supercontinent and the opening of the Atlantic Ocean 130-120 Ma (Pether 2017, NID

406187). Further to this, the early coastal plain would have been inundated or transgressed by the sea during times of late Cretaceous high sea-levels, and transgressive Eocene events also affected the coastal plain, meaning that little evidence of this earlier marine history remains along Namaqualand. The predominant deposits in this area, rather, are Cenozoic coastal deposits between the Orange River and Elandsbaai that comprise the West Coast Group. Buried between the main Namaqualand rivers are ancient river channels that attest to the wetter climates of the early Cenozoic, when more rivers drained the coastal plain. These diamondiferous palaeochannels have fluvial infills that have been kaolinized, and silcrete has formed within the channel deposits in places. Beds of carbonaceous, peaty material containing plant fossils also occur, and these deposits comprise the Koingnaas Formation, which is not shown on the geological maps, being covered by younger deposits. Fossil pollen from the organic-rich beds has provided evidence of the vegetation type present and the age of the Koingnaas Formation. The area was forested, much like the present Cape south coast, with yellowwoods, conifers and ironwoods, and supports an Oligocene maximum age. This pollen record, not replicated elsewhere, provides evidence for the deep time origins for the uniqueness of the Cape Floristic Region.

The predominant deposits in this area, and those of the highest palaeontological significance, are the aeolian sands of the Graauw Duinen and Koekenaap Formations. The Graauw Duinen Formation comprises successive deposits of semi-consolidated aeolianites that range in age from about 4.5 – 3.5 Ma to ~3 Ma.

Overlying the hard surface of the dorbank are compact, but unconsolidated markedly-red sands, the “Red Aeolian Sand” or RAS that is exploited at Namakwa Sands mine, now proposed as the Koekenaap Fm. The red sands of the Koekenaap Fm. occupy most of the surface of the Namaqualand coastal plain and underlie younger formations that obscure surface features of the red sands over large areas. The red sands are underlain by scatters of MSA material on top of the palaeosurface formed on the “Dorbank” or older aeolian formations. Optically-Stimulated-Luminescence (OSL) dating of reddened coversands indicate late Quaternary ages between ~80 ka and ~30 ka and are presumed to reflect depositional ages of the red aeolian sands.

It is noted that, given the deflationary wind regime prevalent in the area, the remaining marine formations are likely to be overlain by aeolianites that considerably postdate them, and in the Hondeklipbaai area, the deflated early Pliocene Avontuur Fm. is overlain by thick aeolianites of probable mid-Quaternary age. Furthermore, the Koekenaap Formation is not as patchily prevalent as its depiction on geological maps would indicate. Rather it is a widespread, reddened coversand unit of mainly vegetated sandsheets and low dunes that, on the basis of satellite imagery, occur inland of the coastal area.

The vertebrate fossils (bones, teeth) found in the coastal plain deposits are absolutely critical for the provision of age constraints. The sample of identifiable fossil bones and teeth from coastal Namaqualand is small, and currently is just sufficient to provide age constraints that support correlations with gross sea-level/ice-volume history. Nevertheless, study of the Hondeklip exposures have demonstrated that there are more bone/teeth fossils in the deposits than is generally perceived, as has been revealed by dedicated searching. These occur in the following contexts:

1. Basal, petrified, mixed assemblage: petrified (phosphatized), variously abraded, reworked fossils found the basal gravels and that pre-date the enclosing marine deposits. Includes both terrestrial and marine vertebrates.
2. The marine assemblage: cetacean, seabird and seal fossils contemporaneous with the enclosing marine deposits. Input of terrestrial bones is associated with local back-barrier environments (lagoons, tidal channel lags).
3. The capping, terrestrial assemblage: Bones of land animals common on the extensive palaeosurface erosively formed on the marine deposits.
4. Overlying terrestrial deposits: Mainly aeolianites (dune, interdune/pan and sandsheet deposits), locally with colluvial and ephemeral streamwash deposits. Rare bones occur on palaeosurfaces within these sequences. Fossils are more common in interdune deposits.

In aeolianites, the fossil material most commonly seen is the ambient fossil content of dune sands: land snails, tortoise shells and mole bones. Other small bones occur very sparsely such as bird and small mammal bones. The fossil content is more abundant in association with palaeosurfaces and their soils (palaeosols), formed during periods of dune stabilization and which define aeolian packages and larger formations.

Importantly, the bones of larger animals (e.g. antelopes) are more persistently present along palaeosurfaces formed on top of marine deposits and the palaeosurfaces which separate the major aeolianite units.

The deposits on slopes adjacent to the coast have a higher content of fossil bones due to the attraction of the shoreline for foraging and scavenging. For example, jackals and hyaenas scavenge seabird, seal and other carcasses, carrying remains onto the sand slopes. The most spectacular bone concentrations found in aeolianites are due to the bone-collecting behaviour of hyaenas which store bones in and around their lairs.

In younger aeolianites such as those expected in the Hondeklipbaai area, it is more likely that fossil bones may occur in an archaeological context, with artefacts and shell. The fossil material in these deposits is a sample of the middle and late Quaternary fauna of the Namaqualand coast, such as large species (elephant, sivathere, zebra), and is often associated with ESA artefacts. The estimated age is mid-Quaternary and the large mammals indicate that the coast was better watered than the present-day.

The fossil bone finds from excavations in aeolianites demonstrate that this sparse material, of both small (rodents, birds) and larger animals (antelopes, carnivores), is important to on-going palaeoclimatic, palaeobiological and biostratigraphic studies. Consequently, the palaeontological sensitivity of the aeolian formations is very high with respect to fossil bones.

The palaeontological heritage of the West Coast Group provides critical data concerning the age and depositional settings of Caenozoic coastal sediments along the west coast that is also important for diamond mining. These fossils contribute to unravelling the complex history of sea-level change, continental uplift, palaeocurrents and palaeoclimates as well as the biogeography and evolution of terrestrial mammals (including hominins) and marine invertebrates in the southern African region. Fossil woods (e.g. yellowwood), pollens and rare silicified bones of Oligocene to Early Miocene age are recorded from peats within the Koingnaas Formation fluvial channel infills. Relict deposits of a possible Paleogene transgression containing fragmentary fossil bones are recorded inland from Doringbaai at elevations of over 100 m amsl. The Miocene to Pleistocene vertebrate faunas recorded from the river gravels of the Arris Drift Formation along the lower Orange River may also be represented within Neogene fluvial terraces and channels further south along the Namaqualand coast. Rare skeletal remains of archaic *Homo sapiens* have been recovered from the Orange River mouth. Lignites (fossil peats) are reported from ancient deposits of the Olifants River north of Strandfontein. The various Miocene – Pliocene packages of shallow marine to beach deposits of the Alexander Bay Formation are each characterised by distinctive biotas of extinct, warm-water shelly invertebrates (e.g. oysters and other bivalves, brachiopods, barnacles). For example, the Middle Miocene Kleinsee Member has the bivalve *Isognomon gariensis* while the Early Pliocene Avontuur Member and Late Pliocene Hondeklip Bay Member are associated with the bivalves *Donax haughtoni* and *D. rogersi* respectively. The shelly fossils occur together with fish teeth, marine mammals, trace fossils and reworked terrestrial fossil remains including mammals and reworked petrified wood, much of which is originally Cretaceous in age. Comparable marine sediments in the Pleistocene to Holocene Curlew Strand Formation contain modern cold-water shelly faunas (e.g. black mussels). Miocene to Holocene coastal aeolianites (Graauw Duinen Formation, Olifants River Formation etc) yield a range of terrestrial gastropods, mammalian bones and teeth (e.g. elephantids) and tortoise carapaces associated with palaeosurfaces or vlei deposits as well as trace fossils and stone artefacts (e.g. calcretized root casts, termitaria). Distinctive morphotypes of thick-shelled ostrich eggs within these aeolianites may be of considerable biostratigraphic value (cf Senut & Pickford 1995). The wide range of subfossil plant and animal fossils recorded from Late Quaternary to Holocene dune sands such as the Swartlintjies Formation – for example mammalian bones and teeth, tortoises, land snails, plant debris including peats and charcoal, microfossils and traces. Scattered bones associated with land snails and stone artefacts may also be found in Quaternary cover sands on the coastal plain.

