Bashan Technologies CC
("Proponent")

Final Environmental Impact Assessment for the Proposed Exploration / Prospecting Programme for the Exclusive Prospecting License (EPL) No. 6702, Lüderitz District, //Karas Region,
SOUTHERN NAMIBIA

December 2020

Bashan Technologies CC
P. O. Box 2020
Swakopmund, Namibia

PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

TYPE OF AUTHORISATIONS REQUIRING ECC

Exclusive Prospecting License (EPL) No. 6702
for ECC for Exploration

NAME OF THE PROPONENT

Bashan Technologies CC

COMPETENT AUTHORITY

Ministry of Mines and Energy (MME)

ADDRESS OF THE PROPONENT AND CONTACT PERSON

Bashan Technologies CC
PO Box 2020
Swakopmund, Namibia

PROPONENT CONTACT PERSON:
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Mobile: +26481 635 9764/+26481 254 9885 I
Email: ikauvee@gmail.com

PROPOSED PROJECT

Proposed Minerals Exploration / Prospecting activities in the Exclusive Prospecting License (EPL) No. 6702,
Lüderitz District, //Karas Region

PROJECT LOCATION

Otjiwarongo District, Otjozondjupa Region, Central Namibia
(Latitude: -28.071667, Longitude: 16.945833)

ENVIRONMENTAL CONSULTANTS

Risk-Based Solutions (RBS) CC
(Consulting Arm of Foresight Group Namibia (FGN) (Pty) Ltd)
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P. O. Box 1839, **WINDHOEK, NAMIBIA**
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ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Dr. Sindila Mwiya
PhD, PG Cert, MPhil, BEng (Hons), Pr Eng

Summary Profile and Qualification of the Environmental Assessment Practitioner (EAP) / International Consultant Projects Director – Dr Sindila Mwiya

Dr Sindila Mwiya has more than eighteen (18) years of practical field-based technical industry experience in Environmental Assessment (SEA, EIA, EMP, EMS), Energy (Renewable and Non-renewable energy sources), onshore and offshore resources (minerals, oil, gas and water) exploration / prospecting, operation and utilisation, covering general and specialist technical exploration and recovery support, Health, Safety and Environment (HSE) permitting for Geophysical Surveys such as 2D, 3D and 4D Seismic, Gravity and Electromagnetic Surveys for mining and petroleum (oil and gas) operations support, through to engineering planning, layout, designing, logistical support, recovery, production / operations, compliance monitoring, rehabilitation, closure and aftercare projects lifecycles. The great array of highly technical specialist knowledge and field-based practical experiences of Dr Sindila Mwiya has now been extended to supporting the development of Environmentally Sustainable, automated / smart and Climate Change resilient homes, towns and cities.

Through his companies, Risk-Based Solutions (RBS) CC and Foresight Group Namibia (FGN) (Pty) Ltd which he founded, he has undertaken more than 200 projects for Local (Namibian), Continental (Africa) and International (Global) based clients. He has worked and continue to work for Global, Continental and Namibian based reputable resources (petroleum and mining / minerals) and energy companies such as EMGS (UK/ Norway), CGG (UK/ France/Namibia), BW Offshore (Norway/Singapore /Namibia), Shell Namibia B. V. Limited (Namibia/ the Netherlands), Tullow Oil (UK/Namibia), Debmarine (DBMN) (Namibia), Reconnaissance Energy Africa Ltd (ReconAfrica) (UK/Canada/Namibia), Osino Resource Corporation (Canada/Germany/Namibia), Desert Lion Energy Corporation (Canada/ Australia/ Namibia), Petrobras Oil and Gas (Brazil) / BP (UK)/ Namibia, REPSOL (Spain/ Namibia), ACREP (Namibia/Angola), Preview Energy Resources (UK), HRT Africa (Brazil / USA/ Namibia), Chariot Oil and Gas Exploration (UK/ Namibia), NABIRM (USA/ Namibia), Serica Energy (UK/ Namibia), Eco (Atlantic) Oil and Gas (Canada / USA/ Namibia), ION GeoVentures (USA), PGS UK Exploration (UK), TGS-Nopec (UK), Maurel & Prom (France/ Namibia), GeoPartners (UK), PetroSA Equatorial Guinea (South Africa / Equatorial Guinea/ Namibia), Preview Energy Resources (Namibia / UK), Sintezneftegaz Namibia Ltd (Russia/ Namibia), INA Namibia (INA INDUSTRIJA NAFTE d.d) (Croatia/ Namibia), Namibia Underwater Technologies (NUTAM) (South Africa/Namibia), InnoSun Holdings (Pty) Ltd and all its subsidiary renewable energy companies and projects in Namibia (Namibia / France), HopSol (Namibia/Switzerland), Momentous Solar One (Pty) Ltd (Namibia / Canada), OLC Northern Sun Energy (Pty) Ltd (Namibia) and more than 100 local companies. Dr Sindila Mwiya is highly qualified with extensive practical field-based experience in petroleum, mining, renewable energy (Solar, Wind, Biomass, Geothermal and Hydropower), Non-Renewable energy (Coal, Petroleum, and Natural Gas), applied environmental assessment, management and monitoring (Scoping, EIA, EMP, EMP, EMS) and overall industry specific HSE, cleaner production programmes, Geoenvironmental, geological and geotechnical engineering specialist fields.

Dr Sindila Mwiya has undertaken and continue to undertake and manage high value projects on behalf of global and local resources and energy companies. Currently, (2020-2023) Dr Sindila Mwiya is responsible for permitting planning through to operational and completion compliance monitoring, HSE and engineering technical support for multiple major upstream onshore and offshore petroleum, minerals and mining projects, Solar and Wind Energy Projects, manufacturing and environmentally sustainable, automated / smart and Climate Change resilient homes developments in different parts of the World including Namibia. Currently, Dr Sindila Mwiya is developing a 16 Ha commercial and residential Mwale Mwiya Park in the Town of Katima Mulilo, Zambezi Region, Namibia as one of first advanced Environmentally Sustainable, automated / smart and Climate Change resilient development in Namibia. He continue to worked as an International Resources Consultant, national Environmental Assessment Practitioner (EAP) / Environmentally Sustainable, automated / smart and Climate Change resilient homes developer, Engineering / Technical Consultant (RBS / FGN), Project Manager, Programme Advisor for the Department of Natural and Applied Sciences, Namibia University of Science and Technology (NUST) and has worked as a Lecturer, University of Namibia (UNAM), External Examiner/ Moderator, NUST, National (Namibia) Technical Advisor (Directorate of Environmental Affairs, Ministry of Environment and Tourism / DANIDA – Cleaner Production Component) and Chief Geologist for Engineering and Environment Division, Geological Survey of Namibia, Ministry of Mines and Energy and a Field-Based Geotechnician (Specialised in Magnetics, Seismic, Gravity and Electromagnetics Exploration and Survey Methods) under the Federal Institute for Geoscience and Natural Resources (BGR) German Mineral Exploration Promotion Project to Namibia, Geophysics Division, Geological Survey of Namibia, Ministry of Mines and Energy.

He has supervised and continue to support a number of MScs and PhDs research programmes and has been a reviewer on international, national and regional researches, plans, programmes and projects with the objective to ensure substantial local skills development, pivotal to the national socioeconomic development through the promotion of sustainable natural resources coexistence, management, development, recovery, utilisation and for development policies, plans, programmes and projects financed by governments, private investors and donor organisations. Since 2006 until 2017, he has provided extensive technical support to the Department of Environmental Affairs (DEA), Ministry of Environment and Tourism (MET) through GIZ in the preparation and amendments of the Namibian Environmental Management Act, 2007, (Act No. 7 of 2007), new Strategic Environmental Assessment (SEA) Regulations, preparation of the updated Environmental Impact Assessment (EIA) Regulations as well as the preparation of the new SEA and EIA Guidelines and Procedures all aimed at promoting effective environmental assessment and management practices in Namibia.

Among his academic achievements, Dr Sindila Mwiya is a holder of a PhD (Engineering Geology/Geotechnical / Geoenvironmental / Environmental Engineering and Artificial Intelligence) – Research Thesis: Development of a Knowledge-Based System Methodology (KBSM) for the Design of Solid Waste Disposal Sites in Arid and Semiarid Environments, MPhil/PG Cert and BEng (Hons) (Engineering Geology and Geotechnics) qualifications from the University of Portsmouth, School of Earth and Environmental Sciences, United Kingdom. During the 2004 Namibia National Science Awards, organised by the Namibian Ministry of Education, and held in Windhoek, Dr Sindila Mwiya was awarded the Geologist of the Year for 2004, in the professional category. Furthermore, as part of his professional career recognition, Dr Sindila Mwiya is a life member of the Geological Society of Namibia, Consulting member of the Hydrogeological Society of Namibia and a Professional Engineer registered with the Engineering Council of Namibia.

December 2020
Windhoek, Namibia

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NON-TECHNICAL SUMMARY

Bashan Technologies CC ("**Proponent**") hold mineral rights for base and rare metals, industrial minerals, precious metals, precious stones and semi-precious stones under the Exclusive Prospecting Licence (EPL) No. 6702. The Proponent is strategically focused on diamonds prospecting / exploration and small-scale test mining activities. The EPL 6702 was granted on the 16/03/2018 and will expire on the 15/03/2021. The total area of the EPL is 684.9362 Ha.

The EPL 6702 is situated in the Lüderitz District, Karas Region, Southern Namibia and falls within the newly proclaimed /Ai - /Ais – Richtersveld Transfrontier Park. The EPL 6702 fall within the Succulent Karoo. The Succulent Karoo is the most important biome in Namibia with numerous endemics and near-endemic species as well as a host of other plant species classified with some kind of formal protection.

The Proponent intends undertake exploration activities covering desktop studies, followed by site-specific activities on targets that may be delineated and using exploration techniques/ methods such as geophysical surveys, geological mapping, trenching, drilling, bulk sampling and test mining.

The proposed exploration and test mining activities are listed in the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007) and cannot be undertaken without an Environmental Clearance Certificate (ECC). This Environmental Impact Assessment (EIA) report has been prepared by Risk-Based Solutions (RBS) CC to support the application for the ECC for the proposed exploration and test mining activities in the EPL 6702.

The impacts that the proposed exploration activities and associated infrastructure such as access and exploration supporting facilities will have on the receiving environment (physical, biological and socioeconomic) will depend on the extent of the proposed activities over the development area, management of the area and how the mitigations as detailed in the EMP Report are eventually implemented and monitored by the Proponent.

Based on the findings of this EIA Report, it is hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate (ECC). The Proponent shall take into consideration the following key requirements in implementing the proposed exploration programme:

(i) The Proponent shall negotiate national park Access Agreement with the Ministry of Environment, Forestry and Tourism (MEFT).

(ii) The Proponent shall adhere to all the provisions of the EMP and conditions of the Access Agreement to be entered between the Proponent and the land owner/s in line with all applicable national regulations.

(iii) Before entering a resource protected area, the Proponent and all workers must have undergone police security clearance with respect to the security of the diamonds during exploration and small-scale test mining, and.

(iv) Continuous consultation process and open disclosure of information to the MEFT, MME and the //Karas Regional Council in terms of outcomes of the exploration and small-scale test mining operations and ways forward.

Once and if economic minerals resources are discovered, a separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports shall be prepared as part of the feasibility study for possible mining operations.

The site-specific EIA and EMP reports shall cover the area identified to have potential economic minerals resources including the pit / shaft area/s, waste rock, tailings dump, access, office blocks, water and external infrastructure support areas such as water pipeline, powerline and main road/s.

In addition to the Terms of Reference (ToR) to be developed during the Environmental Scoping study phase for the mining operations, the following field-based and site-specific specialist studies shall be

considered in the TOR for the EIA and EMP studies for possible mining operations in an event of a discovery of economic minerals resources and possible development of a mining project within the EPL No. 6702:

(i) Water studies.

(ii) Field-based flora and fauna diversity.

(iii) Noise and Sound modelling linked to engineering studies.

(iv) Site-specific archaeological assessment.

(v) Socioeconomic assessment, and.

(vi) Others as may be identified / recommended by the stakeholders/ land owners/ Environmental Commissioner or specialists.

1. BACKGROUND

1.1 Introduction

Bashan Technologies CC, the Proponent, holds mineral rights under Exclusive Prospecting License (EPL) No. 6702. The following is the summary of the EPL 6702:

- **Type of License:** Exclusive Prospecting License (EPL) No. 6702.
- **EPL Holder and Proponent:** Bashan Technologies CC.
- **Granted Date:** 16/03/2018.
- **Expiry Date:** 15/03/2021.
- **Commodities:** Base and rare metals, industrial minerals, precious metals, precious stones and semi-precious stones, and.
- **Size of the EPL:** 684.9362 Ha.

Bashan Technologies CC is locally owned Namibian company focused on the acquisition and development of mining projects in Namibia.

1.2 Proposed Scope of Work

The Proponent intends undertake exploration activities covering desktop studies, followed by site-specific activities on targets that may be delineated and using exploration techniques/ methods such as geophysical surveys, geological mapping, trenching, drilling, bulk sampling and test mining. If the proposed exploration activities lead to positive results, the exploration data collected will then be put together into a prefeasibility report and if the prefeasibility result proves positive then a detailed feasibility study supported by detailed site-specific drilling, bulk sampling, laboratory tests and conduct test mining activities on the discovered mineralised locality will be undertaken.

A positive feasibility study will be required to support the application for a Mining License (ML) together with a new site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) with specialist studies such as flora, fauna, socioeconomic, water, traffic, dust and noise modelling and archaeology to be undertaken to support the application for the new ECC for mining and minerals process.

1.3 Regulatory Requirements

The proposed prospecting activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the EIA Regulations, 2012 and cannot be undertaken without an Environmental Clearance Certificate (ECC). The Proponent is required to have undertaken Environmental Assessment comprising this Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports for the proposed minerals prospecting activities.

In fulfilment of the environmental requirements, the Proponent appointed Risk-Based Solutions (RBS) CC as the Environmental Consultants led by Dr Sindila Mwiya as the Environmental Assessment Practitioner in the preparation of the EIA and EMP Reports in order to support the application for ECC (Annex 1).

1.4 Location, Land Use, Infrastructure and Services

1.4.1 Location and Land Use

The EPL No. 6702 is located in the Lüderitz District, //Karas Region, along the Orange River, the international border between Namibia and South Africa (Figs. 1.1 and 1.2). The EPL area fall within the

/Ai-/Ais National Park which is part of the regional Ai-/Ais-Richtersveld Transfrontier Park created between Namibia and South Africa (Fig. 1.2). Rosh Pinah is the nearest town situated about 30 km to from the centre of the EPL along the C13 road, northwest of the EPL area (Fig. 1.3).

The EPL 6702 area fall within the 4300 km² boundary of the /Ai-/Ais National Park area (Fig. 1.4). National Park is the Fish River Canyon which is the 2nd largest canyon in the world, and is a very well-known tourist destination and boasts one of the most well-known and famous hiking trails in southern Africa (Ministry of Environment, Forestry and Tourism (MEFT) and Ministry of Mines and Energy (MME), 2018).

According to the Ministry of Environment, Forestry and Tourism (MEFT) and Ministry of Mines and Energy (MME), (2018), national policy on prospecting and mining in protected areas, the following areas therefore have been identified to be excluded from future prospecting and mining within the/Ai-/Ais National Park area:

a) The area around the scenic Fish River Mouth is an important wetland for a variety of wetland species including birds.

b) Existing tourist camps such as /Ai-/Ais and Hobas Tourist Camp have high tourism value and currently generate substantial income from tourism. A 30 km radius should be observed for any mining exploration activities.

c) The River mouths for the Konkiep, Boom and Naub rivers have potential for tourism and are ecologically important as they contain rare and endemic species and provide drainage system.

d) Areas close to the Canyon including the northern areas should be excluded to avoid any irreparable damage to the canyon which might affect current and future prospects of tourism.

e) Grootpens Island east of the Fish River has been earmarked as a potential lodge site.

f) Gamkab Valley and River Mouth has huge potential for 4x4 tour activities and new MET gate and facilities have been constructed at the Gamkab River mouth.

According to the Ministry of Environment, Forestry and Tourism (MEFT) and Ministry of Mines and Energy (MME), (2018), areas adjacent to the Orange River have been severely impacted by mining, and major rehabilitation activities will be required to restore the aesthetic value of the area for any future tourism development. In line with the National Heritage Act some areas may be used for heritage tourism.

However, the area under the EPL 6702 cannot be used for heritage tourism because it falls under active diamond exploration and mining areas under the provisions of the Minerals (Prospecting and Mining) Act (No 33 of 1992) and Diamond Act 13 of 1999 (and the Regulations 1 April 2000 and Amendment of the Diamond Regulations 2003).

1.4.2 Targets / Areas of Interest within the EPL 6702

The area of the northern bank of the Orange River, between Augrabies and the eastern boundary of the Tsau //Khaeb (Sperrgebiet) National Park has been divided into 43 contiguous blocks. The blocks were offered for public application to undertake exploration and mining (Fig. 1.5). Each block is 3 (three) kilometers wide and runs for some 10 (ten) kilometers along the riverbank.

The prospecting and small-scale mining will take place within mainly Blocks Nos. 1 and 2. “Prospecting Area” occupies the Northern bank of the Orange River (along a strip of about 3.5 km width) (Fig. 1.5) and includes some portions of informal Blocks Nos. 1 and 2.

The proponent intends to undertake diamonds exploration and small-scale test mining over very limited Areas of Interest marked 1 – 3 as shown in Fig. 1.6 along the Orange River. According to Fig. 1.6, the

Areas of Interest marked 1 – 3 falls outside the national park area excluded for minerals prospecting and mining.

The proponent intends to undertake prospecting using techniques such as geological mapping, trenching and bulk sampling.

1.4.3 Supporting Infrastructure and Services

The mining settlement of Rosh Pinah is the nearest settlement to the EPL area situated about 30 km to northwest of the EPL along the C13 Road. The C13 road which runs along the Orange River links the EPL Area and in particular the targeted area to main tarred national road network at Rosh Pinah. Rosh Pinah has full mobile and fixed telecommunication infrastructure with business services such as banking, security and retail services.

Aus is main nearest major rail station situated about 175 km to the north of the EPL area. The town of Aus is linked to the EPL area via 165 km tarred road to Rosh Pinah and a 20 km good gravel road. The Port of Lüderitz suited about 300 km from the EPL area is the nearest port. The Port of Lüderitz is linked by both rail and the B1 tarred road from Aus.

The EPL area is close to the main electricity supply infrastructure network connecting the Town of Rosh Pinah as well as the NamWater supply infrastructure at the Orange River and within the EPL area. Hence the supply of electricity to any potential mining project in the EPL area will not be a problem because the infrastructure already exists in the area.

Figure 1.1: Regional location of the EPL 6702, Map Prepared by Risk-Based Solution, 2020.