Basement igneous, metamorphic and metasedimentary bedrocks cropping out along the Namaqualand coast are either unfossiliferous or are likely to contain - at most - microfossils and perhaps poorly-preserved stromatolites (Gariiep Supergroup). Diverse fossil heritage occurs within numerous terrestrial to shallow marine subunits of the Caenozoic West Coast Group. Fossiliferous Pleistocene to Holocene sediments cropping out close to modern sea level are especially vulnerable to impacts, but many older fossiliferous units in the West Coast Group are buried beneath thick aeolianites and / or elevated well above the modern coast.

A 300 m red-flag zone apply from the HWM of the sea where special care and micro-sitting of hole positions will apply. A 2km red flag area around the Spegrivier caves was further identified as a sensitive area where hand drilling should take place and visual node of 1.5 km regarded as no-go. A monitoring and fossil find procedure will be in place.

Socio-Economic

A sparsely spread population, with the Richtersveld municipal area reflecting a density of 1,2 persons/km², comparable with the average density for the Namakwa District municipal area of <1 person/km². The broader regional community reflects poor socio-economic prospects, including: - Low literacy levels occurring widespread throughout the rural population - Unemployment due to a decrease in mining activities - Inadequate housing, with rentals largely in arrears - Low affordability levels - Very low level of community health - Poverty within certain communities. The socio-economic conditions within a post-diamond mining economy poses employment sustainability challenges, therefore new mining initiatives of different commodities could prove valuable for job security in the region.

(b) Description of the current land uses.

The application area consist of 3 farm portions that is owned by West Coast Resources (Pty) Ltd (Emerald Panther INV 78 PTY LTD) and Yolandy Trust. Farm Kliphuis no 496 spans over the Spoeg River, with a portion managed by SANPARKS. This section plus a buffer area is not proposed for prospecting. Previously some prospecting occurred on the northern portion and currently the farm is vacant. Farm Langklip No 489 and Farm Michells Bay No. 495 is mined by West Coast Resources (Pty) Ltd. The land use on the entire application area is and was mining and prospecting over the years. The mine area is managed according to a EMP for the Mining Right on the site. This proposal for prospecting will therefore not be a new use or a conflicting activity. The site is heavily disturbed by mining and prospecting over the years. These disturbed areas will be subject to none-bulk sampling for heavy mineral deposits.

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

The environmental features and infrastructure on site assisted in defining the combined constraints map (Appendix 2) the 7437,21 ha area has been reduced to 6 800 ha suitable prospecting zone with an approx. footprint of 5 ha. Approximately 175 initial test holes will be drilled with an 64 sqm activity areas due to machinery and vehicles, this equate to an total impacted area of approximately 1.2 ha, that represent 0,018 % of the total area. Then if feasible an additional 110 holes will be drilled in selected areas with a footprint of 0.7 ha. The following exclusion no-go zones apply:

- A no-go 2 km buffer from the Spoeg River caves applies, due to archaeological only hand drilling may occur here.
- Visual buffer of 1.5 km from the caves apply and it's a no-go zone, no drilling allowed.
- Red-flagged 300 m coastal area (due to Archaeological, Palaeontological and Coastal littoral active zone). The area proposed for prospecting within the 300 m coastal red-flag area will be subject to hand drilling and 1 hole every 250 m. Considering the 13 km coastline it relate to 52 holes inside the 300 red flag zone and if a second round drilling apply it could be doubled.. These holes will be drilled by hand with no vehicle movement within the littoral active zone. The onsite geologist and drill team will be trained wrt Archaeological, Palaeontological and Coastal littoral active zone features in order to avoid sensitive and intact area. The opportunity to monitor fossils are presented during sampling and if material is detected by the geologist it will be noted, bagged and the position be logged. This information can then be used when a PIA takes place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies.

- Two main factors are taken into account in determining sensitivity in the project area. The first is the current disturbance regime and the second is the designation of critical biodiversity areas (CBAs). CBAs have mainly been selected along the Spoeg River corridor and SANPARKS buffer and intact vegetated areas. A Botanical assessment identified sensitivity zones, all highly sensitive areas is red flags where only hand drilling can take place and where no new tracks are allowed.
- The vegetation in the mine area has been heavily disturbed over significant areas within the greater project area. The result is that the remaining vegetation is important not only since it represents particular types but because it is important for functioning of the ecosystem.
- Other sensitive features is the Spoeg River mouth riparian zone, therefore a 600m no-go buffer apply,
- Discourage driving in the intact coastal dune areas and the estuarine environment, all work by foot and hand.
- Geological areas on the western boundary not feasible to be excluded, act as buffer with SANPARKS,
- The use of existing internal road and tracks are encouraged, in red-flag areas no new tracks or "veld" driving are allowed
- Avoidance of current important mining operations and infrastructure.

(d) Environmental and current land use map.

(Show all environmental, and current land use features)

Attached under Appendix 2 is the draft environmental constraints analysis. Red flag areas such as 300 m coastal belt and 2km cave zone and highly-sensitive ecology, will only be subject to hand drilling and no new tracks or veld driving. Attached under Appendix 5 is the extent of the current SANPARK areas and buffers, a 1.5 km visual no-go buffer apply to the caves and a 600 m no-go buffer to the Groenrivier system. West Coast Resources (Pty) Ltd mine area and associated activities and the extent of the current disturbed mine areas is visible on all the maps. Most of the prospecting drill holes will be located within these disturbed areas or within approved mining areas.

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

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

Topography: There will be low impact significance on the topography of the area. The prospecting will not affect the shape of the area due to the nature of the proposal. After drilling the hole will be infilled and the terrain left in the same condition as it was found. The probability is definite and the duration of the impact is short term. The impact can be reversed but due to the low level of intrusion and surrounding mine area the resource is not lost or scarred for life. The site will continue to function as per landowners' rights.

Soil: Considering the size of the area in relation to the prospecting footprint of approx 5ha the impacts are low. 60% of Prospecting will be inside existing mine disturbed areas, dumps and tailing dams. 40% on previous prospecting areas and some natural vacant areas. Workings relate to the removal of limited sample material and no bulk sampling will take place. The on-site material will be enough to accommodate the rehabilitation of the hole and raking of the area afterwards. The certainty of the impact is definite for the duration 2-3 hours per hole. Disturbance is reversible, damage is not irreplaceable and the impact cannot be avoided. The impact on the area will be negated by breaking up the compacted virgin earth in the area where vehicles are driven and parked during drilling; this will be followed up 3 months after initial rehabilitation.

Land capability: The impact on land capability is considered low significance. The area will be rehabilitated to the pre-prospecting land use. No-go areas will be respected. All existing disturbed mine areas where prospecting will take place will be left as found and in virgin areas new tracks will be raked, holes filled

up and compacted area broken up after the 2-3 hour drilling period. The certainty is definite and the duration for the the 2-3 hours of drilling. The site will be able to function as per pre-mining afterwards.

Land use: The impact on land use is considered low, mining rights are in place and will be respected. Possible friction between mine operators landowners and prospecting personnel is reversible, damage is not irreplaceable and the impact can be avoided through consultation and mutual respect and an operational agreement if required.

Vegetation: The probability is high that the prospecting programme would affect areas of vegetation that have previously been disturbed (that may or may not have been restored) as well as areas where vegetation has never been disturbed. Consequently, care is required in all circumstances to limit any negative impacts of prospecting on the vegetation. The plant communities in these arid ecosystems are fragile and take a long time to restore therefore the impact footprint must be kept to a minimum. Where drilling would occur at highly disturbed or transformed sites, the impacts would be Low Negative. In contrast, where drilling would occur at undisturbed sites the impact would be High Negative (at a local scale). This anticipated High Negative impact could, in most cases, be mitigated by restorative intervention (as outlined above) with the residual impact then being Moderate to Low Negative. . This majority of the area is currently disturbed and the undisturbed indigenous vegetation is contained in the no-go areas. Where indigenous vegetation occur in the prospecting area the geologist determining the drill position will avoid intact areas as far as possible by positioning the hole in a disturbed location. Hand drilling in red falg areas only and no new tracks or veld driving allowed. Impacts are reversible if avoided, damage is not irreplaceable and the impact can be avoided.

Animal life: There will be no effect on the animal life. Prospecting will take place in an existing mine area with many activities. The littoral active zone and highly sensitive ecological zones will be regarded as a no vehicle zone and hand drill only therefore avoiding impacts in this area. Mostly existing roads will be used, but if vehicles go off-road, care will be taken when driving by maintaining low speed and selective alignment. Affected fauna will move off. Impacts are reversible, damage is not irreplaceable and the impact can be avoided.

Surface water: The impact on surface water is considered low. The Spoeg River mouth will be avoided and a 600 m buffer is proposed where no prospecting can take place. No prospecting will take place inside the Spoeg River zone. The prospecting will not contribute to any run-off contamination, due to rehabilitation after the 2-3 hour period it takes to drill a hole. The certainty is probable and the duration long term.

Ground water: There will be no effect on the groundwater of the area. The certainty is probable and the duration long term.

Air quality (Dust): The only impact on air quality will be during drilling sessions and when vehicular traffic moves over the terrain. The impact on the mining operation will be negligible due to the distances involved and due to the intensive activities already on site. The certainty is possible and the duration intermittently for the life of prospecting. Its reversible, damage is not irreplaceable and the impact cannot be avoided.

Noise: The only impact on the ambient noise levels of the area will be from the drilling rig travelling to and being established on each site, the diesel engine driving the drill, vehicles going to and from the drilling site and the voices of the drilling crew. Its reversible, damage is not irreplaceable, it's possible and the impact cannot be avoided. The impact will be negligible due to the distances involved and the nature of mining activities already taking place. The certainty is possible and the duration intermittently for the life of the mine.

Sites and structures of archaeological and cultural interest: The character of the site will not be changed because it is already a mine along the coastline. The certainty is possible and the duration for the life of prospecting. It's not reversible, it relates to irreplaceable damage but it can be avoided through mitigation. A 300 m red flag area from the sea applies where special care and borehole location selection will take place. A hand drill 2 km buffer from the Spoeg River caves applies due to archaeological.

Extent of visibility of prospecting relate to a drill rig and a 4x4 vehicle in one location for 2-3 hours. Visual disturbance caused by the drilling rig and other equipment is considered low after drilling no visual impact at all. Only hand drilling will take place within 2 km from the caves or within 600 m from the Spoegrivier system in the National Park, respecting eco-tourism operations. A 1.5 km visual no-go buffer exist from the caves to respect eco-tourism and SAPARKS operations. A geological exclusion area exist on the western boundary that will provide a futher SANPARKS buffer. Its reversible, damage is not irreplaceable is possible and the impact can't be avoided.

Socio-economic structure of the area (negative impact on residences and operations): There will be no impact on the socio-economic structure of the area, because the area is a recognised mining node with various mine operations functioning along with other uses.

Traffic disturbances caused by increase of vehicle movement around the drilling site is limited to a drill rig and a 4x4 vehicle. in red-flag area no new tracks area allowed. In relation to the current activities it's a limited contributor therefore the impacts will be low. Its reversible, damage is not irreplaceable and the impact can be avoided.

Interested and affected parties: The prospecting will not impact upon the owners and of the property because of the small scale and no bulk sampling factor. Applicant will reach agreement on entry and exit arrangements and security. SANPARKS buffers are provided, especially in the south. The impact is considered to be low magnitude and the duration short to medium term while prospecting is active. The certainty is possible

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

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

The attached EIA (Appendix 6) provides the detailed methodology used for the assessment of the significance of potential environmental impacts in the EIA. This methodology allows for the identified potential impacts to be analysed in a systematic manner, with significance rating (from insignificant to very high) assigned to each potential impact. The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur. The criteria used to determine impact consequence include extent, intensity and duration of the impact and are presented in the attachment.

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

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

At the moment there is no alternative layout the 3 farms are fixed as application area, except for micro-sitting of drill areas, the no-go areas were excluded eliminating impacts up-front. Buffer and red flag areas restrict driving and allow only hand drilling. Should we receive comments that warrant changing the prospecting area and the no-go extent it will be considered to reduce the study area. The invasive activities that entail the drilling of approx. 175 phase 2a and possible 110 phase 2b exploration holes will have a minimal

environmental and social impact as the drill sites will be confined to a cumulative 5 ha footprint area 0,067% of the 7437 ha area. This needs to be viewed in the context of the entire prospecting license area under application which it covers and it needs to be kept in mind that of the identified impacts will occur for a limited time 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 low significance. After drilling activities have been completed and the drill pads rehabilitated to predrilling status, the impacts will cease to exist.