Coordinates			License Shape
Official Area:		684.9362 Ha	
Coordinate system:		GCS Bessel 1841	
	Latitude	Longitude	
Part 1			
1	28° 04' 30.43" S	017° 00' 00.43" E	
2	28° 04' 18.77" S	016° 59' 59.89" E	
3	28° 04' 11.89" S	016° 59' 40.85" E	
4	28° 03' 32.00" S	016° 59' 12.52" E	
5	28° 03' 17.82" S	016° 58' 43.68" E	
6	28° 03' 27.65" S	016° 58' 18.19" E	
7	28° 03' 58.57" S	016° 57' 56.05" E	
8	28° 04' 18.05" S	016° 57' 17.17" E	
9	28° 04' 04.04" S	016° 56' 04.81" E	
10	28° 03' 59.62" S	016° 56' 03.26" E	
11	28° 04' 07.64" S	016° 54' 06.91" E	
12	28° 05' 21.16" S	016° 52' 59.88" E	
13	28° 05' 53.45" S	016° 53' 00.10" E	
14	28° 05' 23.93" S	016° 53' 17.92" E	
15	28° 04' 29.64" S	016° 54' 02.74" E	
16	28° 04' 15.92" S	016° 54' 29.27" E	
17	28° 04' 13.40" S	016° 55' 19.99" E	
18	28° 04' 20.10" S	016° 56' 03.77" E	
19	28° 04' 41.84" S	016° 56' 43.44" E	
20	28° 04' 41.63" S	016° 57' 17.42" E	
21	28° 04' 08.65" S	016° 58' 05.38" E	
22	28° 03' 50.11" S	016° 58' 22.33" E	
23	28° 03' 40.50" S	016° 58' 41.38" E	
24	28° 03' 43.92" S	016° 58' 58.37" E	
25	28° 04' 21.04" S	016° 59' 34.91" E	

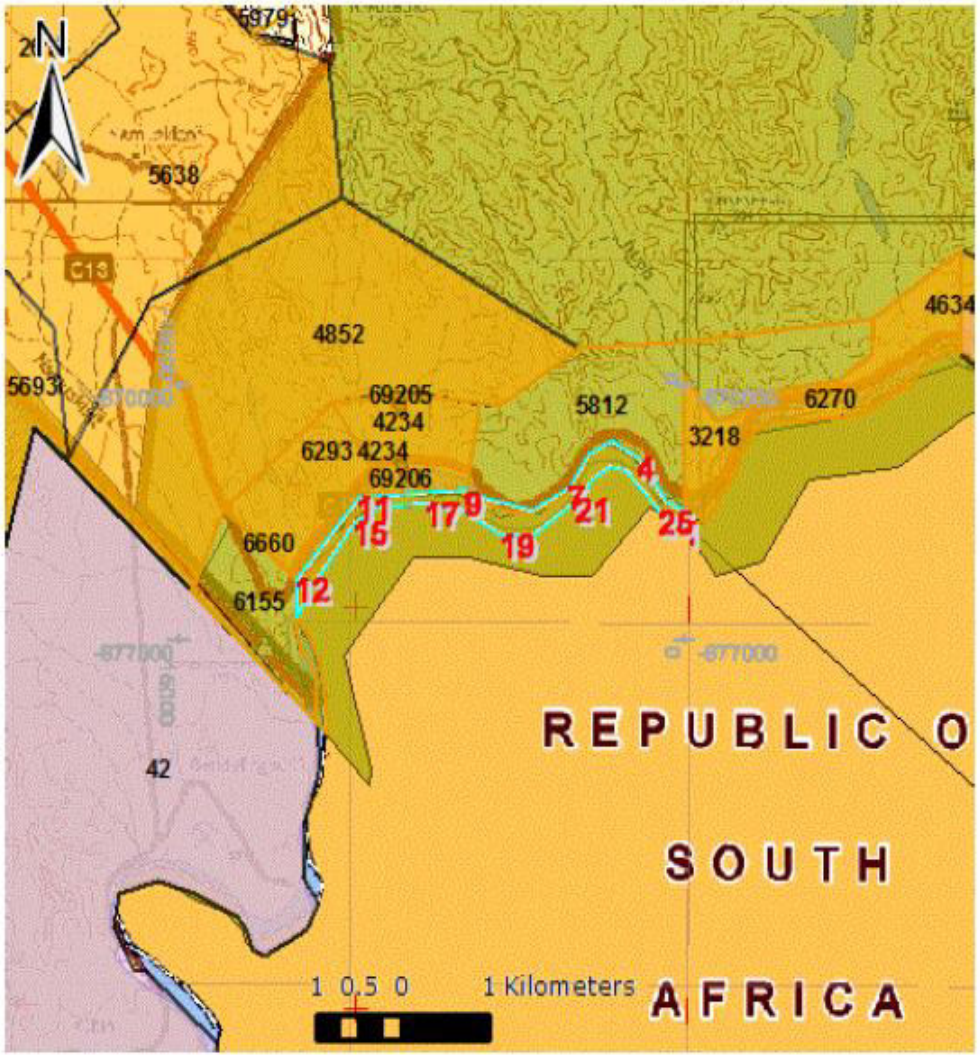


Figure 1.2: Detailed regional location of the EPL 6702 and coordinates (Source: http:// portals. flexicadastre.com/Namibia).

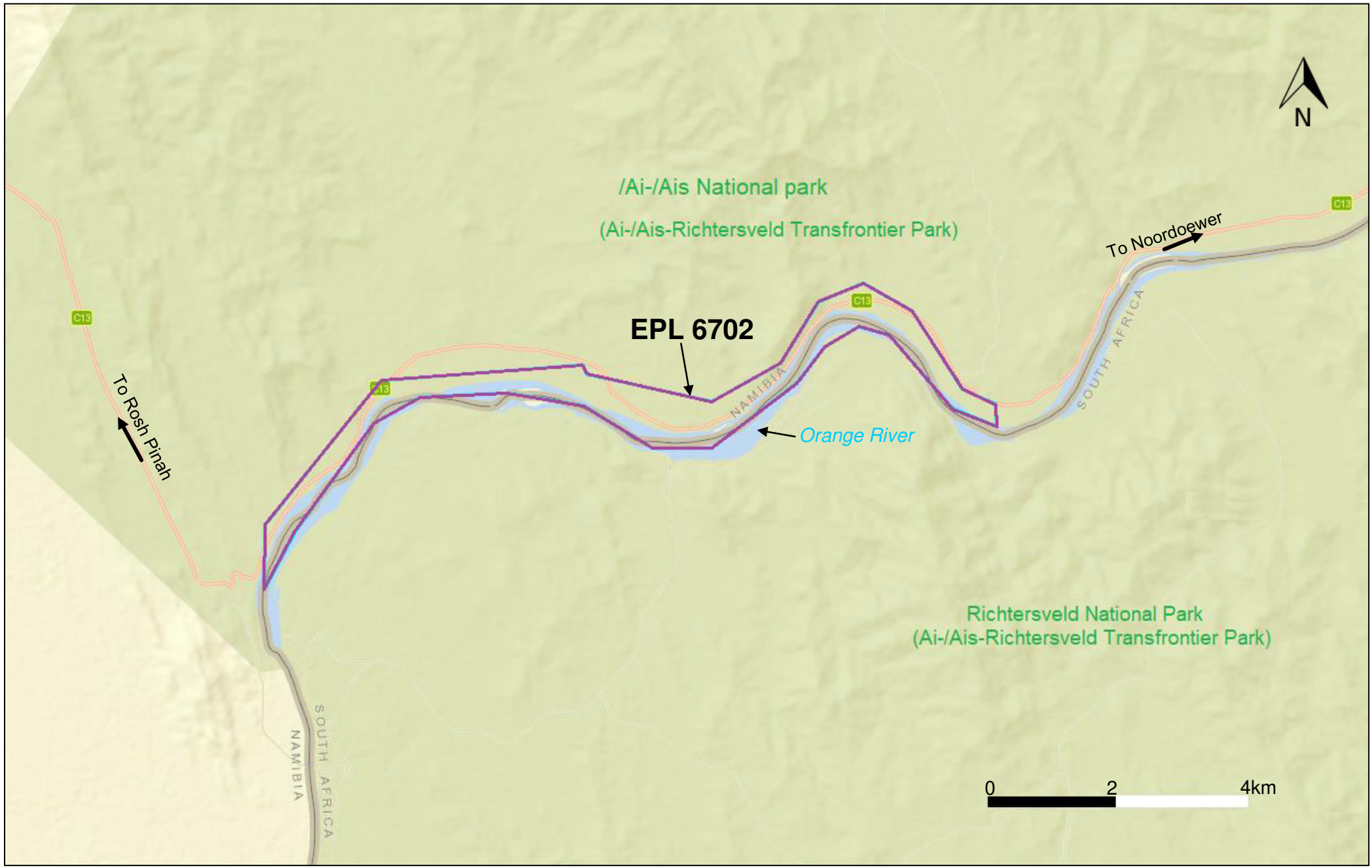


Figure 1.3: Detailed regional location of the EPL 6702 and coordinates (Source: http:// portals. flexicadastre.com/Namibia).

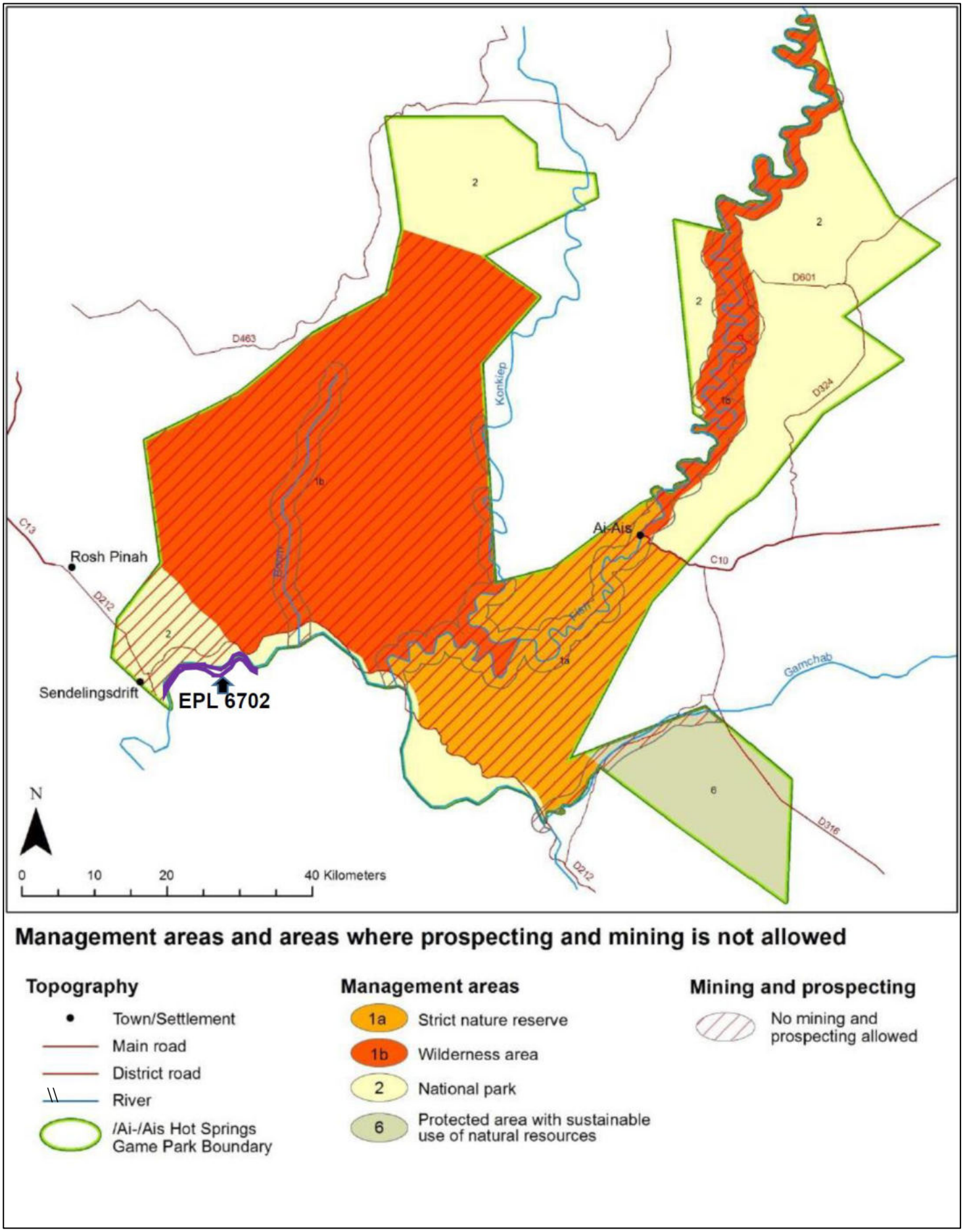
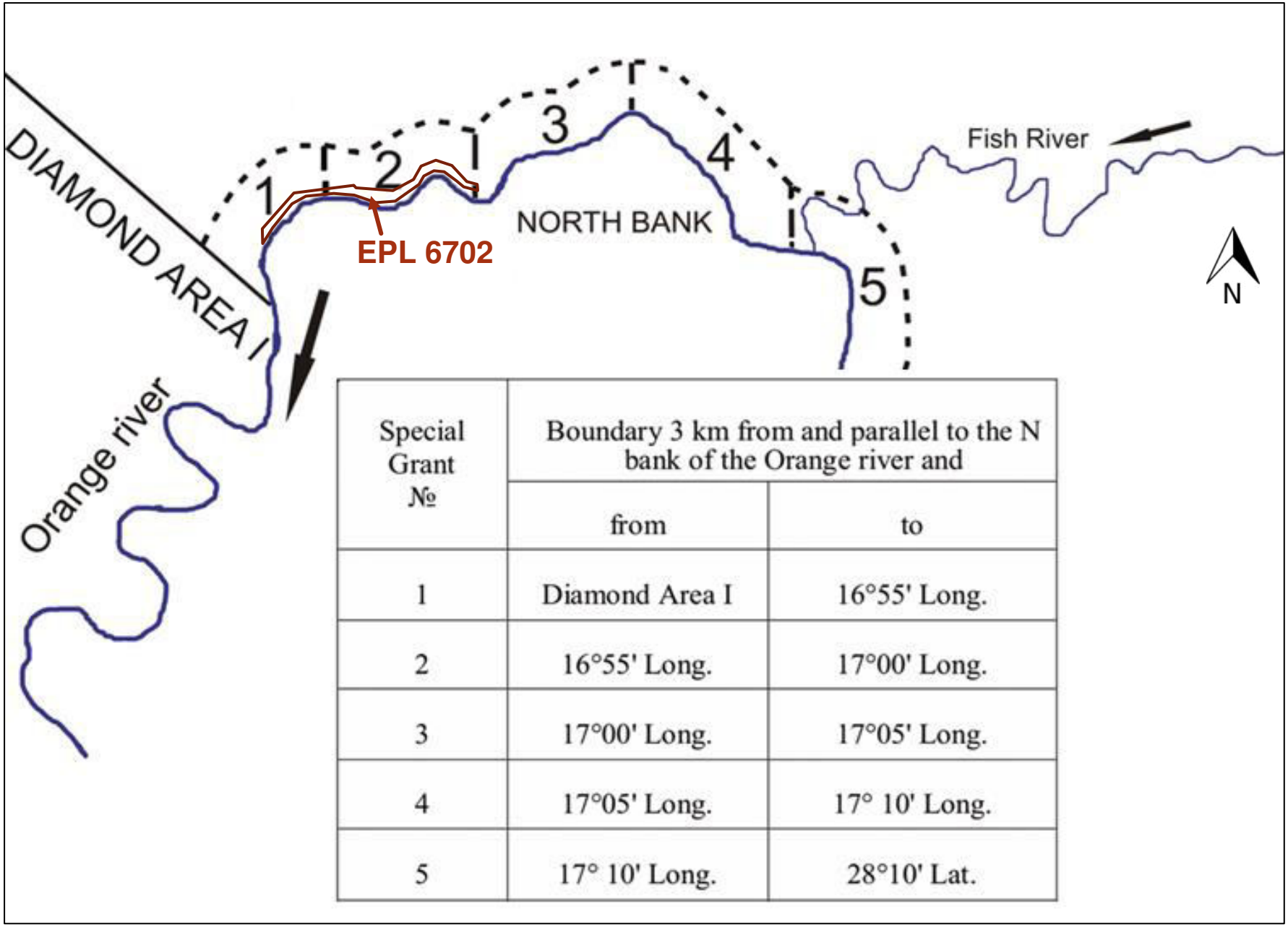


Figure 1.4: Extent and land use of the /Ai-/Ais National park with respect to minerals exploration and mining (Source: Ministry of Environment and Tourism (MET) and Ministry of Mines and Energy (MME), 2018).



Special Grant №	Boundary 3 km from and parallel to the N bank of the Orange river and	
	from	to
1	Diamond Area I	16°55' Long.
2	16°55' Long.	17°00' Long.
3	17°00' Long.	17°05' Long.
4	17°05' Long.	17° 10' Long.
5	17° 10' Long.	28°10' Lat.

Figure 1.5: The northern bank of the Orange River, between Augrabies and the eastern boundary of the Tsau //Khaeb (Sperrgebiet) National Park, divided into 43 contiguous blocks. The EPL 6702 fall within Blocks 1 and 2).

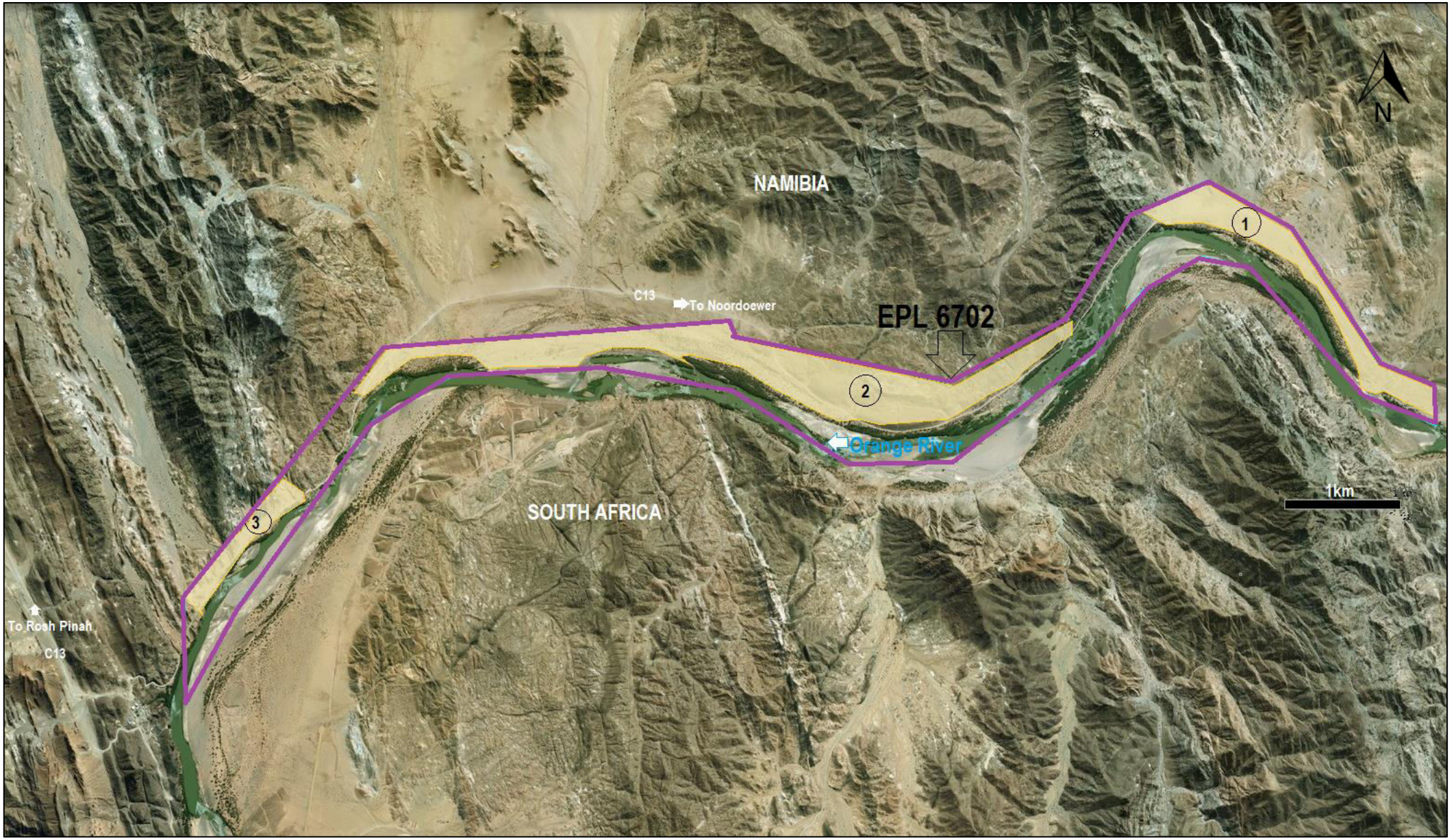


Figure 1.6: Detailed regional location of the EPL 6702 showing the key areas of interest for the proposed diamond exploration and small-scale test mining marked 1-3 (Source: http:// portals. flexicadastre.com/Namibia).