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

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

Appendix 6

ix) Motivation where no alternative sites were considered.

The application is tied to one the three farm cadastrals. The prospecting alternatives relates to site layout on a micro-scale after the prospecting right has been awarded. Areas inside SANPARKS management area plus additional buffer areas were considered for exclusion. No other suitable farms exist in the area for the application. The prospecting application is a natural expansion of the existing mine due to the established infrastructure. The no-go development option is not regarded as feasible because potential resources are available. However no-go areas and buffers were identified that reduced the area subject of the EMP. Mining land-use rights are in place on the majority of the area. Based on this the farms is the only subject.

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

As part of the EIA, sensitive no-go areas were identified. These areas were excluded from the prospecting area and the area was reduced. Further to this no vehicle movement will be allowed within 100 m from the hwm of the sea (littoral active zone) and the 300 m zone from the hwm of the sea and 2 km from the caves will be regarded as a red-flag heritage zone that require special care when drilling. 600 m from the Spoegrivier system is a no-go and in highly sensitive ecological areas only hand drilling is allowed and no new tracks or veld driving allowed. The end result is a reduction of the area from 7437 ha to 6800 ha, with a combined drilling footprint of approx. 5 ha.

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

Appendix 6

j) Assessment of each identified potentially significant impact and risk

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

NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. For mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	POTENTIAL IMPACT (Including the potential impacts for cumulative impacts) (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)	SIGNIFICANCE if not mitigated	MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. Modify through alternative method. Control through noise control Control through management and monitoring through rehabilitation..	SIGNIFICANCE if mitigated
Appendix 6						

The supporting impact assessment conducted by the EAP must be attached as an appendix, marked **Appendix**

k) Summary of specialist reports.

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

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Surface & Groundwater)	<p>A large part of the project area has been mined extensively during the past 60 years. This allowed for the establishment of a very good survey record of conditions relating to the ground and surface water situation at the project area.</p> <p>It is proposed that a 600m buffer zone is established between the Spoeg River and the prospecting area in order to avoid any disturbance that might cause interference with the natural flow of ground water or to generate dust that might impact the water body at the Spoeg River estuary. This no go area will have to cover the entire affected reach of the river from the mouth and have to include the estuary and the northern river valley up to the eastern limit of the project area. No prospecting activity may impact on the Spoeg River estuary and the riparian zones and the no-go areas and must therefore be strictly enforced. This will eliminate any possible impacts on both surface and ground water in these areas. Exploration over the entire area will be limited to the unconsolidated primary aquifer where drilling will be done to an average depth of 40m below surface.</p>	x	Conclusion & Recommendation
Botanical	Report by Dr David J. McDonald Pr. Sci. Nat. Botanical Specialist - provided a sensitivity map with guidelines adopted in the constraint analysis - await report findings	x	Conclusion & Recommendation
Heritage	From careful assessment of the known sites in the area, and evaluation of these in terms of the proposed prospecting, it is clear	x	Conclusion & Recommendations

that minimal impacts will be made to sensitive, significant heritage resources. These are protected, where they occur, by falling outside of areas preferentially selected for prospecting. A hand drill only 2 km buffer from the Spoeg River caves applies to protect archaeological and visual attributes. Where heritage resources are abundant, namely within 300m of the high water mark, they will be protected through responsible adaptation of the sampling strategy, namely the use of hand augers for core drilling. In terms of palaeontological resources, the area is highly sensitive. However, this project, with its limited impacts, offers a chance for palaeontologists to study geolocated, site specific palaeontological resources that will expand their understanding of the occurrence of fossils in the specific geological deposits. This knowledge will allow for appropriate and informed responses from palaeontologists to the destructive phase of full scale mining, should that go ahead. This sampling by coring offers greater research potential than gathering ex situ fossil finds in the open landscape. Furthermore, as this proposal hold the potential to stimulate economic renewal, revive infrastructure and rehabilitate the landscape in an economically depressed area, the socio-economic factors cannot be ignored. As such, the following recommendations are made:

1. There is no heritage objection to the proposed prospecting application;
2. A hand drill only 2 km buffer from the Spoeg River caves applies.
3. A Fossil Finds Protocol must be implemented during the construction phase
4. A red-flag area of 300m from the high water mark is imposed where extra care is taken in terms of avoiding impacts to significant archaeological resources. This includes: a. restricting prospecting in this area to hand augering and b. the inclusion of an archaeological and palaeontological awareness programme, to be implemented prior to prospecting taking place on the site.
5. A detailed HIA is required before any bulk sampling or mining

	<p>can take place during subsequent phases of the project;</p> <p>6. A management plan will be required for the ongoing management of the significant archaeology in this area;</p> <p>7. If in situ archaeological resources or human burials are found, work must cease and these findings must be reported to the Northern Cape PHRA and SAHRA, and a suitably qualified archaeologist must be contacted.</p>		
Visual	<p>PHS Consulting advised that a 1.5 km no-go visual buffer around the caves be adopted to avoid any impact on eco-tourist on SANPARKS lands. The 600 m Spoegrivier buffer will visually buffer the river and estuary system. Further geological exclusions exist on the western boundary of the prospecting area, providing a buffer with SANPARKS.</p>	From BAR Report and constraints analysis	PHS input

Attach copies of Specialist Reports as appendices

I) Environmental impact statement

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

The majority of the prospecting activities are non-invasive and hence will have very low to negligible environmental or social impact. The invasive activities that entail the initial drilling of approximately 175 exploration holes will have a minimal environmental and social impact as each drill site will be confined to an area of 64 m². If feasible it will be followed by another round of drilling that entail approx. 110 holes. In total if 285 holes are drilled with associated impacts an approx. footprint of 5 ha disturbance needs to be viewed in the context of the current application a area which covers 7437,21 ha.

The assessed impact ratings after implementation of the mitigation measures are summarised in the attached Appendix 6.

(ii) Final Site Map

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

Appendix 2

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

When prospect drilling commence the drill rig will be at one given drill hole for 2-3 hours, then the hole and drill site will be rehabilitated before it moves on to the next site approx. 250 to 500 m away. If new off-road tracks are created these tracks will be raked after a drill line is completed. The impacts are split in two sections namely 1- site set-up and 2 - operations.

1 - Set-up:

Cultural and Heritage - a Local Possible low impact before mitigation and with mitigation a very low impact is expected.

Noise - a Local possible very low impact before and after mitigation is expected.

Visual - a Local possible very low impact before and after mitigation is expected.

Traffic - a Local probable very low impact before and after mitigation is expected.

Dust - a Local definite very low impact before and after mitigation is expected.

Soil & vegetation - a Local definite very low impact before and after mitigation is expected.

Animal life - a Local definite very low impact before and after mitigation is expected.

Surface & Groundwater - a Local/regional definite very low impact before and after mitigation is expected

Social - a Local possible very low impact before and after mitigation is expected.

Job creation - a Local positive impact is expected.

2 - Drilling Operation:

Cultural and Heritage - a Local Possible low impact before mitigation and with mitigation a very low impact is expected.