1.5 Project Motivation

The EPL 6702 falls within a highly prospective area for alluvial diamonds that have been deposited by the Orange River along its banks. Alluvial diamonds are known to be associated with some of the alluvial deposits along the Orange River. The diamonds have been transported more than 1,000 kilometres by the Orange River from their source area in the highlands around Kimberley, South Africa.

The proposed / ongoing exploration activities has some limited socioeconomic benefits which are mainly centred around the payment of the annual license rental fees to the Central Government through the Ministry of Mines and Energy (MME) and value addition to the potential underground minerals resources in the area which otherwise would not have been known if the exploration in the EPL 6702 did not take place.

1.6 Approach, Alternatives, Key Issues and Methodology

1.6.1 Terms of Reference (ToR) and Approach

Risk-Based Solutions (RBS) was appointed by the Proponent to prepare the EIA and EMP Reports in order to support the application for renewal of the Environmental Clearance Certificate (ECC) for the EPL No. 6702 with respect to the proposed exploration activities.

The EIA process reviewed the receiving environmental settings (physical, biological, socioeconomic and ecosystem services, function, use values and non-use) and proposed exploration activities, identified the impacts and then assessed the likely impacts (positive and negative) on the receiving environment (Table 1.1).

The key deliverable comprised this EIA Report and a separate Environmental Management Plan (EMP) report detailing appropriate mitigation measures that will enhance the positive impacts and reduce the likely negative impacts identified.

The EIA and EMP report and the completed Application for Environmental Clearance Certificate (ECC) shall be submitted to the client (Proponent) and the Office of the Environmental Commissioner, Department of Environmental Affairs (DEA), Ministry of Environment, Forestry and Tourism (MEFT) through the Ministry of Mines and Energy (the Competent Authority) for review and issue of the Records of Decisions (RDs).

The EIA and EMP processes have been performed with reasonable skill, care and diligence in accordance with professional standards and practices existing at the date of performance of the assessment and that the guidelines, methods and techniques that have been applied are all in conformity to the national regulatory requirements, process and specifications in Namibia as required by MME, MEFT and Ministry of Agriculture, Water and Land Reform (MAWLR).

Both the EIA and EMP Reports have been prepared in line with the January 2015 MET Environmental Assessment Reporting Guideline.

Table 1.1: Summary of the proposed activities, alternatives and key issues considered during the Environmental Assessment (EA) process covering Scoping, EIA and EMP Processes.

<table>
<tr><th>PROPOSED PROJECT ACTIVITIES</th><th>ALTERNATIVES CONSIDERED</th><th colspan="2">KEY ISSUES EVALUATED AND ASSESSED WITH ENVIRONMENTAL MANAGEMENT PLAN (EMP) / MITIGATION MEASURES DEVELOPED</th></tr>
<tr><td rowspan="10">(i) Initial desktop exploration activities (review of existing information and all previous activities in order identify any potential target/s)

(ii) Regional reconnaissance field-based activities such mapping and sampling to identify areas with potential targets

(iii) Initial local field-based activities such as widely spaced mapping, sampling, surveying and possible drilling in order to determine the viability of any delineated targets

(iv) Detailed local field-based activities such very detailed mapping, sampling, surveying and possible drilling in order to determine the feasibility of any delineated local target

(v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive</td><td rowspan="10">(i) Location for Minerals Occurrence: A number of economic deposits are known to exist in different parts of Namibia and some have been explored by different companies over the years.

(ii) Other Alternative Land Uses: Game Farming, Tourism and Agriculture

(iii) Ecosystem Function (What the Ecosystem Does.

(iv) Ecosystem Services.

(v) Use Values.

(vi) Non-Use, or Passive Use.

(vii) The No-Action Alternative</td><td colspan="2">Potential land use conflicts / opportunities for coexistence between proposed exploration and other existing land uses such as conservation, tourism and agriculture</td></tr>
<tr><td rowspan="3">Impacts on the Physical Environment</td><td>Natural Environment such as air, noise, water, dust etc.</td></tr>
<tr><td>Built Environment such as existing houses, roads, transport systems, Buildings, energy and water and other supporting infrastructure</td></tr>
<tr><td>Socioeconomic, archaeological and Cultural impacts on the local societies and communities</td></tr>
<tr><td rowspan="4">Impacts on the Biological Environment</td><td>Flora</td></tr>
<tr><td>Fauna</td></tr>
<tr><td>Habitat</td></tr>
<tr><td>Ecosystem functions, services, use values and non-Use or passive use</td></tr>
</table>

1.6.2 Environmental Assessment Process and Steps

The environmental assessment process adopted for this project took into considerations the provisions of the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act (EMA), 2007, (Act No. 7 of 2007). The steps to be taken are summarised as follows (Fig. 1.7):

- Screened the project against the applicable legislation and regulations undertaken in January 2019.
- In January / February 2019, prepared the Draft BID / Scoping Report (Annex 1) for public and stakeholder consultations process and for registration of the proposed project on the MEFT digital platform.
- In February 2019 prepared the public consultation materials including public notice for publication in the local newspapers.
- Opened a stakeholder register and published the public notice in the local newspapers Invited the public and stakeholders to participate in environmental assessment process. The consultation activities were undertaken during the months February and March 2019.
- Registered the project on the MEFT digital platform in December 2020.

- On receipt of the acknowledgment of the ECC notification from MEFT, finalised the BID /Scoping, EIA and EMP Reports for submission to the Environmental Commissioner through the Mining Commissioner in the MME (Competent Authority) in support of the application for Environmental Clearance Certificate (ECC) for the proposed project. The finalisation of the EIA and EMP reports was undertaken in December 2020.

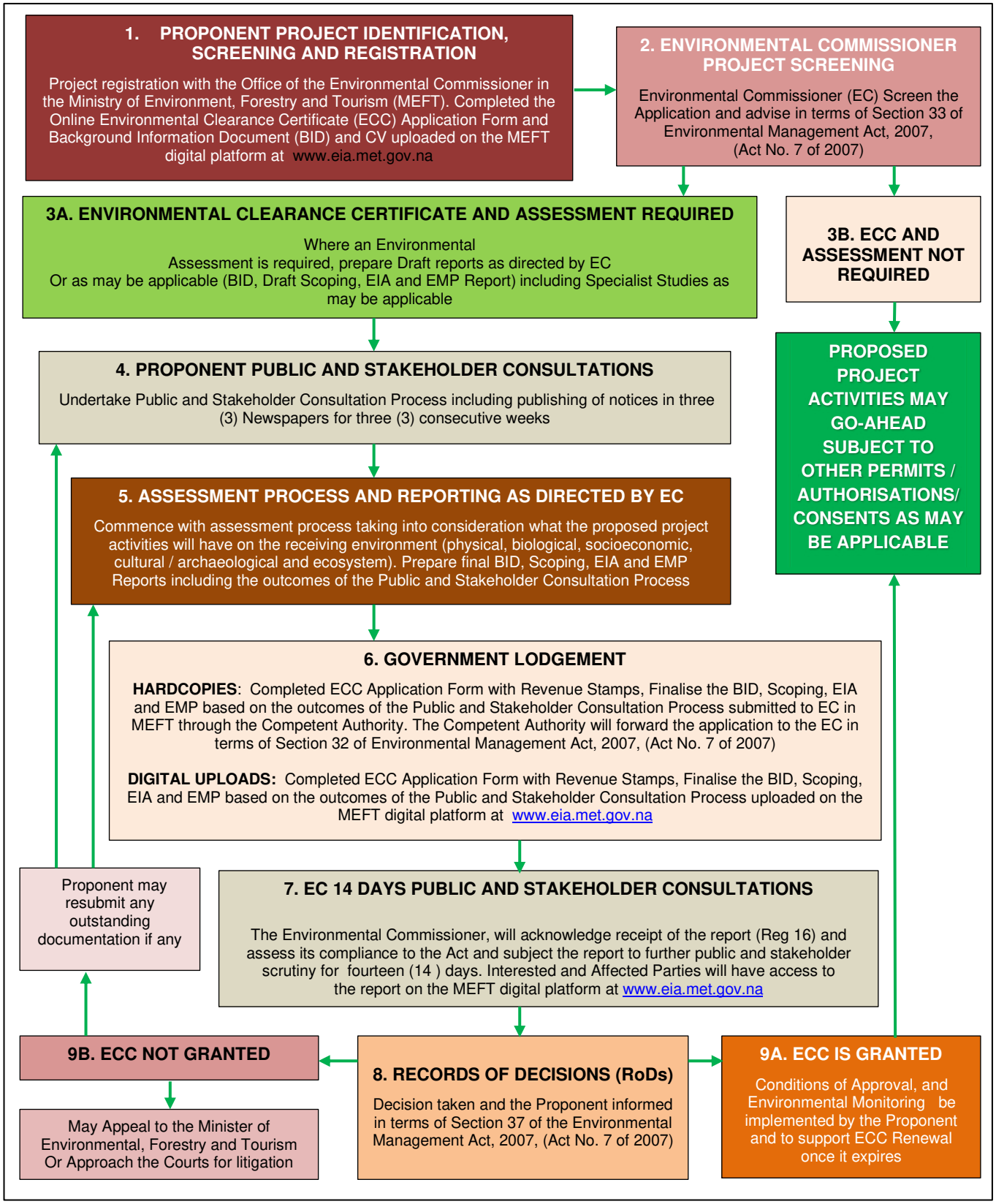


Figure 1.7: Schematic presentation of Namibia's Environmental Assessment Procedure.

1.6.3 Assumptions and Limitations

The following assumptions and limitations underpin the approach adopted, overall outcomes and recommendations for this study:

- The proposed exploration activities as well as all the plans, maps, EPL Boundary / coordinates and appropriate data sets received from the Proponent, project partners, regulators, Competent Authorities and specialist assessments are assumed to be current and valid at the time of conducting the studies and compilation of this environmental report.

- The impact assessment outcomes, mitigation measures and recommendations provided in this report are valid for the entire duration of the proposed exploration / prospecting activities.

- A precautionary approach has been adopted in instances where baseline information was insufficient or unavailable or site-specific locations of the proposed project activities is not yet available, and.

- Mandatory timeframes as provided for in the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) have been observed and will apply to the review and decision of this report by the Competent Authority and the Environmental Commissioner.

1.7 Structure of the Report

The following is the summary structure outline of this EIA report.

1. **Section 1: Background** covering the proposed project location with available infrastructure and services.

2. **Section 2: Project Description** covering the summary of the proposed project exploration activities.

3. **Section 3: Regulatory Framework** covering the proposed exploration with respect to relevant legislation, regulations and permitting requirements.

4. **Section 4: Receiving Environment** covering physical, biological and socioeconomic environments of the proposed project area.

5. **Section 5: Impact Assessment** covering the likely positive and negative impacts the proposed project activities are likely to have on the receiving environment.

6. **Section 6: Conclusions and Recommendations**- Summary of the findings and way forward.

7. **SECTION 7: Annexes**

2. DESCRIPTION OF THE EXPLORATION

2.1 General Overview

The overall aim of the proposed project activities (exploration / prospecting programme) is to search for potential economic minerals resources (base and rare metals, industrial minerals, precious metals, precious stones and semi-precious stones) within the EPL area.

The following is the detailed overview of the proposed activities:

(i) Initial desktop exploration activities (review of existing information and all previous activities in order identify any potential target/s in the EPL Area).

(ii) Regional reconnaissance field-based activities such as reginal mapping, aerial survey and existing data analysis and sampling to identify and verify potential targeted areas based on the recommendations of the desktop work undertaken under (i) above.

(iii) Initial local field-based activities such as widely spaced geological mapping, sampling, surveying and possible trenching and drilling in order to determine the viability of any delineated local target, and.

(iv) Detailed local field-based activities such very detailed geological mapping, trenching, bulk sampling, surveying and detailed drilling in order to determine the feasibility of any delineated local targets and conduct test mining activities.

The scope of the required field-based support and logistical activities will depend on the scale of proposed exploration activities to be undertaken.

The proposed exploration activities will be supported by existing tracks and campsites / farmstead as well as existing accommodation in in the area. In the absences of existing tracks, the field team will create such new tracks with the permission of the land owner/s and depending on the scale of exploration.

In the absences of existing suitable campsite / farmstead, temporary camp will be setup at suitable locations within the EPL area in line with the EMP provisions. The size of the exploration camp will be of very limited footprints during the exploration phase but may be expanded for the test mining and mine development phases in an event of a discovery of economic minerals resources.

2.2 Proposed Detailed Local Field-Based Activities

2.2.1 Potential Diamondiferous Deposits

The mineral deposit to be explored followed by small scale test mining is diamondiferous fluvial gravel of the mesa-Orange terrace remains. Aerial image of the main targeted area is shown on Fig. 1.6. Some gravel deposits have been delineated in a palaeo-terraces of the Orange River. Within the EPL area, the alluvial terraces are traced by the chain of residual Mils along the Orange River north bank (Fig. 1.6).

2.2.2 Proposed Bulk Sampling

The overall grade of the gravels in the mesa-Orange terraces has been shown to be in the order of 1.5 carat per 100 tons. This low grade combined with the large average size of diamond (1.0 carat per stone) means that there is a "nugget effect". Thus, to obtain an accurate estimate of the overall deposit grade it will be necessary to take a large volume sample.

Initially, the intention was to excavate a minimum of 6 to 9 trenches – two (2) in each of the promising areas where an average grade is expected. If the promising area yields positive results and the average

location yields negative, additional trenches may be excavated to improve the uncertainty and for better grade control.

For the purposes of this investigation, it is assumed that only few trenches will be excavated. It is proposed that a 3,500 tonnes bulk sample of gravel may be collected from potential economic terraces depending on test results. According to preliminary estimate the collection of 3,500 tons of gravel sample will require the removal or 9,000 tons of overburden.

If some trenches provide positive results, full-scale mining will commence following the application for a Mining License (ML) and granting of all the relevant permits such as the ECC, water abstraction and discharge, security and park access. If the optimum trench fails to provide encouraging results the operation will be suspended.

2.2.3 Excavation and Test Mining Process

As part of the proposed exploration, excavation of large bulk samples with a minimum of 6 trenches and up to 9 trenches will be undertaken depending on test results. Each trench will be approximately 30 m in length by 15 m wide. The trenches will be terraced (one terrace every 3 m depth) and there will also be a ramp with a 15% slope angle to enable access to the trenches.

The diamondiferous gravel layer is overlain by up to 15 m of overburden, which includes mainly floodplain alluvium and proluvium. This material will need to be removed before excavation of the diamond-bearing gravels can occur. Therefore, each trench will be mined by removing the following overlying layers:

- Overlying soil layer (about 0.5 to 1 m), and.
- Overburden layer which is between 5 m and 20 m deep.

All overburden material will be transported to a suitable site to be stockpiled. The different kinds of material will be stockpiled separately for use later in various applications during and after mining e.g. backfilling, and rehabilitation process.

The 2-3 m thick diamond-bearing gravel layer will then be recovered by excavation using earthmoving equipment. The diamond-bearing gravel will be transported from the trenches to the ore yard for further processing. Transportation of the material will be via haulage trucks (approximately 2-3 on site).

2.2.4 Processing the Gravel and Waste Products

The diamond-bearing ore will be processed covering the following steps in order to recover the diamonds:

- Ore body will be screened to remove the +28 mm (up to 32 mm) fraction.
- +28 mm fraction is the waste gravel portion that will be stockpiled on site.
- -28 mm fraction will proceed to the dense medium separation (DMS) plant (due to the high specific gravity of diamonds, it has been recommended that a Dense Medium Separation (DMS) plant is used rather than a conventional plant).
- Within the DMS plant the diamond-bearing fraction will be separated out by washing (to remove fine particles) and cycloning (to remove further waste gravels).
- Three further wastes will be produced from the DMS plant - tailings (+ 2 mm), waste gravels (up to 28 mm) and the slimes (- 2mm).
- +2 mm to 28 mm waste fractions will be stockpiled on site and the - 2 mm fraction will be pumped into a slimes dam, and.

- ❖ After diamondiferous fraction has been separated out, the diamonds will be sorted using an X-ray sorting machine.

As part of the small-scale test mining and diamond recovery process, a small DMS plant will process 50 tonnes per hour while the screening and washing will have about 15 tonnes per hour capacity.

2.2.5 Water Supply

Water for the small-scale mining operation will be supplied via a pipeline from the Orange River following the issue of an abstraction pert by the Department of Water Affairs in the Ministry of Agriculture, Water and Land Reform.

The water will be abstracted using a diesel-driven pump situated alongside the river and will be pumped via pipeline to the wash area. When the mine is fully operational the water requirement for the mine is 3.5 m^3/h over a 9 hours period to be used for the operation of the washing, dust allaying and domestic use.

2.2.6 Power Supply

Power supply for the operation will be via 2 (two) diesel generators and solar PV as maybe required.

2.2.7 Access

There is an existing gravel road, the C13 and in good condition that extends from Rosh Pinah to Noordoewer. The road is used fairly infrequently and the principal road users are tourists and persons requiring access to Aussenkehr or the Government irrigation projects along the Orange River.

A haul road extended from the C13 along the Orange River northern bank to the diamondiferous gravel deposit, will be required to connect to the prospecting / test mining sites and the test processing plant area.

2.2.8 Solid and Liquid Waste Management

During the exploration phase, Bashan Technologies CC will collect and store all the generated domestic waste at the field camp and disposed of the waste at the existing waste disposal facility in Rosh Pinah. It is planned to continue this during the small-scale mining operations.

Due to the proximity of the proposed operations to Orange River, share water resource between Namibia and South Africa, chemical toilets will be used throughout prospecting and small-scale test mining phase.

Discharge of liquid or solid waste into any public stream and burial of waste within the EPL area is allowed are strictly prohibited.

2.2.9 Staff and Employment

It is envisaged, that Geotechnical personnel and skilled workers such as excavating machinery drivers, wash plant operators and mechanics will be required for the proposed exploration and small-scale test mining operations in the EPL 6702.

The staff required for proposed exploration and small-scale test mining will be between 6-8 senior personnel, including 1 project coordinator/manager, 1 site geologist, 1 shift's foreman, 2 mining foremen, 1 plant fitter and 2 mechanics. There will also be various visiting consulting-geologists, surveyors, environmental inspectors and Bashan Technologies CC Head Office personnel.

Approximately 6 test plant shift workers will be required and up to 10 contract laborers. There will also be the need for at least 2 security personnel, hired from an independent security company, as well as ancillary personnel such as a catering and cleaning staff. There will not be the need for a full

complement of maintenance staff, but maintenance personnel will be required for at least one week of the month. There will therefore be a full-time staff of at least 25 people and at least 2-3 visitors at any one time.

Work will be on a shift basis, either one 9-hours shift, 5 (five) days a week.

2.2.10 Accommodation and Transport

All workers will be accommodated in Rosh Pinah utilising already existing facilities where available. The general labour staff will either be accommodated in a tented camp as may be required. The sub-contractors will be responsible for accommodation of their labourers, who will either be accommodated together with the plant workers in the tented camp.

Transport will be provided to all workers from Rosh Pinah to the EPL 6702 area, approximately over a distance of 30 km one-way.

2.2.11 Security

Bashan Technologies CC has identified 4 (four) areas of potential security and/or safety concern i.e. the test mining area, the washing area, diamond storage and camping/housing as summarised in Table 2.1.

As a result of the identified diamond security challenges there is a need for fencing and security patrols in certain areas in order to meet diamonds security requirements as provided for in the Diamond Act 13 of 1999 (and the Regulations 1 April 2000 and Amendment of the Diamond Regulations 2003).

Table 2.1: Key area of concern in term of diamond security during exploration and small-scale test mining phase in the EPL 6702.

Area	Issues
Exploration and small-scale test mining areas	1. Trenches and pits deeper than 5-10 m, so access should be controlled especially considering proximity of workers. 2. Danger from heavy vehicles, earthmoving and operating equipment.
Washing area	1. Theft of diamonds recovered at the washing. 2. Danger from earthmoving and operating equipment.
Diamond storage	1. Theft of the recovered diamonds.
Camp and housing	1. Petty theft especially during work hours

2.3 Prefeasibility and Feasibility Study

Prefeasibility and feasibility studies will be implemented on site-specific area and is subject to the positive outcomes of the detailed local field-based exploration activities. The activities to be undertaken as part of the prefeasibility and feasibility will include the following:

(i) Detailed site-specific surveys.

(ii) Detailed geological mapping.

(iii) Bulk sampling and testing.

(iv) Ore reserve calculations.

(v) Geotechnical studies for mine design.

(vi) Detailing technical viability studies including forecasts of estimated expenditure and financial.

(vii) Mine planning and designs including all supporting infrastructures (water, energy and access).

(viii) Environmental Impact Assessment for mining.

(ix) Environmental Management Plan for mining.

(x) Test mining activities, and.

(xi) Preparation of feasibility report and application for Mining License.

Field-based support and logistical activities will be very extensive because the local field-based activities will be undertaken on a specific area for a very long time (up to one year or more in some instances). The activities will be supported by existing tracks and campsites / lodging facilities available in the area.

3. LEGISLATIVE FRAMEWORK

3.1 Overview

There are four sources of law in Namibia: (1) statutes (2) common law (3) customary law and (4) international law. These four kinds of law are explained in more detail in the other factsheets in this series. The constitution is the supreme law of Namibia. All other laws must be in line with it. The most important legislative instruments and associated permits\licenses\authorisations\concerts\ compliances applicable to the ongoing exploration activities and possible test mining include: Minerals exploration and mining, environmental management, land rights, water, atmospheric pollution prevention and labour as well as other indirect laws linked to the accessory services of exploration and possible test mining operations.

3.2 Key Applicable Legislation

3.2.1 Minerals Exploration and Mining Legislation

The national legislation governing minerals prospecting and mining activities in Namibia fall within the jurisdiction of the Ministry of Mines and Energy (MME) as the Competent Authority (CA) responsible for granting authorisations. The Minerals (Prospecting and Mining) Act (No 33 of 1992) is the most important legal instrument governing minerals prospecting and mining activities in Namibia. A new Bill, to replace the Minerals (Prospecting and Mining) Act (No 33 of 1992) is being prepared and puts more emphasis on good environmental management practices, local participation in the mining industry and promotes value addition as prescribed in the Minerals Policy of 2003.

The Minerals (Prospecting and Mining) Act (No 33 of 1992) regulates reconnaissance, prospecting (exploration) and mining activities. The Mining Commissioner, appointed by the Minister, is responsible for implementing the provisions of this Act including reporting requirements, environmental obligations as well as the associated regulations such as the Health and Safety Regulations.

3.2.2 Environmental Management Legislation

The Environmental Assessment (EA) process in Namibia is governed by the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) in the Ministry of Environment, Forestry and Tourism (MEFT). The objectives of the Act and the Regulations are, among others, to promote the sustainable management of the environment and the use of natural resources to provide for a process of assessment and control of activities which may have significant effects on the environment. The Minister of Environment, Forestry and Tourism (is authorised to list activities which may only be undertaken if an environmental clearance certificate has been issued by the environmental commissioner, which activities include those relating to exploration and mining operations.

In addition to the requirements for undertaking Environmental Assessment prior to the project implementation, the Environmental Management Act and the EIA Regulations also provide for obligations of a license holder to provide for project rehabilitation and closure plan. In the regulations, the definition of “rehabilitation and closure plan” is a plan which describes the process of rehabilitation of an activity at any stage of that activity up to and including closure stage.

3.2.3 Water Legislation

Water Act 54 of 1956 under the Minister of Agriculture, Water and Land Reform (MAWLR) provides for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes. In terms of Section 6, there is no right of ownership in public water and its control and use is regulated and provided for in the Act. In accordance with the Act, the ongoing exploration must ensure that mechanisms are implemented to prevent water pollution. Certain permits will also be required to abstract groundwater as well as for “water works”. The broad definition of water works will include the reservoir on site (as this is greater than 20,000m^3), water treatment facilities and pipelines. Due to the

water scarcity of the area, all water will be recycled (including domestic wastewater). The Act requires the license holder to have a wastewater discharge permit for discharge of effluent.

The Water Act 54 of 1956 is due to be replaced by the Water Resources Management Act 24 of 2004 which is currently being revised. The Water Resource Management Act 2004 *provides for the management, development, protection, conservation and use of water resources.*

3.2.4 Atmospheric Pollution Prevention Legislation

The Atmospheric Pollution Prevention Ordinance, 11 of 1976 falling under the Ministry of Health and Social Services (MHSS) provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto. Part III of the Act sets out regulations pertaining to atmospheric pollution by smoke. While preventative measures for dust atmospheric pollution are outlined in Part IV and Part V outlines provisions for Atmospheric pollution by gases emitted by vehicles.

3.2.5 Labour, Health and Safety Legislations

The Labour Act, 1992, Act No. 6 of 1992 as amended in the Labour Act, 2007 (Act No. 11 of 2007), falling under the Ministry of Labour, Industrial Relations and Employment Creation (MLIREC) makes reference to severance allowances for employees on termination of a contract of employment in certain circumstances and health, safety and welfare of employees.

In terms of the Health Safety and Environment (HSE), the Labour Act, 2007 protects employees and every employer shall, among other things: provide a working environment that is safe, without risk to the health of employees, and that has adequate facilities and arrangements for the welfare of employees, provide and maintain plant, machinery and systems of work, and work processes, that are safe and without risk to the health of employees, and ensure that the use, handling, storage or transportation of hazardous materials or substances is safe and without risk to the health of employees. All hazardous substances shall have clear exposure limits and the employer shall provide medical surveillance, first-aid and emergency arrangements as fit for the operation.

3.2.6 Other Applicable National Legislations

Other Important legislative instruments applicable to the ongoing exploration operations in the EPL 6702 include the following (Table 3.1):

- The Diamond Act 13 of 1999 (and the Regulations 1 April 2000 and Amendment of the Diamond Regulations 2003).
- Explosives Act 26 of 1956 (as amended in SA to April 1978) – Ministry of Home Affairs, Immigration, Safety and Security (MHAISS).
- National Heritage Act 27 of 2004 – Ministry of Education, Arts and Culture (MEAC).
- Petroleum Products and Energy Act 13 of 1990 – Ministry of Mines and Energy (MME).
- Nature Conservation Ordinance, No. 4 of 1975 – Ministry of Environment, Forestry and Tourism (MEFT).
- Forest Act 12 of 2001 – Ministry of Environment, Forestry and Tourism (MEFT).
- Hazardous Substances Ordinance 14 of 1974 – Ministry of Health and Social Services (MHSS), and.
- Public Health Act 36 of 1919 – Ministry of Health and Social Services (MHSS).

Table 3.1 summarises the key selected legislations relevant applicable to the ongoing exploration in the EPL 6702.

Table 3.1: Legislation relevant to the ongoing exploration operations in the EPL 6702.

LAW	SUMMARY DESCRIPTION
Constitution of the Republic of Namibia, 1990	The Constitution is the supreme law in Namibia, providing for the establishment of the main organs of state (the Executive, the Legislature, and the Judiciary) as well as guaranteeing various fundamental rights and freedoms. Provisions relating to the environment are contained in Chapter 11, article 95, which is entitled "promotion of the Welfare of the People". This article states that the Republic of Namibia shall – "actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at … maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for all Namibians, both present and future. The Government shall provide measures against the dumping or recycling of foreign nuclear waste on Namibian territory."
Minerals (Prospecting and Mining) Act, 1992 ***Ministry of Mines and Energy (MME)***	The Minerals Act governs minerals prospecting and mining. The Act *provides for the reconnaissance, prospecting, and mining for, and disposal of, and the exercise of control over minerals in Namibia. and to provide for matters incidental thereto. A new Minerals Bills is currently under preparation.*
Environmental Management Act (2007) - ***Ministry of Environment, Forestry and Tourism*** **(MEFT)**	The purpose of the Act is *to give effect to Article 95(l) and 91(c) of the Namibian Constitution by establishing general principles for the management of the environment and natural resources. to promote the co-ordinated and integrated management of the environment. to give statutory effect to Namibia's Environmental Assessment Policy. to enable the Minister of Environment and Tourism to give effect to Namibia's obligations under international conventions*. In terms of the legislation it will be possible to exercise control over certain listed development activities and activities within defined sensitive areas. The listed activities in sensitive areas require an Environmental Assessment to be completed before a decision to permit development can be taken. The legislation describes the circumstances requiring Environmental Assessments. Activities listed as per the provisions of the Act will require Environmental Assessment unless the Ministry of Environment, Forestry and Tourism, in consultation with the relevant Competent Authority, determines otherwise and approves the exception.
Water Act 54 of 1956 **Minister of Agriculture, Water and Land reform (MAWLR)**	This Act provides for the control, conservation and use of water for domestic, agricultural, urban, and industrial purposes. In terms of Section 6, there is no right of ownership in public water and its control and use is regulated and provided for in the Act. In accordance with the Act, the proposed project must ensure that mechanisms are implemented to prevent water pollution. Certain permits will also be required to abstract groundwater (already obtained) as well as for "water works". The broad definition of water works will include the reservoir on Site (as this is greater than 20,000m^3), water treatment facilities and pipelines. Due to the water scarcity of the area, all water will be recycled (including domestic wastewater) and the Mine will be operated on a zero-discharge philosophy. It will, therefore, not be necessary to obtain permits for discharge of effluent. Section 23 of the Act requires environment rehabilitation after closure of the Mine, particularly, in this instance to obviate groundwater pollution and potential pollution resulting from run-off. This Act is due to be replaced by the Water Resources Management Act 24 of 2004.
Forest Act 12 of 2001 - **Minister of Environment, Forestry and Tourism (MEFT)**	The Act provide for the establishment of a Forestry Council and the appointment of certain officials. to consolidate the laws relating to the management and use of forests and forest produce. to provide for the protection of the environment and the control and management of forest fires. Under Part IV Protection of the environment, Section 22(1) of the Act, it is unlawful for any person to: cut, destroy, or remove: (a) any vegetation which is on a sand dune or drifting sand or in a gully unless the cutting, destruction or removal is done for the purpose of stabilising the sand or gully or (b) any living tree, bush or shrub growing within 100m of a river, stream, or watercourse. Should either of the above be unavoidable, it will be necessary to obtain a permit from the Ministry. Protected tree species as listed in the Regulations shall not be cut, destroyed, or removed.
Hazardous Substance Ordinance 14 of 1974 ***Ministry of Health and Social Services***	Provisions for hazardous waste are amended in this act as it provides "*for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances. to provide for the prohibition and control of the importation, sale, use, operation, application, modification, disposal or dumping of such substance. and to provide for matters connected therewith"*

Table 3.1: *Cont.*

Agricultural (Commercial) Land Reform Act, 1995, Act No.6 of 1995 ***Ministry of Agriculture, Water and Land Reform*** **(MAWLR)**	This Act provide for the acquisition of agricultural land by the State for the purposes of land reform and for the allocation of such land to Namibian citizens who do not own or otherwise have the use of any or of adequate agricultural land, and foremost to those Namibian citizens who have been socially, economically or educationally disadvantaged by past discriminatory laws or practices. to vest in the State a preferent right to purchase agricultural land for the purposes of the Act. to provide for the compulsory acquisition of certain agricultural land by the State for the purposes of the Act. to regulate the acquisition of agricultural land by foreign nationals. to establish a Lands Tribunal and determine its jurisdiction. and to provide for matters connected therewith.
Explosives Act 26 of 1956 (as amended in SA to April 1978) - ***Ministry Home Affairs, Immigration, Safety and Security (MHAISS)***	All explosive magazines are to be registered with the Ministry of Mines and Energy as accessory works. In addition, the magazines must be licensed as required by Section 22. The quantity of explosives and the way it is stored must be approved by an inspector. The inspector has powers to enter the premises at any time to conduct inspections regarding the nature of explosive, quantity and the way it is stored. At closure, all explosives are to be disposed of accordingly.
Atmospheric Pollution Prevention Ordinance 11 of 1976. ***Ministry of Health and Social Services (MHSS)***	This regulation sets out principles for *the prevention of the pollution of the atmosphere and for matters incidental thereto.* Part III of the Act sets out regulations pertaining to atmospheric pollution by smoke. While preventative measures for dust atmospheric pollution are outlined in Part IV and Part V outlines provisions for Atmospheric pollution by gases emitted by vehicles.
The Nature Conservation Ordinance, Ordinance 4 of 1975, ***Ministry of Environment, Forestry and Tourism*** **(MEFT)**	During the Mine's activities, care must be taken to ensure that protected plant species and the eggs of protected and game bird species are not disturbed or destroyed. If such destruction or disturbance is inevitable, a permit must be obtained in this regard from the Minister of Environment, Forestry and Tourism. Should the Proponent operate a nursery to propagate indigenous plant species for rehabilitation purposes, a permit will be required. At this stage, however, it is envisaged that this type of activity will be contracted out to encourage small business development.
Labour Act, 1992, Act No. 6 of 1992 as amended in the Labour Act, 2007 (Act No. 11 of 2007 **Ministry of Labour, Industrial Relations and Employment Creation (MLIREC)**	The labour Act gives effect to the constitutional commitment of Article 95 (11), to promote and maintain the welfare of the people. This Act is aimed at establishing *a comprehensive labour law for all employees. to entrench fundamental labour rights and protections. to regulate basic terms and conditions of employment. to ensure the health, safety and welfare of employees* under which provisions are made in chapter 4. *Chapter* 5 of the act improvises on the *protection of employees from unfair labour practice.*
Petroleum Products and Energy Act 13 of 1990 ***Ministry of Mines and Energy (MME)***	Any consumer installation as envisaged in this Act must be licensed. Appropriate consumer installation certificate will need to be obtained from the Ministry for each fuel installation. The construction of the installation must be designed in such a manner as to prevent environmental contamination. Any certificate holder or other person in control of activities related to any petroleum product is obliged to report any major petroleum product spill (defined as a spill of more than 200ℓ per spill) to the Minister. Such person is also obliged to take all steps as may be necessary in accordance with good petroleum industry practices to clean up the spill. Should this obligation not be met, the Minister is empowered to take steps to clean up the spill and to recover the costs thereof from the person. General conditions apply to all certificates issued. These include conditions relating to petroleum spills and the abandonment of the Site. The regulation further provides that the Minister may impose special conditions relating to the preparation and assessment of environmental assessments and the safe disposal of petroleum products.
National Heritage Act 27 of 2004 ***Ministry of Education, Arts and Culture (MEAC)***	This Act provides provisions for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. The proposed activities will ensure that if any archaeological or paleontological objects, as described in the Act, are found during the implementation of the activities, such a find shall be reported to the Ministry immediately. If necessary, the relevant permits must be obtained before disturbing or destroying any heritage

3.3 Key Regulators / Competent Authorities

The environmental regulatory authorities responsible for environmental protection and management in relation to the proposed project including their role in regulating environmental protection are listed in Table 3.2.

Table 3.2: Government agencies regulating environmental protection in Namibia.

AGENCY	RESPONSIBILITY
Ministry of Environment, Forestry and Tourism (MEFT)	Issue of Environmental Clearance Certificate (ECC) based on the review and approval of the Environmental Assessments (EA) reports comprising Environmental Scoping, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) prepared in accordance with the Environmental Management Act (2007) and the Environmental Impact Assessment Regulations, 2012
Ministry of Mines and Energy (MME)	The competent authority for minerals prospecting and mining activities in Namibia. Issues Exclusive prospecting License (EPL), Mining Licenses (ML) and Mining Claims (license) as well as all other minerals related permits for processing, trading and export of minerals resources
Ministry of Agriculture, Water and Land Reform (MAWLR)	The Directorate of Resource Management within the Department of Water Affairs (DWA) at the MAWLR is currently the lead agency responsible for management of surface and groundwater utilisation through the issuing of abstraction permits and waste water disposal permits. DWA is also the Government agency responsible for water quality monitoring and reporting. The National Botanical Research Institute's (NBRI) mandate is to study the flora and vegetation of Namibia, in order to promote the understanding, conservation and sustainable use of Namibia's plants for the benefit of all. The Directorate of Forestry (DOF) is responsible for issuing of forestry permits with respect to harvest, transport, and export or market forest resources.

3.4 International and Regional Treaties and Protocols

Article 144 of the Namibian Constitution provides for the enabling mechanism to ensure that all international treaties and protocols are ratified. All ratified treaties and protocols are enforceable within Namibia by the Namibian courts and these include the following:

- The Paris Agreement, 2016.
- Convention on Biological Diversity, 1992.
- Vienna Convention for the Protection of the Ozone Layer, 1985.
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987.
- United Nations Framework Convention on Climate Change, 1992.
- Kyoto Protocol on the Framework Convention on Climate Change, 1998.
- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, 1989.
- World Heritage Convention, 1972.
- Convention to Combat Desertification, 1994. and
- Stockholm Convention of Persistent Organic Pollutants, 2001.
- Southern Africa Development Community (SADC) Protocol on Mining, and.

- ❖ Southern Africa Development Community (SADC) Protocol on Energy.

3.5 Standards and Guidelines

Industrial effluent likely to be generated by the proposed activities must comply with provisions of the Government Gazette No 217 dated 5 April 1962 (Table 3.3) while the drinking water quality comparative guideline values are shown in Table 3.4.

The only key missing components to the regulatory frameworks in Namibia are the standards, and guidelines with respect to gaseous, liquid, and solid emissions. However, in the absence of national gaseous, liquid, and solid emission limits for Namibia, the proposed project shall target the Multilateral Investment Guarantee Agency (MIGA) gaseous effluent emission level and liquid effluent emission levels (Table 3.5).

Noise abatement measures must target to achieve either the levels shown in Table 3.6 or a maximum increase in background levels of 3 dB (A) at the nearest receptor location off-site (MIGA guidelines).

Table 3.3: R553 Regional Standards for Industrial Effluent, in Government Gazette No 217 dated 5 April 1962.

Colour, odour and taste	The effluent shall contain no substance in concentrations capable of producing colour, odour or taste	
pH	Between 5.5 and 9.5	
Dissolved oxygen	At least 75% saturation	
Typical faecal coli	No typical faecal coli per 100 ml	
Temperature	Not to exceed 35 °C	
Chemical demand oxygen	Not to exceed 75 mg/l after applying a correction for chloride in the method	
Oxygen absorbed	Not to exceed 10 mg/l	
Total dissolved solids (TDS)	The TDS shall not have been increased by more than 500 mg/l above that of the intake water	
Suspended solids	Not to exceed 25 mg/l	
Sodium (Na)	The Na level shall not have been increased by more than 50 mg/l above that of the intake water	
Soap, oil and grease	Not to exceed 2.5 mg/l	
Other constituents	Residual chlorine	0,1 mg/l as Cl
	Free & saline ammonia	10 mg/l as N
	Arsenic	0,5 mg/l as As
	Boron	1,0 mg/l as B
	Hexavalent Cr	0,05 mg/l as Cr
	Total chromium	0,5 mg/l as Cr
	Copper	1,0 mg/l as Cu
	Phenolic compounds	0,1 mg/l as phenol
	Lead	1,0 mg/l as Pb
	Cyanide and related compounds	0,5 mg/l as CN
	Sulphides	1,0 mg/l as S
	Fluorine	1,0 mg/l as F
	Zinc	5,0 mg/l as Zn

Table 3.4: Comparison of selected guideline values for drinking water quality (after Department of Water Affairs, 2001).