Noise - a Local possible very low impact before and after mitigation is expected.

Visual - a Local possible very low impact before and after mitigation is expected.

Traffic - a Local probable very low impact before and after mitigation is expected.

Dust - a Local definite very low impact before and after mitigation is expected.

Soil & vegetation - a Local definite very low impact before and after mitigation is expected.

Animal life - a Local definite very low impact before and after mitigation is expected.

Surface & Groundwater - a Local/regional definite very low impact before and after mitigation is expected

Social - a Local possible very low impact before and after mitigation is expected.

Job creation - a Local positive impact is expected.

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

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

The objectives of the EMPr will be to:

- Provide sufficient information to strategically plan the prospecting activities as to avoid unnecessary social and environmental impacts.
- Provide sufficient information and guidance to plan prospecting activities in a manner that would reduce impacts (both social and environmental) as far as practically possible.
- Ensure an approach that will provide the necessary confidence in terms of environmental compliance.
- Provide a management programme that is effective and practical for implementation.

Through the implementation of the proposed mitigation measures it is anticipated that the identified social & environmental impacts can be managed and mitigated effectively. Through the implementation of the mitigation and management measures it is expected that:

- Heritage/cultural resources can be managed by avoidance of known resources and through consultation with landowners/stakeholders. Contractor personnel will also be briefed of the 2 km red flag Spoeg River caves buffer and 300 m coastal buffer (hand drill only) these sensitivities and consequences of any damage/removal of such features, the on-site geologist will be responsible for micro-siting of drill hole positions to identify and avoid resources; The opportunity to monitor fossils are presented during sampling and if material is detected by the geologist it will be noted, bagged and the position be logged. This information can then be used when a PIA takes place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies.
- Noise generation can be managed through consultation and restriction of operating hours and by maintaining equipment and applying noise abatement equipment if necessary;
- Visual intrusion can be managed through consultation with landowners/ stakeholders and by suitable siting of drill sites. The 600 m Spoeg River buffer and 1.5 km Spoegrivier cave no-go (no-prospecting allowed) will reduce visual impact possibly experienced from SANPARKS.

- Traffic is managed as far as possible, speed limits are honoured and vehicle congested is prevented in and around the drilling site;
- Dust fall can be managed by application of speed limits and avoiding established operations
- Soil disturbance and clearance of vegetation at drill areas will be limited to existing disturbed areas and to the absolute minimum required. In highly sensitive zone, no new roads and hand drill only, no unnecessary uprooting of vegetation and disturbed areas will be raked;
- Animal life is protected, avoided and preserved at all times and the prospecting activities has minimal disturbance to the surrounding habitat;
- Social friction with landowners/mine operators can be managed by employing strong, experienced personnel with proven skills in public consultation and conflict resolution during stakeholder consultation phases. All prospecting personnel will be made aware of the local conditions and sensitivities in the prospecting area and that they treat locals with respect and courtesy at all times.
- Employment is created during the prospecting- contributing to the local economic even if it is only on a temporary basis. Possible future mining could sustain the area and its people.

n) Aspects for inclusion as conditions of Authorisation.

Any aspects which must be made conditions of the Environmental Authorisation

- Avoid natural vegetated areas no new roads allowed and hand drilling only in high sensitive areas
- Maintain a 600 m buffer from the Spoeg River riparian zone, no drilling allowed
- Respect all no-go areas as per constraints map
- No vehicle driving within 100 m from the high water mark of the sea (littoral active zone), only hand drilling allowed in this area
- Hand drill within 2 km from the Spoegrivier caves and no drilling within 1.5 km from the caves
- Regard the 300 m heritage zone from the high water mark of the sea as a red-flag area. Apply the following principles where extra care is taken in terms of avoiding impacts to significant archaeological resources including an archaeological and palaeontological awareness program implemented prior to prospecting. The opportunity to monitor fossils are presented during sampling and if material is detected by the geologist it will be noted, bagged and the position be logged. This information can then be used when a PIA takes place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies.
- Maintain a minimum 250 m buffer from any infrastructure or dwelling;
- Landowners and mine operators should be engaged with at least 1 month prior to any site activities being undertaken once drill sites are known, in order to stipulate the drilling activities for security reasons; and
- A map detailing the drilling locations should be provided to the landowners and mine operator as well as the DMR prior to commencement of prospecting activities.

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

(Which relate to the assessment and mitigation measures proposed)

- It is assumed that the description of the proposed project, provided by the applicant is sufficient for providing the authorities with the right information for understanding the proposed project.
- It is assumed that the public consultation process to be undertaken as part of the Environmental Impact Assessment (EIA) will suffice and that the application will be soldiered objectively based on stakeholders' response to the proposed activities.

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

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

It is the opinion of the EAP that the proposed prospecting activities should be authorised.

- The environmental impacts associated with the limited drilling activities are minimal provided that the proposed mitigation is implemented;
- The spatial extent of the physical impact is approx. 1.2 ha phase 2a drilling (175 sites) and 0.7 ha phase 2b drilling (110 sites) plus once-off 4x4 tracks a cumulative footprint of 5 ha max;
- With appropriate care and consideration the impacts resulting from drilling can be suitably avoided, minimised or mitigated;
- With implementing the appropriate rehabilitation activities (immediate and follow-up), the impacts associated with the drilling activities can be reversed; and
- Without implementation of prospecting activities the knowledge concerning the potential mineral resource within the prospecting right area will not be confirmed.
- A need to position future mining to satisfy the expected demand for Heavy Minerals is of utmost strategic importance.
- Heavy mineral mining will most definitely give the communities in the area a new lease of life and will see to the further sustainability of infrastructure of the area that will be to the advantage of the greater community.
- A very important aspect is that future heavy mineral mining will result in the systematic rehabilitation of the area including the slimes and coarse tailing dumps that will be mined and eradicated from the landscape presently littered by large dumps.
- If mining should go ahead, a full scale EIA will be conducted. It will be integrated with the current EMP and closure objectives to allow for a smooth transition.

ii) Conditions that must be included in the authorisation

- Hand drilling in highly sensitive ecological zones and no new roads or veld driving allowed
- Maintain a 600m buffer no-go from the Spoeg River Riparian edge
- Hand drilling in 2 km Spoegrivier Caves radius and 1.5 km no-drilling from the caves
- Respect all no-go areas as per constraints map
- No vehicle driving within 100 m from the high water mark of the sea (littoral active zone), only hand drilling allowed in this area
- Regard the 300 m heritage zone from the high water mark of the sea as a red-flag area, hand drilling only. Apply the following principles where extra care is taken in terms of avoiding impacts to significant archaeological resources including an archaeological and palaeontological awareness program implemented prior to prospecting. The monitoring of fossils during sampling and if material is detected by the geologist it will be noted, bagged and the position be logged. This information can then be used when a PIA takes place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies.
- Maintain a minimum 250 m buffer from any infrastructure or dwelling;
- Landowners and mine operators should be engaged with at least 1 month prior to any site activities being undertaken once drill sites are known for good communication and security reasons; and
- A map detailing the drilling locations should be provided to the landowners and mine operator as well as the DMR prior to commencement of prospecting activities.
- Record must be kept of the implementation of the EMP measures and monitoring of the efficiency of the implemented measures;
- Follow-up rehabilitation work 3 months after the initial rehabilitation is essential; and
- A suitable closure plan must be submitted to show sufficiently providence for the avoidance, management and mitigation of environmental impacts associated with the decommissioning of the proposed activities.

q) Period for which the Environmental Authorisation is required.