Parameter and Expression of the results			WHO Guidelines for Drinking-Water Quality 2nd edition 1993		Proposed Council Directive of 28 April 1995 (95/C/13-1/03) EEC	Council Directive of 15 July 1980 relating to the quality intended for human consumption 80/778/EEC		U.S. EPA Drinking water Standards and Health Advisories Table December 1995		Namibia, Department of Water Affairs Guidelines for the evaluation of drinking-water for human consumption with reference to chemical, physical and bacteriological quality July 1991			
			Guideline Value (GV)		Proposed Parameter Value	Guide Level (GL)	Maximum Admissible Concentration (MAC)	Maximum Contaminant Level (MCL)		Group A Excellent Quality	Group B Good Quality	Group C Low Health Risk	Group D Unsuitable
Temperature	t	°C		-	-	12	25		-	-	-	-	-
Hydrogen ion concentration	pH, 25° C	-	R	<8.0	6.5 to 9.5	6.5 to 8.5	10		-	6.0 to 9.0	5.5 to 9.5	4.0 to 11.0	<4.0 to >11.0
Electronic conductivity	EC, 25° C	mS/m		-	280	45	-		-	150	300	400	>400
Total dissolved solids	TDS	mg/l	R	1000	-	-	1500		-	-	-	-	-
Total Hardness	$CaCO_3$	mg/l		-	-	-	-		-	300	650	1300	>1300
Aluminium	Al	µ g/l	R	200	200	50	200	S	50-200	150	500	1000	>1000
Ammonia	NH_4^+	mg/l	R	1.5	0.5	0.05	0.5		-	1.5	2.5	5.0	>5.0
	N	mg/l		1.0		0.04	0.4		-	1.0	2.0	4.0	>4.0
Antimony	Sb	µ g/l	P	5	3	-	10	C	6	50	100	200	>200
Arsenic	As	µ g/l		10	10	-	50	C	50	100	300	600	>600
Barium	Ba	µ g/l	P	700	-	100	-	C	2000	500	1000	2000	>2000
Berylium	Be	µ g/l		-	-	-	-	C	4	2	5	10	>10
Bismuth	Bi	µ g/l		-	-	-	-		-	250	500	1000	>1000
Boron	B	µ g/l		300	300	1000	-		-	500	2000	4000	>4000
Bromate	BrO_3^-	µ g/l		-	10	-	-	P	10	-	-	-	-
Bromine	Br	µ g/l		-	-	-	-		-	1000	3000	6000	>6000
Cadmium	Cd	µ g/l		3	5	-	5	C	5	10	20	40	>40
Calcium	Ca	mg/l		-	-	100	-		-	150	200	400	>400
	$CaCO_3$	mg/l		-	-	250	-		-	375	500	1000	>1000
Cerium	Ce	µ g/l		-	-	-	-		-	1000	2000	4000	>4000
Chloride	Cl^-	mg/l	R	250	-	25	-	S	250	250	600	1200	>1200
Chromium	Cr	µ g/l	P	50	50	-	50	C	100	100	200	400	>400
Cobalt		µ g/l		-	-	-	-		-	250	500	1000	>1000
Copper after 12 hours in pipe	Cu	µ g/l	P	2000	2	100	-	C	TT##	500	1000	2000	>2000
		µ g/l		-	-	3000[1]	-	S	1000	-	-	-	-
Cyanide	CN^-	µ g/l		70	50	-	50	C	200	200	300	600	>600
Fluoride	F^-	mg/l		1.5	1.5	-	at 8 to 12 °C: 1.5	C	4	1.5	2.0	3.0	>3.0
		mg/l		-	-	-	at 25 to 30 °C: 0.7	P,S	2	-	-	-	-
Gold	Au	µ g/l		-	-	-	-		-	2	5	10	>10
Hydrogen sulphide	H_2S	µ g/l	R	50	-	-	undetectable		-	100	300	600	>600
Iodine	I	µ g/l		-	-	-	-		-	500	1000	2000	>2000
Iron	Fe	µ g/l	R	300	200	50	200	S	300	100	1000	2000	>2000
Lead	Pb	µ g/l		10	10	-	50	C	TT#	50	100	200	>200
Lithium	Li	µ g/l		-	-	-	-		-	2500	5000	10000	>10000
Magnesium	Mg	mg/l		-	-	30	50		-	70	100	200	>200
	$CaCO_3$	mg/l		-	-	7	12		-	290	420	840	>840
Manganese	Mn	µ g/l	P	500	50	20	50	S	50	50	1000	2000	>2000
Mercury	Hg	µ g/l		1	1	-	1	C	2	5	10	20	>20
Molybdenum	Mo	µ g/l		70	-	-	-		-	50	100	200	>200
Nickel	Ni	µ g/l		20	20	-	50		-	250	500	1000	>1000
Nitrate*	NO_3^-	mg/l	P	50	50	25	50		45	45	90	180	>180
	N	mg/l		-	-	5	11	C	10	10	20	40	>40
Nitrite*	NO_2^-	mg/l		3	0.1	-	0.1		3	-	-	-	-
	N	mg/l		-	-	-		C	1	-	-	-	-
Oxygen, dissolved	O_2	% sat.		-	50	-	-		-	-	-	-	-
Phosphorus	P_2O_5	µ g/l		-	-	400	5000		-	-	-	-	-
	PO_4^{3-}	µ g/l		-	-	300	3350		-	-	-	-	-
Potassium	K	mg/l		-	-	10	12		-	200	400	800	>800
Selenium	Se	µ g/l		10	10	-	10	C	50	20	50	100	>100
Silver	Ag	µ g/l		-	-	-	10	S	100	20	50	100	>100
Sodium	Na	mg/l	R	200	-	20	175		-	100	400	800	>800
Sulphate	SO_4^{2-}	mg/l	R	250	250	25	250	S	250	200	600	1200	>1200
Tellurium	Te	µ g/l		-	-	-	-		-	2	5	10	>10
Thallium	Tl	µ g/l		-	-	-	-	C	2	5	10	20	>20
Tin	Sn	µ g/l		-	-	-	-		-	100	200	400	>400
Titanum	Ti	µ g/l		-	-	-	-		-	100	500	1000	>1000
Tungsten	W	µ g/l		-	-	-	-		-	100	500	1000	>1000
Uranium	U	µ g/l		-	-	-	-	P	20	1000	4000	8000	>8000
Vanadium	V	µ g/l		-	-	-	-		-	250	500	1000	>1000
Zinc after 12 hours in pipe	Zn	µ g/l	R	3000	-	100	-	S	5000	1000	5000	10000	>10000
		µ g/l		-	-	5000	-		-	-	-	-	-
			P: Provisional R: May give reason to complaints from consumers					C: Current. P: Proposed. S: Secondary. T#: Treatment technique in lieu of numeric MCL. TT##: treatment technique triggered at action level of 1300 µ g/l					

Table 3.5: Liquid effluent emission levels (MIGA /IFC).

Pollutant	**Max. Value**
pH	6-9
Total suspended solids	50 mg/l
Total metals	10 mg/l
Phosphorous (P)	5 mg/l
Fluoride (F)	20 mg/l
Cadmium (Cd)	0.1 mg/l

Table 3.6: Noise emission levels (MIGA /IFC).

	Maximum Allowable Leq (hourly), in dB(A)	
Receptor	Day time (07:00 – 22:00)	Night time (22:00 – 07:00)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

3.6 Recommendations on Permitting Requirements

It is hereby recommended that the Proponent must follow the provisions of all relevant national regulatory throughout the proposed project lifecycle and must obtain the following permits/ authorisations as maybe applicable / required as the proposed project develops:

(i) Valid EPL as maybe applicable from Department of Mines in the MME.

(ii) Diamonds security clearance during Exploration and Small-Scale Test Mining from MME.

(iii) Valid ECC from the Department of Environmental Affairs in the MEFT.

(iv) Permit to access a national park from MEFT.

(v) The Proponent shall apply for a fresh water abstraction and waste water discharge permits from the Department of Water Affairs (DWA) in the MAWLR before abstracting water from the Orange River and discharge wastewater into the environment respectively, and.

(vi) All other permits as may be applicable for the proposed exploration operations and test mining activities.

Table 3.7 summarises the key permits requirements associated with the various activities to be undertaken under the EPL 6702.

Table 3.7: Summary of the likely applicable permits.

Activity	Permit and Applicable Legislation	Permitting Authority	Current Status
1. Exploration (Sampling and Processing and Diamonds Recovery)	Exclusive Prospecting License (EPL) No. 6702 issued under the Minerals (Prospecting and Mining) Act, 1992	Ministry of Mines and Energy (MME)	Granted 16/03/2018 and will expire on the 15/03/2021
2. Diamonds security during Exploration and Small-Scale Test Mining	The Diamond Act 13 of 1999 (and the Regulations 1 April 2000 and Amendment of the Diamond Regulations 2003)		Meet Requirements During Exploration and Test Mining
3. Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP)	Environmental Clearance Certificate (ECC) issued under the Environmental Policy and Environmental Management Act, (Act No. 7 of 2007)	Ministry of Environment, Forestry and Tourism (MEFT)	To apply after completion of the EIA and EMP
4. Construction, alteration of waterworks with capacity to hold in excess of 20,000L	Water Act 54 of 1956	Ministry of Agriculture, Water Affairs and Land Reform (MAWLR)	To Apply when required / before the Implementation of the proposed activities
5. Abstraction of water other than that provided by Nam Water	Water Resources Management Act, 2004 (No. 284 of 2004)		
6. Discharge of effluents or construction of effluent facility or disposal site			
7. Removal, disturbances or destruction of bird eggs	Nature Conservation Ordinance 4, 1975	Ministry of Environment, Forestry and Tourism (MEFT)	No removals anticipated
8. Removal, disturbance of protected plants			
9. Removal, destruction of indigenous trees, bushes or plants within 100 yards of stream or watercourse	Forestry Act, 12 of 2001	Ministry of Agriculture, Water Affairs and Land Reform (MAWLR)	
10. Scheduled processes in Controlled area	Atmospheric Pollution Prevention Ordinance 11 of 1976	Ministry of Health and Social Services	No Permits Require
11. Management of used oil	Petroleum Products and Energy Act 13 of 1990	Ministry of Mines and Energy (MME).	To Apply when required / before the Implementation of the proposed Activities
12. Operating a petroleum consumer installation.			
13. Transport of hazardous substances and radioactive waste	Minerals (Prospecting and Mining) Act, 1992		
14. Construction of waste Disposal sites.	Environmental Policy and Environmental Management Act, (Act No. 7 of 2007)	Ministry of Environment, Forestry and Tourism (MEFT)	

4. SUMMARY OF NATURAL ENVIRONMENT

4.1 Climatic Components

The proposed Mining Project in the EPL area is located in the Lüderitz District, //Karas Region in Southern Namibia with daytime warm to hot temperatures throughout the year, while the nights are mild to cool.

The mean annual rainfall is highly variable and may range between less 50 mm - 100 mm in some parts of the EPL Area (Table 4.1). The distribution of rainfall is extremely seasonal with almost all the rain falling in summer - from November to April with occasional winter rainfall. Mean annual gross evaporation is between 3000 mm and 2800 mm.

During the winter and early spring months, from May to September, mean daily maximum temperatures range between 22°C and 29°C while the mean daily minimum temperatures range between 6° C and 12*C (Table 4.1). During the summer, daytime temperatures regularly exceed 40°C, even as high as 47°C, while temperatures below zero may be experienced in the winter, especially from June to August.

Wind. No wind data are available for the site and the closest wind recording station is Alexander Bay. Therefore, it is necessary to use more generalized data for the region instead of site-specific information.

Typically, in Namibia the north-easterly of Berg winds that occur during winter (from April to August) have a high velocity and are capable of shifting material such as sand. Prevailing winds in the area are most likely to be southerly or south-westerly but the velocity at which they blow is not known.

Adiabatic winds can be expected to blow upslope during the early morning and down slope in the evening. These winds do not usually persist throughout the day, as noted during the site visit, although they may be fairly intensely during the period that they do blow.

Table 4.1: Summary of rainfall and temperature date (Weather Bureau).

Month	Rainfall % of MAP	Mean Daily Maximum	Temperature Mean Daily Minimum	°C Mean
January	3.38	39.3	21.8	30.5
February	6.23	38.3	21.6	29.9
March	9.78	36.3	20.2	28.3
April	11.41	32.4	16.4	24.41
May	11.97	27.1	11.2	19.11
June	13.58	23.4	7.1	15.3
July	12.49	22.6	6.4	14.5
August	11.09	25.7	8.7	17.2
September	5.14	29.1	12.0	20.5
October	5.02	32.8	15.6	24.21
November	3.48	34.9	17.9	26.4
December	6.46	37.9	20.6	29.3
Average	**100**	**31.7**	**15.0**	**23.3**

4.2 Topography

4.2.1 General Overview

Relief is medium and high upland, of very rugged topography. The highest peak nearest to the concession cover the area north of the EPL. The southern steep mountain slopes are located

immediately adjacent to the river. The mountain slopes are dissected with shallow streams and trough valleys. The stream channels are dry almost throughout the whole year.

4.2.2 Floodplain

The level portion of the Orange River floodplain forms a narrow belt flanking the river. The narrow river areas are as a rule accompanied with rapids and rifts. In summer the river level is 3-5m up. The river water filtrated is quite potable.

4.2.3 Gentle Slope

The floodplain does not converge abruptly with the mountainous landscape. Instead, there is a long gentle relatively straight slope with a gradient of approximately 1:22, which connects the floodplain with the mountains to the east. The Orange River mesa-terrace remains covers a large area of the mid-section of this slope. This gentle slope does not occur in isolation but continues in a southerly direction towards the small valley forming a stretch of undulating land around the EPL area.

4.2.4 Hummocks

The hummocks feature forms part of the undulating landscape of the EPL area. The hummocks lie in a more or less parallel linear arrangement, which is perpendicular to the Orange River and extends towards the mountains in the north.

The length of the individual hummocks is variable and they range in height from 1 m to more than 5 m. In some places the hummocks are separated by flat open areas (which are ephemeral streams or washes) or may merge with one another forming of a continuous series of undulations.

4.2.5 Topography Influences on Environmental Impact

4.2.5.1 Visibility

The topography may have positive implications on the visibility of the site, because the presence of the hummocks on either side will aid in concealing the trenches and associated infrastructure. The exploration scars will be concealed from the road but will remain visible in some areas.

4.2.5.2 Erosion

The level topography of the mesa-terrace area will minimize the possibility of water erosion. however, the steeper gradient of the adjacent hummock slopes will make them more susceptible to erosion. Similarly, the steeper nature of the slope around the areas of interest, will make these areas more prone to the effects of erosion. Wind erosion will be less noticeable because the site is protected by the adjacent hummocks landscape and vegetation along the Orange River. However, due to the open nature of the valley and landscape on the slope, some localised areas may more exposed to the effects of wind erosion.

4.2.6 Soils and Land Capability

4.2.6.1 Description

Due to the hot, dry arid climate it is assumed that, other than the floodplain soils immediately adjacent to the river, the soils in the area are poorly developed, shallow and low in nutrients and organic matter. The soils of arid areas are usually immature – shallow, coarse textured, with a low organic matter content and low clay content. They also exhibit little horizon differentiation. The soils at or near the site can be divided into two groups - the alluvial soils on the floodplain and the shallow soils on the gentle slopes. The surface of mesa-terrace remains mainly do not consist any soils.

4.2.6.2 Alluvial Soils

The floodplain of the Orange River is composed of alluvial soils, which form a relatively narrow belt along the riverbank. These alluvial soils can be divided into two groups - the Class 1 soils (suitable for irrigation) and the Class II soils (conditionally irrigable). The Class II soils and although their physical properties do not all comply with the criteria for irrigation a certain area of these soils mainly covering much of the area of interest. There is a coarser gravel top layer, which serves to retard evaporation from the soil, however, the main disadvantage of the soil type from an agricultural perspective is the low water retaining capacity.

4.2.6.3 Slope Soils

On the gentle slope above the River rout, the soil layer appears to be shallow. The substrate is sandy and loose and is capped by a fine gravel layer comprising small angular fragments. Linear gravel-dominated patches occur across this area where the gravel fragments range in size from a few millimeters to more than 20 cm. Although there was an abundance of material lying on the soil surface (mainly remnant Stipagrostis seeds), there appeared to be little organic material present within the soil layer. The soils were also dry.

4.2.6.4 Piedmont Fan Soils

The coluvial and proluvial deposition of material has given rise to a series of hummocks, which are comprised mostly of gravelly material and rocks with a fine sandy fill. Minor stratification was observed where gravel layers are interspersed between finer fill layers composed of a sand/gravel mix. The gravel layers may be composed of smaller fragments or rocks up to 50 cm.

4.2.6.5 Sensitivity to Disturbance

Soils in arid areas may be disturbed in one of two ways - disruption of the surface micro-topography and/or compaction and modification of the subsurface layers. Both of these may result from uncontrolled passage of vehicles including earthmoving across EPL area.

Micro-topographic Disruption. Arid area soils are capped by either an organic or inorganic layer, which protects the soil from erosion in areas that are devoid of, or have a low density of vegetation cover. The soil covering most of site is capped with a fine angular gravel layer, which helps to protect the underlying layers. Once this layer is disturbed, the underlying sand is exposed and becomes more susceptible to erosion.

4.2.6.6 Compaction

Soils most susceptible to compaction are those with a high sand component. Poorly sorter soils are highly susceptible as pore spaces are not of a uniform size and may be easily modified by pressure. It is usually the layer of soil just beneath the surface that is the zone of maximum compaction.

4.2.6.7 Soil Stripping and Stockpiling

It can be anticipated that the soils across the site will show little horizon differentiation. However, the soils in arid areas store seeds in the upper layers for extended periods of time until the germination conditions for those seeds are met. These seeds will be very valuable to the rehabilitation process, as they will provide a source of plant material. Separate stripping of differentiated soil layers will be necessary. Similarly, differentiated soil layer will need to be stockpiled separately and certain precautions taken to protect the stockpiled soils.

4.2.6.8 Rehabilitation

The nutrient status and organic matter content of the soils is low. However, it is not considered necessary to boost the organic matter and nutrient levels within the soils during rehabilitation as local plant species, which are adapted to these conditions, will be used in the rehabilitation process. The passage of vehicles within the mining area may result in compaction of the soil layers and disruption

of the micro-topography. These areas will need to be rehabilitated to restore the underlying soils, as far as possible, to their previous condition. This includes those areas that have been disrupted during the drilling exploration phase.

4.2.6.9 Loss of Agricultural Land

The nature of the soils in combination with the topography renders most of the EPL area unsuitable for arable land production. In addition, these areas are also not suitable for livestock production due to the scarcity and poor quality of plant cover for grazing. Thus, there will be no significant loss of agricultural land or grazing land as a result of the proposed exploration and possible mining operations.

4.3 Geology

4.3.1 Regional and Local Geology

The Orange River basin is located in the joint of several big tectonic elements of the African platform south: synclines of Kalahari and Karoo divided by protrusions of the ancient crystalline base and structures of the folded Kais structures. In the lower course of the Orange River the following rock complexes are abundant:

- Vioolsdrift suite (Haib Group): The suite is presented by dense granodiorite, granite, gabbro, diorite and is abundant in the Lorelei and Vioolsdrift region.

- Namaqualand Metamorphic Complex: It overlaps the Vioolsdrift suite in concordance and is bedded by granite, gneiss, gabbro and arnphibolite. The complex is exposed in the Huns mountain massif.

- Nama Group: These sediments lay with structural incorcordance on subadjacent rocks. The relatively thin (40 m) basalt layers presented by sandstone and shale are united into the Kuibis subgroup. The Schwarzrand subgroup curcordanlly overlappmg it is bedded by limestone and sandstone. The superimposed Fish River subgroup is formed by red and grey sandstones and amphibolites. In the Orange River valley, the Nama group rocks are abundant only in the Vioolsdrift area.

- Karoo System: The Karoo system accumulation was preceded by a long interruption in sedimentation. The sedimentary basin located to the north of Vioolsdrift is filled with shales and tillites of Dwyka Formation incorcordantly bedded on more ancient sediments. It is overlapped by Ecca Ggroup with Prince Albert, Whitehill, Aussenkier and Amibberg formations. The Ecca Group rocks presented by shales and sandstones generate the socle of the Orange River in the Aussenkehr and Noordoewer area. The superjacent Gai-As and Etio Formations are presented by redsol sandstones, aleuxolites and conglomerates. The introduction of Kalkrand and Etendeka formation basalts took place prior to the next interruption.

- Post Karoo: In the Cretaceous period introduction of kimberlite and carbonatite bodies occurred, and.

- Tertiary Deposits: In the Tertiary period erosion with formation of Miocene calcrete, Pliocene sand dunes (the Kalahari Group) and terraces of the Orange River dominated. The rocks are intensely distorted by faults of different amplitude and directions. The largest of them have a near-meridian orientation. Faults of higher orders are oriented in near-latitude and north-eastern directions. Faults are often accompanied with zones of fragmentation, silicification and mineralization. Veins and dykes are widely abundant in the area. Dykes are presented by dolerites. The biggest of them are 25-m thick. Dykes are oriented in the north-eastern or north-western directions. The veined bodies are of small thickness (20-25 cm), bedded mostly by rhyolites and intersect the terrace bed floor in the near-latitude direction. The age of the dyke complex is most probably Late Mesozoic. The dykes and veins are not as a rule manifested in the bed floor relief, i.e., they do not form natural barriers and trapping conditions. Faults and fragmentation zones are manifested only as slight irregularities and linear channels on the bed floor surface and, judging from everything do not involve substantial prerequisites for trapping.

4.3.2 Geology Influences on Environmental Impact

4.3.2.1 Excavation

The diamond-bearing layers are buried deep below the surface (3 m to 20 m). So, it would be necessary to excavate pits and trenches in order to remove the overburden and get diamondiferous layers. To maintain the stability of the trench walls terraces will be required, and to allow access to the trenches it will be necessary to construct ramps. These matters have been considered as part of the mine design.

A second implication of excavating the trenches is the certain volume of overburden to be removed, stockpiled and backfilled after mining. It is estimated that for every 5 000 m^3 of diamond-bearing gravel excavated, 15 000 m^3 of overburden will need to be removed. Once the overburden has been removed it will be necessary to select a suitable site to stockpile it before it can be used to backfill the trenches following the completion of mining.

A 30% swell factor of the overburden is anticipated so it will be necessary to find alternative uses and permanent stockpiling points for the material, that cannot be accommodated in the trenches when backfilling.

4.3.2.2 Geochemistry

The beneficiation process to be used to separate out the diamonds is a relatively simple gravity separation process. No toxic chemicals will be added during the process and no geochemically-derived pollutants will result from the beneficiation process. Thus, the pollution risk is very low.
Blasting.

Due to the presence of the hard-calcareous layer within the overburden, light blasting should be necessary to break the layer to facilitate its removal. The blasting is unlikely to have major vibration impacts, although it may generate some dust and noise. The necessary permission for the light blasting should be obtained from the Namibian Ministry of Mines and Energy.

4.3.2.3 Seismic Activity

There is no threat from direct underlying seismic activity. Nor is there a risk from secondary effects of seismic activity in the regional faults as the region is presently geologically inactive and the faults are located far away to have any visual impact.

4.4 Surface Hydrology

4.4.1 Description of the Hydrology

The EPL area is located on the northern bank of the Orange River. The general flow trend of the Orange River is in a westerly direction but in this area. With the exception of the Orange River, drainage at the site is characterised by numerous ephemeral watercourses which originate in the mountainous escarpment located to the north, north-east and east. Most of these water streams are small and short-lived. However, a few of the larger watercourses converge with and flow into the Orange River but this is usually only under high rainfall or flood conditions. These larger non-perennial watercourses flow in a southerly direction down the Orange River along a gravelly wash. Several such watercourses are located within the EPL Area, between mesa-terrace remains. Another smaller, unnamed watercourse is situated at the eastern boundary of the EPL area.

4.4.2 Stream-Flow

The total virgin river-flow of the Orange River at the Oranjemund is 10 670 Mm^3/a. However, due to major upstream developments, the mean annual runoff reaching the mouth was estimated to be around 5 340 Mm^3/a. The last major flood event along the Orange River was in March, 1988 when simultaneous heavy rainfalls in three regions in South Africa (Orange Free State, the Southern Transvaal and the Karoo) caused water levels to rise dramatically. It is not known how far the floodline

extended during these floods but according to investigations conducted by the Soil and Irrigation Research Institute the high-water level is at about the 120 m contour.

4.4.3 Water Demand

The total demand from the Orange River Project (ORP) including South African and Namibian water demands was approximately 3190.6 Mm^3/a in 1992 and is expected to increase to 3813.8 Mm^3/a by 2020 (Table 4.2). The consumptive Namibian and South African water demand downstream of the Orange/Fish confluence is presently about 31.4 Mm^3/a and is expected to increase to 46.0 Mm^3/a by 2020. Irrigation is by far the largest consumer of water from the Orange River and represents 85 % of the demand on the ORP. Presently irrigation permits allow for a total abstraction of 45.24 Mm^3/a from the Orange River. The total Namibian water demand from the Orange River will be approximately 205 Mm^3/a by 2100, which will comprise 25 Mm^3/a for domestic consumption, 25 Mm^3/a for mining and 155 Mm^3/a for irrigation projects.

Table 4.2: Total Water Demand from the Orange River basin Consumer.

Consumer	**Demand in Mm^3/a**	
	1992	2020
Urban	100.4	300.5
Industrial	5.2	5.2
Stock watering	1.0	1.0
irrigation	1829.9	2428.5
Environmental Requirement (mouth)	294	294
River losses	960.1	960.1
Total	**3190.6**	**3989.3**
Irrigation return flows	125.6	169.5
Urban return flow	3.1	6.0
Balance	**3061.9**	**3813.8**

4.4.4 Environmental Water Requirements

The environmental water demand for the Orange River mouth, which is RAMSAR site, has been established principally to re-establish the salt-marsh on the southern bank of the Orange River mouth and to restore the fresh water regime to control salinisation of the Orange River mouth by periodic fresh-water flushing. Under ideal conditions the requirements are as follows:

- 244 Mm^3/a or 20 $Mm^3/month$ over 10 (ten) months.
- 4 $Mm^3/month$ low flow during August, and.
- 40 $Mm^3/month$ during September as a freshwater flush.

These environmental water requirements must be met 95% of the time. Under absolute minimum conditions the requirements are as follows:

- 100 Mm^3/a or 6 $Mm^3/month$ over ten months, and.
- 2 (two) fresh-water flush of 20 $Mm^3/month$ for one month each. These water requirements must be met 99.5% of the time.

4.4.5 Surface Hydrology Influences on Environmental Impact

4.4.5.1 Flooding Threats

Flooding threat to the EPL area is associated with the flooding of the Orange River or sporadic high velocity flow within the ephemeral streams following a high rainfall event. The flooding potential of the areas of interest in the EPL area are low because both are located far beyond the river's high-water mark.

If a high rainfall event occurs and water flows from the high lying adjacent land at high velocity, this will not affect the key areas of interest within the EPL area.

4.4.5.2 Surface Water Contamination

Under normal hydrological conditions, contamination of surface water resources will be low due to the low rainfall and no wastewater or other waste products will be disposed in the river and there will be few potential chemical pollutants on site due to the chemical-free exploration process. There are, however, two situations in which the surface water may become contaminated:

(i) Flood conditions - under flood conditions, erosion of the substrate due to the passage of high velocity water may increase the suspended solids entering the river system. This could be aggravated by poor erosion control practices, which do not adequately protect the surface from erosion, and.

(ii) Negligence and accidental spillages - spillage of substances such as petrol, diesel, oil and grease either directly or indirectly. For example, spillage of diesel and oil used for the operation of the generator at the water abstraction point on the riverbank.

4.4.5.3 Surface Water Utilisation

Water for use in the small-scale test mining operation will be abstracted from the Orange. The good quality of the water along the lower reaches of the Orange River is suitable for all uses and should therefore not pose any problems for the proposed operation.

It is anticipated that 2.5m^3 of water per hour will be required on a 24 hour, 365 days p.a. basis.

The 2.5 m^3/h will be apportioned as follows:

- 25.0 m^3/shift for the operation of the washing area.
- 3.5 m^3/shift for dust allaying in the mining areas and on the roads.
- 0.5 m^3/day for domestic use and wash down water.

During the initial stages, when the overburden is being stripped and stockpiled, the water requirement will only be 3.5 m^3/shift, principally for dust allaying.

The requirement will only rise to 25 m^3/shift (as shown above) after ten months once processing is commenced. Thus, the total water requirement will be as follows (Table 4.3).

The requirements for the small-scale mining operation are very low in comparison to current and projected requirements of other users along the Orange River. These volumes are far from the amount of 12 000 cub.m/h (or 216 000 m^3 p.a.) currently abstracted by Aussenkehr Farm for irrigation of the vineyards. Aussenkehr Farm does not currently utilize the total annual abstraction allowance allocated by the Department of Water Affairs.

The requirement for a small-scale mining is less than the additional unutilized allocation for Aussenkehr Farm. In addition, a portion has been allocated for smaller mining operations in the projected Namibian

water demand figures. Thus, there is sufficient water available for the small-scale mining operation and the abstraction of this volume of water will not have an impact on the functioning of the ORM wetland.

Table 4.3: Indicative water requirements.

Phase of Operation	Time Period	Requirement (m^3/h)			
		Hourly	**Daily**	**Monthly**	**Annually**
Small-scale mining	11 months, 9 hours	**2.5**	26.5	795	9 500
Mining and processing	10 months, 9 hours	**2.5**	26.5	795	7 950

4.5 Groundwater

4.5.1 Description

Because no investigation was conducted on the nature of groundwater at the site, no information is available on the groundwater quality, quantity and depth. A description of the groundwater can only be based on assumptions and general characteristics.

Along the route of the river, groundwater probably moves in a band adjacent to the river, but the width and depth of this band is not known. It is assumed that groundwater recharge here results mainly from the Orange River and that there is very little recharge from other sources due to the low rainfall.

As a result, the water table is probably fairly close to this surface near the river and fluctuates with the level of the river too. Groundwater depths are probably deeper further upslope, where the elevation of the land increases. According to investigations conducted by the Company in the area, the underlying bedrock (i.e. the De Hoop Subgroup) has poor groundwater potential and groundwater is virtually non-existent.

Groundwater appears to be limited (only gravels of the Orange River palaeo-channels, which overly the bedrock. It is uncertain whether this groundwater represents a static body of water at the palaeo-channel or whether it is connected to other groundwater sources. Groundwater utilization is low as determined by the low occurrence boreholes and windmills in the area. This is mainly because the Orange River provides a sufficient volume of water to meet requirements so the utilization of an alternative water sources is unnecessary.

4.5.2 Groundwater Influences on Environmental Impact

4.5.2.1 Groundwater Utilization

There will be a very low impact on groundwater utilisation as surface water sources (i.e. the Orange River) are the preferred source of water at the site and groundwater utilization is very limited.

4.5.2.2 Seepage and Flooding

Seepage into the trenches should be anticipated because according to regional groundwater characteristics, groundwater tends to be concentrated in the palaeo-channels. In addition, the water table was intercepted during exploration drilling operations on site.

The riparian groundwater sources may also pose a flooding or seepage threat to the exploration and small-scale test mining operations. Under normal conditions the groundwater is not likely to have an impact on the operation as the trenches will be located above the water level within the Orange River and the adjacent groundwater mound. Under flood conditions, however, the recharge of groundwater from the river may increase the extent of the groundwater mound so, that it is intercepted by the trench within the hummock area. Flooding of the trench may result under such conditions.

The volume, duration and extent of seepage cannot be predicted. In summary:

- If the trenches are located within the boundary of the riparian groundwater mound, which is fed by the Orange River, more or less constant seepage can be anticipated, and.
- If the trenches are located within the boundary of the riparian groundwater mound when the Orange River is in flood, periodic seepage can be expected.

4.5.2.3 Groundwater Pollution

Groundwater pollution can be considered from two aspects - chemical pollution and suspended sediment load. The chemical pollution of groundwater sources will be low, because the proposed operations do not require the use of toxic chemicals. However, there will still be chemicals such as petrol, diesel, grease and oil on site. So long as the quality of the river water is not affected and these chemicals are not allowed to enter the river system, the groundwater will remain free of pollutants likely to be associated with the proposed project activities because groundwater recharge is assumed to be mainly via the Orange River.

Under the right conditions (e.g. a high velocity rainfall event and poor erosion control leading to substrate erosion), increased runoff sediment load may result. If this runoff enters the groundwater system, it is unlikely to cause groundwater pollution problem as the gravels are effective sponges that will filter out the particles.

4.6 Flora

4.6.1 Regional Description

According to Muller (1984) the site lies near the border of two vegetation types - the Desen and Succulent Steppe (which includes the southern Namib) and the Dwarf Shrub Savanna. In addition, elements of a third vegetation type, the Upland Succulent Karoo (or Namaqualand Broken Veld) also need to be considered as this occurs on the South African side of the Orange River. From initial observations it was noted that elements of all these vegetation types might be present at the site.

Four zones of natural vegetation were identified within the EPL area and these are:

- The riparian vegetation.
- The floodplain vegetation.
- The hummock vegetation.
- The vegetation of the gentle slope, and.
- Alien plants.

4.6.2 Riparian Vegetation

In sharp contrast to the sparse vegetation of the EPL area, a band of tall tree/shrub vegetation about 10 m wide, flanks the Orange River. The most common species forming the upper stratum of vegetation are Euclea pseudobenus, Ziziphus mucronata. Acacia karroo, Rhus sp. Tamarix usneoides, and, Prosopis glanulosa, an exotic, declared weed. Dense stands of Phragmites australis grow intermittently along the River within the shallow water.

Extensive clearing of the trees and reeds along the river for firewood and building materials has resulted in open patches and provided a niche for the invasion of numerous weedy species. These include Ricinis communis (castor oil bush), Nicotiana glauca (wild tobacco), Sonchus sp., Salsola kali (tumbleweed) and others. In most of the cleared parts of the riparian zone: the substrate has covered by a layer of discarded sticks and wood chips. Tracks and footpaths are common.

4.6.3 Hummock Vegetation

Among the compact collection of elongated hillocks near the base of the Berg, various forms of vegetation were identified. Although the species composition was consistent, certain differences in the characteristics of the vegetation were observed. These various forms were as follows:

- The sparse grass and forb vegetation of the level areas between the hillocks (i.e. The ephemeral water course/wash).
- The open grass-dominated slopes.
- The sparse forb-dominated vegetation on the hummock sides.
- The pockets of higher-density grass and forb vegetation occurring in shallow channels, where the hummocks merge.

The level open ephemeral watercourse and adjacent hummocks are dominated by Osteospermum scariosum (bietou), which occurs as scattered individuals across this area. The maximum height of the vegetation is 0.5 m, but most plants are 20 cm high or less. In general, the quality of the vegetation is relatively poor, probably due to disturbance. Overall aerial cover is extremely low with large areas having no plant cover at all. Basal cover is low too because the dominant plants are narrow-stemmed forbs which offer little basal cover. Cover on the hummock slopes and especially the crest of the hummocks is particularly low.

Other low-growing forbs occurring in this area are various Pelargonium species, Felicia sp., Helichrysum sp., Aptosimum indivisum (Karoo violet), Lotononis sp., Asclepias sp., various Zygophyllum species, Galenia sarcophylla (vanwyksbrak), Tnbulus terrestris (devil's thorn), Cotula sp., Rumex cordatus (tongbiaar) and Pelioslomum leucorrhizurn (veld violet). Larger plants are uncommon but scattered specimens of Sarcostemma viminale (spantou) and Rhigozum trichotomum (driedoring) were noted. It was also noted that there are numerous leguminous species (of the Fabaceae family) occurring in the area. These legumes most likely serve an important role in boosting the nitrogen levels of the substrate.

In some parts, usually on the fringes of the wash, the forbs give way to grasses. In the grass-dominated patches, cover is greater - aerial cover is up to 50% while basal cover is about 10%. The dominant grass species are Stipagrostisobtusa (small Bushman grass) and Scimidtia kalahariensis (Bushman grass). Further upslope but still within the limits of the ephemeral wash, the vegetation becomes almost entirely grass-dominated. This form of vegetation is continuous with the slope vegetation described below where more detail is provided.

Where the hummocks converge, species diversity and plant density are at its greatest. The most common species present include forbs such as Aptosimum indivsum (Karoo violet), Osteospermum scariosum, Helichrysum sp., Aptosimum sp., and various Mesembryanthemaceae while grasses such as Stipagrostis cilliata (tall Bushman grass), Schmidtia kalahariensis (Bushman grass) and Leucophrys mesocoma also occur. The forbs and grasses are present in almost equal proportions. This higher diversity and density of plants is probably due to two main factors - protection and drainage. In these furrows between the hummocks the vegetation is relatively well protected from natural elements.

In addition, these furrows are seasonal drainage lines along which water will collect and flow when precipitation falls. The plants have collected in these furrows because of the greater moisture content of the substrate associated with these furrows and because seeds have washed into and been trapped by the furrows.

4.6.4 Slope Vegetation

Along the slopes extending from the outcrops towards the Orange River, a scant, low diversity vegetation cover occurs. The almost exclusively dominant plant is a grass, Stipagrostis obtusa (small Bushman grass). Occasionally, another grass species Stipagrostis cilliata (tall Bushman grass) and Schmidtia kalahariensis (Bushman grass) occur too. Scattered low-growing forbs similar to those found in the hummock area were also occasionally noted including Pelargonium species, Helichrysum sp., Aptosimum indivisum, Zygophyllum sp., Galenia sarcophylla, Tribulus terrestris and a few Osteospermum scariosum. It was observed that the density of grass plants was approximately 16 plants per sq. m with a basal cover of less, than 1 % and an aerial cover of about 4%. The vegetation is low growing and does not exceed 20 cm in height.

The substrate over most of this zone is sandy and loose with a shallow cap (<2 cm) of gravel material mainly comprising small shale fragments. However, occurring within this zone are bare elongated outcrops, which are much rockier in nature and which run down slope. These outcrops are largely devoid of vegetation and grasses.

4.6.5 Floodplain Vegetation

Around the EPL area, grasses, especially Stipagrostis species, grown in scattered patches, overall plant cover is very low and the most noticeable plants present are the specimens of Sarcostemma viminale. Another commonly occurring species are Galenia sarcophylla and various Mesembryanthemaceae. The species composition indicates some kind of disturbance to this area. In addition, there is a tract of land that is comprised of shifting sand hummocks where vegetation is virtually absent.

4.6.6 Flora Influences on Environmental Impact

4.6.6.1 Loss of Plant Cover

The loss of plant cover will not present a significant problem because:

- Plant cover is naturally low and, in some places, absent.
- Plant cover does not have an important role in protecting the substrate surface.
- The plant cover is not a valuable form of vegetation - in the hummock area, most of the vegetation is disturbed while the slope vegetation is a monoculture of Stipagrostis species, which is widely distributed, and.
- The loss of plant cover is temporary and will be replaced during site rehabilitation.

4.6.6.2 Valuable Plant Species and Communities

The key areas of interest have already been disturbed in the past and the vegetation found around theses area is widely distributed across the general area.

However, there are two vegetation communities that occur adjacent to the areas that have some ecological value:

- The hummock convergence vegetation that occurs within the narrow drainage furrows because it may serve as a source of seed and species diversity for the surrounding areas, and.
- The relatively undisturbed riparian vegetation flanking the Orange River because it serves as the habitat for many animals, is an important buffer between the terrestrial and riparian environments and a bank stabilizer.

4.6.6.3 Rehabilitation

The plant species selected for the rehabilitation process should be the locally occurring species because they are adapted to the prevailing climatic and edaphic conditions. Seeds of the local plants are stored within the upper layer of the substrate. These seeds may lie dormant for many years until the appropriate conditions for their germination are met. This seed bank will serve as an important part of the rehabilitation process.

4.6.6.4 Alien Plant Invasion

The disturbance of the site will make it prone to disturbance and the invasion of unfavourable weedy species. Weedy species are common along the Orange River where clearance of trees has provided a suitable niche for the invasion of these species. Weedy species are less abundant on the slope toward the Orange River. The occurrence of these species in the area may aggravate and encourage their invasion into areas disturbed by historical exploration and mining operations.

4.7 Fauna Diversity

4.7.1 Fauna Description

A formal survey of the fauna in the area was not deemed necessary at this stage of the proposed exploration and small-scale mining operation.

The trees along the Orange River potentially support a rich and diverse avifauna but due to the extensive clearing of the riparian fringe, few birds were noted. In the dry hostile terrain in the interior, limited avifauna occurred.