The authorisation is required for the duration of the prospecting right which is an initial 5 years plus a potential to extend the right by an additional 3 years. Therefore a total period of 8 years is required.

r) Undertaking

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

An undertaking is provided at the end of this report

s) Financial Provision

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

i) Explain how the aforesaid amount was derived.

A financial provision of approximately, R 250 000 which includes rehabilitation activities has been made by Saxon Heavy Minerals. A breakdown of these costs is presented in Appendix 10.

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

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

Refer to the PWP (Appendix 3) indicating the budget for the prospecting operation

t) Specific Information required by the competent Authority

i) Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the:-

(1) Impact on the socio-economic conditions of any directly affected person. (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an **Appendix** .

A full consultation process will be 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 will be captured and addressed within the public participation section of this report. As the final positioning of the drill sites cannot be confirmed without completion of phase 1 of the prospecting programme, a recommendation has been made to ensure that the landowner and mine operators are engaged with a minimum of 1 month prior to implementing invasive activities (drilling) for security and communication reasons. The purpose of the re-consultation is to ensure that socio-economic impacts on directly affected persons can be raised and where possible addressed.

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

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

Mitigation measures proposed in this report include the 2 km hand drill zone and 1.5 km no-drill zone from the Spoegrivier cave and that the 300 m from the HWM of the sea will be

regarded as a red-flag (hand-drill) zone where special care will be taken to avoid visible resources. Pre-drilling awareness training will take place and a finds procedure will be implemented as per attached Appendix 9. The monitoring of fossils during sampling and if material is detected by the geologist it will be noted, bagged and the position be logged. This information can then be used when a PIA takes place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies A full Desktop HIA was completed.

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

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

The proposed site was selected based on extensive research and also following on information from previous prospecting and mining activities in the area. There are known resource deposits in the area and mining is currently taking place on the proposed project area. In terms of the technologies proposed, the proposed prospecting has been chosen based on the long term success. The prospecting activities proposed in the Prospecting Works Programme (PWP) is dependent on the preceding phase as previously discussed, therefore no alternatives are indicated, but rather a phased approach of trusted prospecting techniques.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme.

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

It is confirmed that the requirements for the provision of the details and expertise of the EAP are already included in PART B, section (1)(h)

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

It is confirmed that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART B, section (1)(h).

c) **Composite Map**

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

Please refer to Appendix 1, 2 & 5 for the Maps

d) **Description of Impact management objectives including management statements**

- i) **Determination of closure objectives.** (ensure that the closure objectives are informed by the type of environment described)

After prospecting is completed at each drill site, it will be rehabilitated to be safe, stable, non-polluting, non-eroded and in a state that is suitable for agreed postclosure land use. A follow-up rehabilitation inspection will follow 3 months after initial work. The sites should be monitored over a two-year period for success or otherwise of revegetation. If initially unsuccessful, a second attempt should be carried out.

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

No water is required or water resource are affected (no prospecting inside a watercourse or riparian zone and drilling will not affect groundwater as per specialist report), therefore no water use licence apply.

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

iv) Impacts to be mitigated in their respective phases

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

ACTIVITIES	PHASE	SIZE AND SCALE of disturbance	MITIGATION MEASURES	COMPLIANCE WITH STANDARDS	TIME PERIOD FOR IMPLEMENTATION
<p>(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc</p> <p>E.g. For mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</p>	<p>(of operation in which activity will take place.</p> <p>State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure).</p>	<p>(volumes, tonnages and hectares or m²)</p>	<p>(describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)</p>	<p>(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>	<p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-</p> <p>..</p> <p>Upon cessation of the individual activity or.</p> <p>Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>
<p>Site establishment, operational drilling. rehabilitation all takes place within a 2-3 hour period before the rig move onto new site.</p>	<p>Setup; drilling & rehabilitation</p>	<p>Drilling Phase I -3 ha</p> <p>Drilling Phase II - 2 ha</p>	<p>- Heritage resources in the 300 m coastal red-flag zone need to be avoided, when drill positions are determined in the veld, hand drilling only. Hand-drilling 2 km from the Spoegrivier caves and no drilling 1.5 km from the caves. Awareness programme will assist the lead Geologist to determine site selection and what to look out for. If resources area found the Finds Procedure will be implemented.The monitoring of fossils during sampling and if material is detected by the geologist it will</p>	<p>Heritage Act</p>	<p>Before and during drilling activities</p>

			be noted, bagged and the position be logged. This information can then be used when a PIA takes place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies		
			<ul style="list-style-type: none"> - Noise; Operational and decommissioning activities will be limited to daylight hours on Mondays to Saturdays and no activities on Sundays and public holidays; -Separation of distance of minimum 250m, but preferably 500m to be maintained between drill sites and dwellings; Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition; and - If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, rig is only 2-3 hours on a site then it moves on. 	SANS 10103 guideline	Before and during drilling activities
			<ul style="list-style-type: none"> -The drilling rig and other visually prominent items on the site will be located in consultation with the landowner if in sensitive area; - Rig will move on after 2-3 hours of drilling 	N/a	Before and during drilling activities

			<ul style="list-style-type: none"> - Drilling takes place inside mine area, plus very short duration - Drilling in natural area be limited through desk-top elimination 		
			<ul style="list-style-type: none"> -Obey traffic signs around the site -Vehicles to make trips on/off site only when necessary - Vehicles to adhere to local speed limits as far as possible when driving in around site - No new tracks in high-sensitiv or 100m coastal area 	Mine rules	Before and during drilling activities
			<ul style="list-style-type: none"> - Dust; Separation distance of minimum250m but preferably 500m to be maintained between drill sites and dwellings; and - Low vehicle speeds will be enforced on unpaved surfaces 	GN R. 827 (NEM:AQA)	Before and during drilling activities
			<ul style="list-style-type: none"> - Soil, vegetation, animal & water disturbance and clearance of vegetation at drill areas will be limited to the absolute minimum required; - No drilling inside 600 m from Spoegrivier system or 1.5 km from caves - No clear scraping (dozing) be carried out to establish a level drill site. - Avoid surface vegetation clearance to leave the roots intact so that vegetation can 	NEM:BA & ICMA	Before and during drilling activities