The dry, sand and gravel plains covering most of the study area are only suitable for a very limited range of mammals, such as springbok (Antidoreas marsupialis), porcupine (Hystrix africaeaustralis), bat-eared fox (Otocyon megalotis). Cape fox (Vulpes chama), black-backed jackal (Canis mesomelas), caracal (Felis caracal), small gray mongoose (Galerella purverulenta), and various small rodents such as field mice, gerbils and rock dassies (Procavia capensis). Other species that may occur in the area are klipspringers (Oreotragus oreotragus), rhebok (Pelea capreolu) and steenbok (Raphicerus campestris).

Along the River, vervet monkeys (Cercopithecus aethiops) and baboons (Papio ursinus) are common. Otters are also known to occur in and along the banks of the Orange River. An interesting feature of the fauna on Aussenkehr Farm is the herd of wild horses. A herd of approximately 30 horses were brought to the farm from the Swakopmund area but they occur mostly in the mountainous parts away from the developed areas.

Two Red Data Book species are also known to occur in the area, namely the brown hyaena (Hyaena brunnea) and leopard (Panthera pardlls). Both of these species are classified as rare (Smithers, 1986).

The Orange River valley has been identified as being an area of special herpetological interest. Species of particular interest include the Namaqua gecko (Pachydactylus namaquensis), water monitor (Varanus niloticus). Cape flat lizard (Platysauras capensis), dwarf plated lizard (Cordylosaurus subtessellatas), various skinks, many-horned adder (Bids cornuta), horned adder (Bins caudalis), Narnib tiger snake (Telescopus beetvi), and the western thread snake (Leptotyphilops occidentalis) which is classified in the Red Data Book as peripheral (Branch, 1988).

Invertebrates are likely to occur within the targeted key areas of interest.

4.7.2 Fauna Influences on Environmental Impact

The impact on the fauna is expected to be low because:

- Fauna diversity is low within the EPL area and especially on the key areas of interest.

- ❖ The current activity around the camp and wash plant is a deterrent for animals.

- ❖ Most of the fauna is concentrated within the riparian vegetation or mountainous areas away from the key areas of interest, in particular, the leopard and hyaena and the important herpetological population, which concentrates near the Orange River, and.

- ❖ Although animals may forage within the EPL area, these areas are not important refuge and breeding sites for animals, either because of the lack of suitable protective vegetation, the open nature of the terrain and/or the proximity to the main road.

Despite this, the necessary steps will need to be taken to protect the fauna in the potentially dangerous areas such as the access roads, the trenches and surroundings where heavy machinery will be operational, and, the plant areas. In addition, inquisitive pest animals, such as baboons and vervets may disrupt operations (e.g. by scratching through garbage), if adequate controls and deterrents are not implemented.

4.8 Archaeology

4.8.1 Description

The desktop assessment that has been undertaken for this project indicates that there are no known significant archaeological sites within area of EPL area or along this part of the Orange River. However, there might be archaeological remnants that may be unearthed during exploration and test mining operations.

4.8.2 Archaeology Influences on Environmental Impact

Based on the regionally low occurrence of known archaeological sites, it is assumed that the occurrence of undiscovered sites at this area is also low. Any sites that did exist here would either have been discovered already during previous investigations (due to the accessibility of the site to archaeologists) or have been destroyed during the previous exploration and mining operations that were undertaken in the area.

Combined with the fact that the prospecting/mining operations cover a small area contained diamondiferous gravel reserves, it can be assumed there will be little or no impact. The following are the key recommended actions related to archaeology in the EPL Area:

- ❖ Contractors working on the site should be made aware that under the National Heritage Act, 2004 (Act No. 27 of 2004) any items protected under the definition of heritage found in the course of development should be reported to the National Heritage Council.

- ❖ The chance finds procedure as outlined in the EMP must be implemented at all times, and.

- ❖ Detailed field survey should be carried out if suspected archaeological resources or major natural cavities / shelters have been unearthed during the proposed exploration and test mining operations.

4.9 Socioeconomic Settings

4.9.1 Regional Socioeconomic Setting

Namibia's southernmost and largest region covers 161,235 km² and comprises about 20 percent of the total surface area of Namibia (//Karas Regional Council (KRC), n.d.). The Hardap Region in the North, Botswana and South Africa in the East, South Africa in the South and the Atlantic Ocean in the West border it. The // Karas Region has 7 constituencies: Berseba, Keetmanshoop Rural, Keetmanshoop Urban, Karasburg East, Karasburg West, Oranjemund and !Nami=nüs, formerly Lüderitz Constituency (Government of Namibia (GRN), 2014a. National Statistics Agency (NSA), 2014a). There are 53 proclaimed towns and villages in Namibia of which 10 are in the// Karas Region:

Berseba, Tses, Koës, Bethanie, Keetmanshoop, Aroab, Karasburg, Rosh Pinah, Oranjemund and Lüderitz (NSA, 2014b). Keetmanshoop is the regional capital and is also the seat of the government in //Karas, referred to as the //Karas Regional Council. Keetmanshoop and Karasburg are governed by municipalities, Lüderitz and Oranjemund by town councils, Berseba, Bethanie, Koës and Tses by village councils (KRC, n.d.). Oranjemund was proclaimed a public town in 2012, having been managed as a 'closed' company town since its establishment in 1936 (De Beers Group of Companies (DeBeers), 2012). The demographic information provided indicates the following:

- There has been a proportional decline in the //Karas Regions population as only 3.66% of the country's population live in the region and the region's population is growing at a slower rate (1.1%) than the national growth rate (1.4%).
- There is high migration rate from especially the north central regions to the //Karas region.
- There is only slightly more males than female indicating that either migratory male job seekers had moved away from the region (an possible explanation for the negative growth rate in the Lüderitz/!Nami=nüs constituency) or that more females are being employed by companies which historically employed men.
- A high proportion (63%) of the population is of working age (between 15 and 59 years).
- There is a large urban population (54% compared to 43% nationally) and 92.4% of the residents in the Lüderitz/!Nami=nüs constituency live in the town.
- The main source of income in the region is wages and salaries (72%) and the fishing and mining industries are the largest employers, and.
- There is a high labour force participation rate of 75.4% for the region.

4.9.2 Local Socioeconomic Setting

The EPL 6702 area falls within the Ai-Ais/Richtersveld Transfrontier Park, //Karas Region, Southern Namibia. Rosh Pinah is the nearest settlement suited about 30 km northwest of the main targeted area. Rosh Pinah is unproclaimed mining village located on government land and managed and supported by the mining activities at Rosh Pinah and Skorpion Mines. The two mines provided all formal housing, services and other amenities in the town.

Approximately 11 000 people lived in the Town of Rosh Pinah, with an estimated 6000 people living in informal settlement adjacent to the formal area. The possible opening of another mine close to Rosh Pinah is likely to cause an increase influx of people to the town of Rosh Pinah of which not all will be able to secure job and are likely to end up in the informal settlement of the town.

Outside of Rosh Pinah, farming occurs in the surrounding areas to the east of the Tsau //Khaeb (Sperrgebiet) National Park and the diamond company Namdeb controls interests in the park. Farms are large and the area is very sparsely settled due to its arid nature. Access to both the EPL Area and the Town of Rosh Pinah is along a tarred road from Aus, approximately 165 km north of Rosh Pinah. The community in the area is thus relatively isolated and farmers often travel long distances to access services in nearby towns of Aus and Rosh Pinah. The economy of the area is largely based on tourism and travel, mining and farming. The community of Rosh Pinah is also not well integrated, with a distinct divide between the informal settlement and residents in the more formal parts of Rosh Pinah.

4.9.3 Potential Social, Economic and Cultural Impacts

Social impacts at the exploration stage are likely to be minimal and tend to be positive. A clear understanding of these impacts may help communities understand and anticipate the effects of exploration. One of the major possible impacts of exploration may be unrealistic expectations about the development of a mine. It's important for local communities to bear in mind that most exploration activity will not advance to mine development. The following is the summary of the likely positive and

negatively social, economic and cultural impacts that may be associated with the proposed exploration and possible test mining activities at local (Rosh Pinah) and regional (//Karas Region) levels:

(i) Social:

- ❖ Opportunities for social shift work / rotational work associated with the exploration programme.
- ❖ Less time to spend on traditional activities such as farming.
- ❖ Workers and their families are separated for several days or weeks resulting in some marital stress.
- ❖ Members leaving the community (because they now have money and good-paying jobs).
- ❖ Members leaving their skilled jobs in the community to take exploration related temporal jobs because of good temporal returns, and.
- ❖ The community then has to spend money to train new workers.

(ii) Economic:

- ❖ Increased employment levels.
- ❖ Increased income levels.
- ❖ Increased training and skill development opportunities.
- ❖ Increased buying power.
- ❖ Creates positive role models.
- ❖ More money flowing into a community could result in more liquor, and/or drugs coming into the community.
- ❖ Widens the gap between the employed and unemployed.
- ❖ Use the positive working role models within the community, and.
- ❖ Create addiction response programs and support groups.

(iii) Cultural:

- ❖ Cultural strangers in the community.
- ❖ Increased population.
- ❖ Strains existing services, and.
- ❖ Worsens existing social problems.

4.10 Public Consultations

4.10.1 Overview

Public consultation process has been part of the environmental assessment process for this project. Opportunity for the public to submit written comments / inputs / objections with respect to the proposed

exploration and possible test mining activities in the EPL 6702 were provided from Friday, 22nd February 2019 to Friday 7th – 13th March 2019 (Figs. 4.1 - 4.3).

4.10.2 Public Consultation Process

Public consultation process was undertaken through emails contact and the newspaper advertisements as shown in Figs. 4.1 - 4.3. The project public notices were published in the local newspapers as follows:

- Windhoek Observer newspaper dated Friday, 22nd February 2019 (Fig. 4.1).
- Namibian newspaper dated Tuesday 28th February 2019 (Fig. 4.2).
- Confidente newspapers dated 7th – 13th March 2019 (Fig. 4.3).

A stakeholder register was opened from Friday, 22nd February 2019.

4.10.3 Stakeholders and Public Discussions

Despite telephonic inquiries with respect to contracts and employment opportunities, no written objection or inputs about the proposed exploration and test mining activities in the EPL 6702 was received.

4.10.4 Stakeholders and Public Consolations Recommendations

Overall, in meeting the need for continuous public / stakeholder engagement process, it is hereby recommended that the Proponent shall notify the local community on the implementation of the proposed project once the ECC has been granted. Such communications shall be maintained throughout the lifecycle of the proposed project.

This recommendation may be included as condition on the ECC to be issued.

22 | FRIDAY 22 FEBRUARY 2019

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PUBLIC INVITATION

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE CONSTRUCTION AND OPERATION OF THE FUEL RETAIL FACILITY IN KALKRAND, HARDAP REGION

Notice is hereby given to all Interested and Affected Parties (I & APs) that an application will be made to the Environmental Commissioner in terms of Environmental Management Act (No. 7 of 2007) and its Regulations (2012) for the following intended activity.

Project Name: Menash Service Station - Kalkrand

Project Location: 444, Dunkrust, in Kalkrand, Hardap Region

Project Description: The construction of a new Fuel Retail Facility and associated convenience store.

Proponent: Menash Service Station

Environmental Consultant: Matrix Consulting Services

Public Meeting Date: Friday, 8 March 2019

Venue: Kalkrand Recreational Centre

Matrix Consulting Services has been appointed by Menash Service Station to conduct an Environmental Impact Assessment for the proposed fuel retail facility.

All Interested and Affected Parties (I&AP's) are encouraged to register and raise concerns or provide comments and opinions. All Interested and Affected Parties will be provided with a Background Information Document (BID) comprising detailed information for the intended. Should you wish to register as I&AP and receive a BID, please contact the Matrix Consulting Services office.

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Figure 4.1: Copy of the public notice that was published in the Windhoek Observer Newspaper dated Friday, 22nd February 2019.

Husab workers fear for lives as Chinese get blasting contract

• ADAM HARTMAN

SWAKOP Uranium employees of the Husab mine in the Erongo region fear their safety was compromised by the company's management for contracting what they claim an 'incompetent' Chinese contractor to carry out the drilling and blasting activities at the mine.

As a result, the workers stopped working since Monday, and petitioned their employer on Tuesday to investigate the matter.

About 500 workers in the mining department stopped working, and said they will not return to work until their concerns are investigated and the mine declared as safe by their employer. The workers warned that if this is not done soon, the processing department of about 1 200 workers would also shut down as it would not be supplied by the miners.

Vice president of human resources Percy McCallan, however, said only about 105 mine-workers are not working as there are 105 workers per shift, and three are three shifts.

Mineworkers Union of Namibia (MUN) branch chairman for Swakop Uranium, Timoteus Katjuaende, who read the petition, said the workers did not trust Beifang Mining Services after they learned that there were "a number of high potential incidents" related to the use and handling of explosives on site, and yet no apparent action was allegedly being taken by the company.

The workers accused Swakop Uranium of quickly suspending mining operations after an operator was killed in a truck accident last year on the mine site, and having terminated a contract for a local security company for alleged non-conformances, "but turn a blind eye" on issues that involve the Chinese expatriates and companies contracted by Swakop Uranium.

"Misconduct is misconduct, and non-compliance is non-compliance, whether the transgressor is Namibian or Chinese," charged Katjuaende.

The union accused Swakop Uranium's CEO, Cai Yushen, of turning a blind eye when Chinese break the rules or are not compliant, and in this case, the contractor is "doing experiments with explosives", or being irresponsible when handling explosives. But when confronted, they allegedly sneer at "Namibian laws".

The union alleges that Beifang Mining Services has a bad track record in terms of safety and quality compliance, yet they still managed to get the five-year contract through a "questionable tendering process".

MUN secretary for information and publicity Teofilus Teofilus said according to the Namibian Labour Act, the employer has an obligation to provide a safe and healthy environment for employees.

Some high potential incidents pointed out by the workers show that on 17 February, two live detonators were discovered on site by an excavation operator while busy preparing for a drilling process.

Another incident, on 16 February, allegedly occurred while an excavator was doing final wall scaling. The operator discovered two live detonators.

On 12 February, an incident happened in a pit while a hydraulic shovel was loading a haul truck, which resulted in a detonation after a shovel bucket came into contact with a detonator and set off a booster, resulting in the detonation.

Incidents referred to go as far back as 2016, but operations were allegedly not stopped.

The union is accusing the blasting company of using the Husab mine as an experimenting ground or training academy, which is done at the expense of the workers' safety and depriving Namibian professionals, especially young graduate mining engineers, artisans and surveyors the opportunity to develop themselves.

The company currently also does civil blasting services, mostly for all Chinese firms around the country, such as Chinese Cement at Otjiwarongo and a coal mine at Opuwo.

The Namibian tried to reach out to Beifang Mining Services, but there was no answer. A message was left, but by the time of going to the printers, there was no response.

This company does not have any explosives magazine elsewhere, but using Husab mine explosives magazines for their commercial purposes outside Husab's operations.

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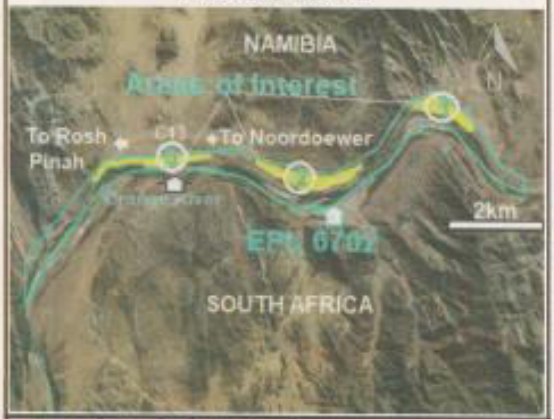

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GIPF invests N$17,4m in housing development at Eenhana

THE Government Institutions Pension Fund (GIPF) has invested N$17,4 million in housing aimed at low and medium income groups at Eenhana in the Ohangwena region.

This was revealed by Ohangwena governor Usko Nghaamwa in a speech read on his behalf at the official opening ceremony of the new GIPF office at the town on Tuesday.

He said the housing development in Extension 6 will consist of 271 houses, and will greatly contribute towards the housing shortage in the region.

"The GIPF, through its unlisted investments, has been implementing some of the Harambee Prosperity Plan's pillars, such as social progress and infrastructure development by delivering housing and servicing land for their members," he noted.

Speaking at the same event, GIPF board of trustees' chairperson Goms Menette said the Eenhana housing unit development under the developer Fonnosa Island Investment consists of 271 erves, of which 124 are already serviced.

Eighty-five houses in phase one and 97 houses in phase two have been sold to date.

"This development came as a requirement to provide low-cost and decent housing to accommodate low, middle and high-income earners in a bid to ease land and housing shortages within the town of Eenhana," he added.

The GIPF is aiming to construct 30% of the 20 000 housing units envisaged under the Harambee Prosperity Plan. – *Nawpre*

Goms Menette

Figure 4.2: Copy of the public notice that was published in the Namibian Newspaper dated Tuesday 28th February 2019.

Agriculture & Tourism Conservation

- Subsistence
- Pastoral
- Horticulture

Impacts of climate change on livestock productivity

By Frastus Ngaruka

CLIMATE change is a long term change in climatic/weather patterns of the earth or region. Such change is observed in temperature and rainfall patterns amongst others. It is being evidently reported that the earth temperature is on an increase and that rainfall activities have become unpredictable in many parts of the world, and Namibia is evidently experiencing the adverse effects of climate change. The agricultural output is primarily driven by climatic events, and these have adverse effects on both food and water availability in agroecosystems, hampering sustainable crop and livestock productivity, as well as farmers' livelihoods.

The climate change effects can be direct or indirect. Livestock productivity is directly reliant on rangeland productivity which in turn is determined by soil moisture availability and environmental

Frastus Ngaruka

temperature. The management aspects as secondary determinants of agricultural output, should therefore aim at mitigating or enhancing farmers' adaptation to climate change events.

Climate change has been characterized by increases in environmental temperature, hence the extreme heat wave being experienced in all parts of Namibia currently, and figures of more than 40°C were recorded especially in the southern regions. The direct impact of this on livestock is the heat stress which negatively affects their wellbeing and performance.

Heat stress and feed intake

When an animal is eating, the digestive processes generate heat and increases the body temperature. For example, the normal body temperatures (°C) of cattle, Sheep and goats are; 38.5, 39, 39.5 respectively. When the body temperature increases beyond the normal, then the animals physiological functioning is affected and could be detrimental or life threatening in extreme cases. These ruminant animals (cattle, goat, and sheep) under normal circumstances will prefer to graze/forage during cooler hours of the day (early morning, late afternoon, or night) to avoid heat stress. They would only rest during the hot hours of the day to ruminate or re-chew the food they have eaten, breaking them into smaller pieces to enhance digestion further.

Grazing during the hot hours will mean too much heat will be exerted on the animal, from the sunlight and from the internal digestive processes rendering it to heat stress. This means the animal's physical activities such as walking, and food intake will have to be reduced in order to maintain normal or optimal body temperature, and this in turn compromises the animal's nutrition and health status, and the overall performance. These will be experienced as nutrient deficiencies, poor growth rate and body condition, reduced milk yield, and poor reproduction amongst others.

Heat stress and reproduction

High temperature also affects livestock reproduction. The heat stress forces animals to reduce their exhaustive physical activities which also includes mating. The female animal's reproductive system as well as the sperm production process in male animals can be adversely affected by high temperature. Heat stress is said to depress the release of reproductive hormones such as the oestrogen and progesterone, compromising the consequent processes of oocyte (female egg cell) growth, oestrus (heat) cycle, conception, embryo development, and foetus growth amongst others. In male animals, high temperature negatively affects the process of sperm production, leading to temporal infertility.

Preventing heat stress in livestock

Although animals have the ability to adapt to environmental conditions and management regimes, the hot environments will compromise their potential physiological functioning and overall performance to some degree. It is therefore advisable to minimize the exposure of your animals to extreme high temperatures.

In the hot environments or when animals forage during the hot hours of the day, the water demand or intake increases. Thus, animals should have daily access to clean, cool and sufficient water. Water has a direct role of quenching the thirst and in digestion, and is importantly used as a coolant by animals through the sweating mechanism.

This article is compiled by Frastus Ngaruka, Technical Officer- Livestock within Agribank's Agri Advisory Services Division.