			<p>coppice and regrow; or avoid intact virgin areas and move drill hole</p> <ul style="list-style-type: none"> - No driving on the beach and high sensitive area only hand drilling - Use existing tracks as far as possible and if the rig drive off-road, follow route of least resistance, rake tracks and compacted drill area after works - On site geologist need to avoid any animal nesting or manure sites - If any animals are encountered they must not be killed or injured, but should rather be removed or chased away from the site 		
			<ul style="list-style-type: none"> - All operations will be carried out under the guidance of a strong, experienced geological manager with proven skills in public consultation and conflict resolution; - All prospecting personnel will be made aware of the local conditions and sensitivities in the mine area - There will be a strict requirement to treat local residents and operators with respect and courtesy at all times. 	Mine Rules	

e) Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ());

<p>ACTIVITY (whether listed or not listed). (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).</p>	<p>POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</p>	<p>ASPECTS AFFECTED</p>	<p>PHASE In which impact is anticipated (e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)</p>	<p>MITIGATION TYPE (modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring • Remedy through rehabilitation.. </p>	<p>STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.</p>
<p>Site establishment, operational drilling, rehabilitation all takes place within a 2-3 hour period before the rig move on to new site.</p>	<p>Cultural and Heritage</p>	<p>Destruction or loss of Cultural and Heritage Resources within the 2km cave buffer and 300 m red-flag coastal zone</p>	<p>Setup & drilling</p>	<p>Extra care is taken in terms of avoiding impacts to significant archaeological resources by respecting no-go and micro-sitting drill hole positions including an archaeological and palaeontological awareness program implemented prior to prospecting . Hnad drill 300 m from sea and 2 km from cave. No drilling 1.5 km from cave. A Fossil Finds Procedure be implemented The monitoring of fossils during sampling and if material is detected by the geologist it will be noted, bagged and the position be logged. This information can then be used when a PIA takes</p>	<p>Avoid impact and ensure very low levels of impact</p>

				place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies.	
	Noise	Noise Generation	Setup, drilling & rehabilitation	Activities will be limited to daylight hours on Mondays to Saturdays and no activities on Sundays and public holidays; Separation of distance of minimum 250m, but preferably 500m to be maintained between drill sites and dwellings; Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition; and If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, rig is only 2-3 hours on a site then it moves on.	Minimise intensity of impact
	Visual; Traffic & Dust	Additional activity and rig on site, increase in traffic movement and dust nuisance	Setup, drilling & rehabilitation	Respect landowner/operators needs to avoid visual intrusion and stay within the mine area; Obey traffic signs around the site; Vehicles to make trips on/off site only when necessary; Vehicles to adhere to local speed limits as far as possible when driving in around site Separation of distance of minimum 250m, but preferably 500m to be maintained between drill sites and dwellings to avoid dust impacts; and keep vehicle	Avoid and minimise impacts and disturbance. The operation will be in mine area only therefore mine rules apply.

				speeds low to be enforced on unpaved surfaces. No new tracks inside high-sensitive area or 100 m from sea. No drilling 1.5 km from cave or 600 m from river.	
	Soil, vegetation, animals, surface & ground water	Most of the drill holes will be on existing disturbed areas but there will be drilling off-road and inside intact areas and on the beach	Setup, drilling & rehabilitation	<p>Soil, vegetation, animal & water disturbance and clearance at drill areas will be limited to the absolute minimum required. No drilling 600 m from river, 1.5 km from cave, hand drill only in the 300 m coastal zone and high sensitive ecology No clear scraping (dozing) be carried out to establish a level drill site.</p> <p>Avoid surface vegetation clearance to leave the roots intact so that vegetation can coppice and regrow; or avoid intact virgin areas and move drill hole</p> <p>Use existing tracks as far as possible and if the rig drive off-road, rake & close tracks and compacted drill area after works</p> <p>No driving on the beach and only hand drilling within 100 m from the hwm.</p> <p>On site geologist need to avoid any nesting or manure sites</p> <p>If any animals are encountered they must not be killed or</p>	NEM:BA & ICMA; avoid sensitive feature by on site micro-sitting of drill holes by geologist and avoid no-go areas, this will avoid impacts.

				<p>injured, but should rather be removed or chased away from the site .</p> <p>Implement rehabilitation plan</p>	
	Social	Conflict with landowners and mine operators	Setup, drilling & rehabilitation	<p>All operations will be carried out under the guidance of a strong, experienced geological manager with proven skills in public consultation and conflict resolution;</p> <p>All prospecting personnel will be made aware of the local conditions and sensitivities in the mine area</p> <p>There will be a strict requirement to treat local residents and operators with respect and courtesy at all times.</p> <p>No drilling within 1.5 km from caves or 600 m from river to respect eco-tourist.</p>	Avoid impacts

f) Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved).

<p>ACTIVITY whether listed or not listed.</p> <p>(E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.).</p>	<p>POTENTIAL IMPACT</p> <p>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</p>	<p>MITIGATION TYPE</p> <p>(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</p> <p>E.g.</p> <ul style="list-style-type: none"> • Modify through alternative method. • Control through noise control • Control through management and monitoring <p>Remedy through rehabilitation..</p>	<p>TIME PERIOD FOR IMPLEMENTATION</p> <p>Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required.</p> <p>With regard to Rehabilitation specifically this must take place at the earliest opportunity. .With regard to Rehabilitation, therefore state either:-..</p> <p>Upon cessation of the individual activity</p> <p>or.</p> <p>Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</p>	<p>COMPLIANCE WITH STANDARDS</p> <p>(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</p>
<p>Site establishment, operational drilling. rehabilitation all takes place within a 2-3 hour period before the rig move on to new site.</p>	<p>Cultural and Heritage</p>	<p>Extra care is taken in terms of avoiding impacts to significant archaeological resources by respecting no-go and micro-sitting drill hole positions (hand drill within 2 km and no-drill within 1.5 km from caves and hand drilling within 300 m from HWM) including an archaeological and palaeontological awareness program</p>	<p>Planning stage, training personnel before going into the field, setup selection and micro-sitting and during drilling identify if resources are found, bag cores and gps find position of any resources for future record.</p>	<p>Adhere to the Heritage Act and the recommendations from Heritage Specialist.</p>

		<p>implemented prior to prospecting. A Fossil Finds Procedure be implemented. The monitoring of fossils during sampling and if material is detected by the geologist it will be noted, bagged and the position be logged. This information can then be used when a PIA takes place during the EIA for a future Mining Licence the appropriate time to conduct detail field studies</p>		
	Noise	<p>Activities will be limited to daylight hours on Mondays to Saturdays and no activities on Sundays and public holidays; Separation of distance of minimum 250m, but preferably 500m to be maintained between drill sites and dwellings; Noise abatement equipment, such as mufflers on diesel engines, will be maintained in good condition; and If intrusive noise levels are experienced by any person at any point, the source of the noise will be moved if practical, rig is only 2-3 hours on a site then it moves</p>	Setup, drilling and rehabilitation	SANS 10103 guideline and acceptable for the mine operations

		on.		
	Visual; Traffic & Dust	Respect landowner/operators needs to avoid visual intrusion and stay within the mine area; Obey traffic signs around the site; Vehicles to make trips on/off site only when necessary; Vehicles to adhere to local speed limits as far as possible when driving in around site; Separation of distance of minimum 250m, but preferably 500m to be maintained between drill sites and dwellings to avoid dust impacts; and keep vehicle speeds low to be enforced on unpaved surfaces. No new roads in high-sensitive zones or 100 m from sea.	Setup, drilling and rehabilitation	Mine rules and acceptable to the mine operators
	Soil, vegetation, water & animals	Soil, water, animals & vegetation disturbance and clearance of vegetation at drill areas will be limited to the absolute minimum required; No drilling within 600 m from river, 1.5 km from cave. Hand drill only in high sensitive ecological zone and 300 m coastal zone. No clear scraping (dozing)	Training personel before going into the field, setup selection, access selection by avoiding new tracks and micro-sitting before drilling. Avoid vegetation removal. Respect no-go areas.	NEM:BA & ICMA, limit new disturbance try stay within existing disturbed mine footprint.

		<p>be carried out to establish a level drill site</p> <p>Avoid surface vegetation clearance to leave the roots intact so that vegetation can coppice and regrow; or avoid intact virgin areas and move drill hole</p> <p>Use existing tracks as far as possible and if the rig drive off-road, rake tracks and compacted drill area after works</p> <p>No driving on the beach and only hand drilling within 300 m from the hwm.</p> <p>On site geologist need to avoid any nesting or manure sites</p> <p>If any animals are encountered they must not be killed or injured, but should rather be removed or chased away from the site</p> <p>Implement rehabilitation plan .</p>		
	Social	<p>All operations will be carried out under the guidance of a strong, experienced geological manager with proven skills in public consultation and conflict resolution;</p> <p>All prospecting personnel will be made aware of the</p>	<p>Planning stage, training personnel before going into the field, setup, drilling & rehabilitation</p>	<p>Mine rules</p>

		<p>local conditions and sensitivities in the mine area There will be a strict requirement to treat local residents and operators with respect and courtesy at all times. Maintain visual buffer with SANPARKS of 1.5 km from caves and 600 m from river</p>		
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i) **Financial Provision**

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

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

The closure objectives are to record and communicate the results of the prospecting programme to the participating stakeholders, and to receive an effective closure certificate should the prospect indicate that the resource(s) would not support a sustainable mining operation.

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

Minimise the area to be disturbed and to ensure that the areas disturbed during the prospecting activities are rehabilitated and stable, as per the commitments made in the EMP. Sustain the pre-prospecting land use, and return the site the state it was found in.

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

After drilling has been completed in one area, the drilling team will ensure the site is reverted back to its original state by implementing the measures listed in Appendix 11.

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

The Company is required to make the prescribed financial provision for the rehabilitation or management of negative environmental impacts. If the Company fails to rehabilitate or manage any negative impact on the environment, the DMR may, upon written notice to the Company, use all or part of the financial provision to rehabilitate or manage the negative environmental impact in question. The Company will specify that the drilling contractor is required to comply with all the environmental measures specified in the EMP. This will include avoiding unnecessary disturbance of natural vegetation and the rehabilitation of each drill site, immediately after drilling has been completed. All tracks to the drill sites must be rehabilitated at the end of use. The closure objective is to leave the site as it was found. The financial provision provides for the final checking of all sites before closure.

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

The quantum of the financial provision required is R 250 000 The Company must annually update and review the quantum of the financial provision (as per Regulation 54 (2) of the MPRDA). The financial Quantum Calculation is found under Appendix 10.

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

Please refer to Appendix 3 for more details on the financial provision for the proposed activity

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

- g) Monitoring of Impact Management Actions
- h) Monitoring and reporting frequency
- i) Responsible persons
- j) Time period for implementing impact management actions
- k) Mechanism for monitoring compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
All Prospecting Activities	N/a	Ensure that the prospecting programme is being implemented in line with the approved prospecting works programme.	Consulting Geologist	Submit an annual prospecting progress report to DMR
Setup & Drilling Activities	Heritage Noise Dust fall Visual Soil & vegetation Social Housekeeping & maintenance Waste management Rehabilitation	Weekly inspections will cover the following: - Daily site selection to avoid heritage resources (hand drilling within 2 km from caves; hand drilling within 300 m from HWM. No drilling 1.5 km from caves) - Daily site selection to avoid intact fauna & flora sites - No drilling within 600 m from river - Hand drilling in high sensitive zone and now new tracks or veld driving allow in this zone - Implementation of effective waste management	On site Geologist	Weekly inspection and monthly internal reporting to EAP/ECO

		<ul style="list-style-type: none"> - Establish and implement a stakeholder compliant register on-site and ensure that all complaints are responded to promptly - Ensure that an oil spill kit is readily available - Ensure that all chemicals and hydrocarbons are stored within bund walls - Have driptrays on site to avoid soil contamination - Rehabilitation of drill sites. - Control and minimise the development of new access tracks by planning the daily route to follow - Appropriate storage and handling of topsoil. 		
Post drilling	<p>Open drill holes Revegetation Stability Soil erosion Closed tracks</p>	The drill sites will be inspected 3 months after rehabilitation, to ensure further backfilling if required, no erosion has occurred and that closed tracks is still effectively blocked and not recognised as tracks. The sites should be monitored over a two-year period for success or otherwise of revegetation. If initially unsuccessful, a second attempt should be carried out.	On site Geologist	Monitoring Report
Environmental	All commitments	Ensure commitments made within	Independent EAP/ECO	Undertake and submit an

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

Regular monitoring of all the environmental management procedures and mitigation measures shall be carried out by the Company in order to ensure that the provisions of this EMP are adhered to. Internal monthly reporting will take place and a follow-up report 3 months after rehabilitation. Formal monitoring and performance assessment of the EMP will be undertaken annually. Site photographs taken before drilling commences and after each drilling site has been rehabilitated must be included in the monthly internal report and the performance assessment reports

m) Environmental Awareness Plan

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

Environmental awareness training courses will be provided to all personnel on site by the independent EAP/ECO.

The environmental training courses will include, amongst others, aspects such as:

- Awareness training for contractors and employees
- Job specific training – training for personnel performing tasks which could cause potentially significant environmental impacts;
- Comprehensive training – on emergency response, spill management, etc;
- Specialised skills for engagement with mine operations;
- Mine rules and security protocol
- Training verification and record keeping.
- Environmental issues on site, buffers, red flags and no-go's;
- Roles and responsibilities;
- The operational environmental management measures;
- Cultural awareness; and
- Heritage discovery procedures (Appendix 9).

All attendees shall remain for the duration of the course and, on completion, sign an attendance register that clearly indicates participants' names. A copy of the register shall be kept on record.

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

All employees must be provided with environmental awareness training to inform them of any environmental risks and security protocols which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment. This should be in conjunction with the implementation of the EMP.

**n) Specific information required by the Competent Authority
(Among others, confirm that the financial provision will be reviewed annually).**

Not applicable at this stage but as part of the annual audit the financial provision will be reviewed.

2) UNDERTAKING

The EAP herewith confirms

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

Signature of the environmental assessment practitioner:

PHS Consulting

Name of company:

12 February 2018

Date:

-END-