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Figure 4.3: Copy of the public notice that was published in the Confidente Newspaper dated 7th – 13th March 2019.

5. IMPACT ASSESSMENT AND RESULTS

5.1 Impact Assessment Procedure

The Environmental Assessment process that has been undertaken with respect to the proposed exploration programme for the EPL No. 6702 has been conducted in accordance with the provisions of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007).

5.2 Alternatives and Ecosystem Assessments

The following alternatives have been considered:

(i) **EPL Location:** A number of potential economic minerals deposits are known to exist in the general area and linked to the regional geology of the EPL area. The Proponent intend to explore / prospect for all the licensed minerals groups likely to be associated with the regional and local geology. The minerals occurrences are site-specific and related to the regional and local geology of a specific area to which there are no alternatives sites to consider with respect to the license location. The only other alternative is the no-action option (no exploration activities are implemented in a specific area).

(ii) **The No-Action Alternative** - A comparative assessment of the environmental impacts of the 'no-action' alternative (a future in which the proposed exploration activities do not take place) has been undertake. An assessment of the environmental impacts of a future, in which the proposed exploration and possible discovery of economic minerals resources does not take place, may be good for the receiving environment because there will be no negative environmental impacts due to the proposed minerals exploration or possible mining operation that may take place in the EPL area.

The environmental benefits will include:

- ❖ No negative impacts as a result of no mineral exploration taking place, and.
- ❖ Potential future mining related negative environmental impact on the receiving environment.

However, it is important to understand that even if the proposed exploration activities do not take place, to which the likely negative environmental impacts are likely to be low and localised, the other current and future land uses such as agriculture and tourism will still have some negative impacts on the receiving environment. The likely negative environmental impacts of the other current and future land use that may still happen in the absence of the proposed minerals exploration activities includes:

- ❖ Land degradation due to drought.
- ❖ Poor land management practices, and.
- ❖ Erosion.

Furthermore, it's also important to understand what benefits might be lost if the proposed exploration activities do not take place. Key loses that may never be realised if the proposed project activities do not go-ahead include: Loss of potential added value to the unknown underground minerals resources that maybe found within the EPL No. 6702, socioeconomic benefits derived from current and future exploration, direct and indirect contracts and employment opportunities, export earnings, foreign direct investments, license rental fees, royalties and various other taxes payable to the Government.

(iii) **Other Alternative Land Uses:** The EPL area fall within the well-known Ai-Ais/Richtersveld Transfrontier Park with land uses area dominated by conservation, tourism and travel.

Tourism a vital socioeconomic opportunity in the Ai-Ais/Richtersveld Transfrontier Park and surrounding areas. Grape farming and minerals exploration and mining activities especially diamond mining is well known land use options along the Orange River. Due to the limited scope of the proposed exploration and the implementation of the EMP, it's likely that the proposed exploration and possible test mining activities can coexist with the current and potential future land uses within the general area.

(iv) **Potential Land Use Conflicts:** Considering the current land use practices (tourism) as well as potential other land uses including minerals exploration and possibly agriculture, it's likely that potential economic derivatives from any positive exploration outcomes leading to the development of a mine in the general area can still co-exist with the existing and potential future land use options of the general area. However, much more detailed assessments of any likely visual and other socioeconomic impacts will need to be included in the EIA that must be undertaken as part of the prefeasibility and feasibility studies if economic minerals resources are discovered. The use of thematic mapping and delineation of various land use zones for specific uses such as agriculture, conservation, mining or tourism etc, within the EPL area will greatly improve the multiple land use practices and promote coexistence for all the possible land use options.

(v) **Ecosystem Function** (**What the Ecosystem Does**)**:** Ecosystem functions such as wildlife habitats, carbon cycling or the trapping of nutrients and characterised by the physical, chemical, and biological processes or attributes that contribute to the self-maintenance of an ecosystem in this area are vital components of the receiving environment. However, the proposed exploration activities will not affect the ecosystem function due to the limited scope of the proposed activities because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked.

(vi) **Ecosystem Services:** Food chain, harvesting of animals or plants, and the provision of clean water or scenic views are some of the local ecosystem services associated with the EPL area. However, the proposed exploration activities will not affect the ecosystem services due to the limited scope and area of coverage of the proposed activities because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked.

(vii) **Use Values**: The EPL area has direct values for other land uses such as agriculture, conservation and tourism as well as indirect values which includes: Watching a television show about the general area and its wildlife, food chain linkages that sustains the complex life within this area and bequest value for future generations to enjoy. The proposed exploration activities will not destroy the current use values due to the limited scope of the proposed activities as well as the adherence to the provisions of the EMP, and.

(viii) **Non-Use or Passive Use**: The EPL area has an existence value that is not linked to the direct use / benefits to current or future generations. The proposed exploration activities will not affect the ecosystem current or future none or passive uses due to the limited scope of the proposed activities that will leave much of the EPL area untouched because the ecosystem of this EPL area is part of the larger local and regional ecosystems which are all interlinked.

5.3 Key Issues Considered in the Assessment Process

5.3.1 Sources of Impacts (Proposed Project Activities)

The ongoing exploration activities being undertaken in the EPL 6702 and as assessed in this EIA Report with mitigation measures provided in the EMP Report are as follows:

(i) Initial desktop exploration activities (no field-work undertaken).

(ii) Regional reconnaissance field-based mapping and sampling activities.

(iii) Initial local field-based mapping and sampling activities.

(iv) Detailed local field-based activities such as local geological mapping, geochemical mapping and sampling, trenching and drilling of closely spaced boreholes and bulk sampling, and.

(v) Prefeasibility and feasibility studies leading to test mining and mining if proves positive.

5.3.2 Summary of Receptors Likely to be Negative Impacted

Based on the finding of this EIA Report, the following is the summary of the key environmental receptors that are may be negatively impacted by the proposed activities:

- **Physical environment:** Water quality, physical infrastructure and resources, air quality, noise and dust, landscape and topography, soil quality and, Climate change influences.

- **Biological environment:** Habitat, protected areas and resources, flora, fauna, and ecosystem functions, services, use values and non-use or passive use, and.

- **Socioeconomic, cultural and archaeological environment:** Local, regional and national socioeconomic settings, commercial and subsistence agriculture, community protection areas tourism and recreation cultural, biological and archaeological resources.

5.4 Impact Assessment Methodology

5.4.1 Impact Definition

In this EIA Report, a natural and/or human environmental impact is defined as: “Change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s environmental aspects.” (ISO 14001).

All proposed project activities (routine and non-routine) were considered during the Scoping, EIA and EMP Phases in terms of their potential to:

- Interact with the existing environment (physical, biological and social elements), and.

- Breach relevant national legislation, relevant international legislation, standards and guidelines, and corporate environmental policy and management systems.

Where a project activity and receptor were considered to have the potential to interact, the impact has been defined and ranked according to its significance. Table 5.1 provides the definition of different categories of impacts identified and used in this report.

This EIA Report has assessed the potential impacts resulting from routine Project activities, assuming that the Project activities that may cause an impact that will occur but the impact itself will be dependent on the likelihood (Probability) (Table 5.2).

Correct control measures through the implementation of the EMP and monitoring thereof, often reduce any negative significant impacts on the receiving environment as the results of the project activities. The assessment therefore, has focussed on the measures aimed at preventing the occurrence of an impact as well as mitigation measures that may be employed.

Table 5.1: Definition of impact categories used in this report.

Nature of Impact	Adverse	Considered to represent an adverse change from the baseline, or to introduce a new undesirable factor.
	Beneficial	Considered to represent an improvement to the baseline or to introduce a new desirable factor.
Type of Impact	Direct	Results from a direct interaction between a planned or unplanned Project activity and the receiving environment.
	Indirect	Results from the Project but at a later time or at a removed distance or which may occur as a secondary effect of a direct impact.
	Cumulative	Results from (i) interactions between separate Project-related residual impacts. and (ii) interactions between Project-related residual impacts in combination with impacts from other projects and their associated activities. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
Duration of Impact	Short-term	Predicted to last only for a limited period but will cease on completion of the activity, or as a result of mitigation/reinstatement measures and natural recovery typically within a year of the project completion.
	Medium-	Predicted to last only for a medium period after the Project finishing, typically one to five years.
	Long-term	Continues over an extended period, typically more than five years after the Project's completion.
	Permanent	Occurs during the development of the Project and causes a permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime.
Scale of Impact	Local	Affects locally important environmental resources or is restricted to a single habitat/biotope, a single community.
	Regional	Affects nationally important environmental resources, or an area that is nationally important/protected or has macro-economic consequences.
	National	Affects nationally important environmental resources, or an area that is nationally important/protected or has macro-economic consequences.
	International	Affects internationally important resources such as areas protected by international Conventions
	Transboundary	Impacts experienced in one country as a result of activities in another.
Probability	Negligible	Possibility negligible
	Improbable	Possibility very low
	Probable	Distinct possibility
	Highly Probable	Most likely
	Definite	Impact will occur regardless of preventive measures

The overall impact severity has been categorised using a semi-quantitative subjective scale as shown in Table 5.2 for sensitivity of receptors, Table 5.3 for magnitude, Table 5.4 for duration, Table 5.5 for extent and Table 5.6 showing probability.

Table 5.2: Definitions used for determining the sensitivity of receptors.

SENSITIVITY RATING		CRITERIA
1	**Negligible**	The receptor or resource is resistant to change or is of little environmental value.
2	**Low**	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.
3	**Medium**	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance
4	**High**	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.
5	**Very High**	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.

Table 5.3: Scored on a scale from 0 to 5 for impact magnitude.

SCALE (-) or (+)		DESCRIPTION
0		no observable effect
1		low effect
2		tolerable effect
3		medium high effect
4		high effect
5		very high effect (devastation)

Table 5.4: Scored time period (duration) over which the impact is expected to last.

SCALE (-) or (+)		DESCRIPTION
T		Temporary
P		Permanent

Table 5.5: Scored geographical extent of the induced change.

SCALE (-) or (+)		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality.
R		impact of regional character
N		impact of national character
M		impact of cross-border character

5.4.3 Likelihood (Probability) of Occurrence

The likelihood (probability) of the pre-identified events occurring has been ascribed using a qualitative scale of probability categories (in increasing order of likelihood) as shown in Table 5.6. Likelihood is estimated on the basis of experience and/ or evidence that such an outcome has previously occurred. Impacts resulting from routine/planned events (i.e., normal operations) are classified under category (E).

Table 5.6: Summary of the qualitative scale of probability categories (in increasing order of likelihood).

SCALE (-) or (+)		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

5.4.4 Project Activities Summary of Impacts Results

The results of the impacts assessment and evaluation has adopted a matrix framework similar to the Leopold matrix. Assessment results of the magnitude, duration, extent and probability of the potential impacts due to the proposed project activities interacting with the receiving environment are presented in form of a matrix table as shown in Tables 5.7-5.10.

The overall severity of potential environmental impacts of the proposed project activities on the receiving environment will be of low magnitude (Table 5.7), temporally duration (Table 5.8), localised extent (Table 5.9) and low probability of occurrence (Table 5.10) due to the limited scope of the proposed activities and the use of step progression approach in advancing exploration.

The step progressional approach will allow the Proponent to the results of exploration success and the implementation of the next stage of exploration will be subject to the positive outcomes of previous activities as graded (Tables 5.7-5.10).

It is important to note that the assessment of the likely impacts as shown in Tables 5.7 - 5.10, have been considered without the implementation of mitigation measures detailed in Section 6 of this Report.

The need for implementation of the appropriate mitigation measures as presented in the Section 6 of this report have be determined on the results of the impact assessment (Tables 5.7 - 5.10) and the significant impacts as detailed in Tables 5.11 and 5.12.

Table 5.7: Results of the sensitivity assessment of the receptors (Physical, Socioeconomic and Biological environments) with respect to the proposed exploration / prospecting activities.

RECEPTOR SENSITIVITY		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(iii) Purchase and analysis of existing Government aerial hyperspectral	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SENSITIVITY RATING		CRITERIA
1	Negligible	The receptor or resource is resistant to change or is of little environmental value.
2	Low	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.
3	Medium	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance
4	High	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.
5	Very High	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.

Table 5.7: Cont.

RECEPTOR SENSITIVITY			PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
			Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3. Initial Local Field-Based Activities	(i)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(ii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iii)	Ground geophysical survey (Subject to the positive outcomes of i and ii above)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iv)	Possible Trenching (Subject to the outcomes of i - iii above)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(v)	Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(vi)	Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4. Detailed Local Field-Based Activities	(i)	Access preparation and related logistics to support activities	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(ii)	Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iii)	Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	(iv)	Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5. Prefeasibility and Feasibility Studies	(i)	Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(ii)	Detailed drilling and bulk sampling and testing for ore reserve calculations	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(iii)	Geotechnical studies for mine design	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	(iv)	Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(v)	EIA and EMP to support the ECC for mining operations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(vi)	Preparation of feasibility report and application for Mining License	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

SENSITIVITY RATING		CRITERIA
1	Negligible	The receptor or resource is resistant to change or is of little environmental value.
2	Low	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.
3	Medium	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance
4	High	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.
5	Very High	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.

Table 5.8: Results of the scored time period (duration) over which the impact is expected to last.

RECEPTOR SENSITIVITY		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
SCALE / DESCRIPTION: T = Temporary; P = Permanent		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Purchase and analysis of existing Government aerial hyperspectral	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T

Table 5.8: *Cont.*

DURATION OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
SCALE / DESCRIPTION: T = Temporary; P = Permanent		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3. Initial Local Field-Based Activities	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iii) Geotechnical studies for mine design	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(v) EIA and EMP to support the ECC for mining operations	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	(vi) Preparation of feasibility report and application for Mining License	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T

Table 5.9: Results of the scored geographical extent of the induced change.

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iii) Purchase and analysis of existing Government aerial hyperspectral	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L

SCALE		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality
R		impact of regional character
N		impact of national character
M		impact of cross-border character

Table 5.9: *Conti.*

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
SCALE	DESCRIPTION	Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
L	limited impact on location																
O	impact of importance for municipality																
R	impact of regional character																
N	impact of national character																
M	impact of cross-border character																
3. Initial Local Field-Based Activities	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iii) Geotechnical studies for mine design	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(v) EIA and EMP to support the ECC for mining operations	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	(vi) Preparation of feasibility report and application for Mining License	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L

Table 5.10: Results of the qualitative scale of probability occurrence.

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

IMPACT PROBABILITY OCCURRENCE		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(iii) Purchase and analysis of existing Government aerial hyperspectral	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

Table 5.10: *Cont.*

IMPACT PROBABILITY OCCURRENCE			PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
			Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3.	**Initial Local Field-Based Activities**	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
4.	**Detailed Local Field-Based Activities**	(i) Access preparation and related logistics to support activities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
		(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
		(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
		(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5.	**Prefeasibility and Feasibility Studies**	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
		(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
		(iii) Geotechnical studies for mine design	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
		(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
		(v) EIA and EMP to support the ECC for mining operations	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
		(vi) Preparation of feasibility report and application for Mining License	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

5.5 Evaluation of Significant Impacts

5.5.1 Overview

The significance of each impact has been determined by assessing the impact severity against the likelihood (probability) of the impact occurring as summarised in the impact significance assessment matrix provided in Table 5.11.

5.5.2 Significance Criteria

Significance criteria for negative/adverse impacts (i.e., relative ranking of importance) are defined in Table 5.11. It is important to note that impacts have been considered without the implementation of mitigation measures. The need for and appropriate mitigation measures as presented in the EMP report have be determined on the basis of the impact assessment presented in this report.

Table 5.11: Scored impact significance criteria.

IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	**RECEPTOR CHARACTERISTICS (SENSITIVITY)**				
	Very High (5)	**High(4)**	**Medium (3)**	**Low (2)**	**Negligible (1)**
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2 /5]	Minor 1/5
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]

5.5.3 Assessment Likely Significant Impacts

The assessment of significant impacts depended upon the degree to which the proposed project activities are likely to results in unwanted consequences on the receptor covering physical and biological environments (Table 5.12). Overall, the assessment of significant impacts has focused on the ecosystem-based approach that considers potential impacts to the ecosystem. The main key sources of impacts that have been used in the determination of significant impacts posed by the proposed minerals exploration comprised activities. Each of the main areas of impact have been identified and assessed as follows:

- Positive Impacts are classified under a single category. they are then evaluated qualitatively with a view to their enhancement, if practical.
- Negligible or Low Impacts will require little or no additional management or mitigation measures (on the basis that the magnitude of the impact is sufficiently small, or that the receptor is of low sensitivity).
- Medium or High Impacts require the adoption of management or mitigation measures.
- High Impacts always require further management or mitigation measures to limit or reduce the impact to an acceptable level.

Overall, the results of the significant impact assessment matrix for the proposed minerals exploration activities on the physical and biological environments are shown in Tables 5.12.

Table 5.12: Significant impact assessment matrix for the proposed exploration activities.

SIGNIFICANT IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	RECEPTOR CHARACTERISTICS (SENSITIVITY)	Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
Very High (5)	Major [5/5] / Major [4/5[/ Moderate [3/5] / Moderate [2 /5] / Minor 1/5																
High (4)	Major [5/4] / Major [4/4] / Moderate [3/4] / Moderate [2/4] / Minor[1/4]																
Medium (3)	Major [5/3] / Moderate[4/3] / Moderate[3/3] / Minor[2/3] / None[1/3]																
Low (2)	Moderate [5/2] / Moderate[4/2] / Minor[3/2] / None[2/2] / None[1/2]																
Negligible (1)	Minor [5/1] / Minor [4/1] / None [3/1] / None [2/1] / None [1/1]																
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	(iii) Purchase and analysis of existing Government aerial hyperspectral	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

Table 5.12: *Cont.*

SENSITIVITY			PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
			Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3.	**Initial Local Field-Based Activities**	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2
		(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
4.	**Detailed Local Field-Based Activities**	(i) Access preparation and related logistics to support activities	2\2	2\2	2\2	2\2	2\2	2\2	3/2	3/2	3/2	3/2	3/2	2\2	2\2	2\2	2\2	2\2
		(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities	2\2	2\2	2\2	2\2	2\2	2\2	3/2	3/2	3/2	3/2	3/2	2\2	2\2	2\2	2\2	2\2
		(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2
		(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above).	2\2	2\2	2\2	2\2	2\2	2\2	3/2	3/2	3/2	3/2	3/2	2\2	2\2	2\2	2\2	2\2
5.	**Prefeasibility and Feasibility Studies**	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2
		(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3
		(iii) Geotechnical studies for mine design	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2	2\2
		(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3
		(v) EIA and EMP to support the ECC for mining operations	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
		(vi) Preparation of feasibility report and application for Mining License	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	RECEPTOR CHARACTERISTICS (SENSITIVITY)				
	Very High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2 /5]	Minor 1/5
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]

5.6 Assessment of Overall Impacts

5.6.1 Summary of the Results of the Impact Assessment

In accordance with Tables 5.7 - 5.12, the following is the summary of the overall likely negative and significant impacts of the proposed exploration activities on the receiving environment (physical, biological and socioeconomic environments) without and with mitigations:

(i) Initial desktop exploration activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[1/1]** (Table 5.12). Except for the socioeconomic components which carries a **(+)**, the rest of the likely impacts are negative **(-)**.

(ii) Regional reconnaissance field-based activities: Overall likely negative impact on the receiving environment will be negligible with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[1/1]**. Some field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations. Overall significant impacts will be negligible **[1/1]** (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**.

(iii) Initial local field-based activities: Initial field-based activities will have localised low impacts with low probability of occurrence without mitigations and negligible with mitigations**.** Overall significant impacts will be negligible **[2/2]**. All desktop related activities and laboratory assessments will have negligible impacts with extremely unlikely probability of occurrence without mitigations. Overall significant impacts will be negligible **[2/2]** (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**.

(iv) Detailed local field-based activities: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised low impacts with mitigations. Overall significant impacts will be medium **[2/2]** without mitigations and low with mitigations (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**, and.

(v) Prefeasibility and feasibility studies to be implemented on a site-specific area if the local field-based studies prove positive: Overall likely negative impact on the receiving environment will be high and localised impacts without mitigations and localised medium impacts with mitigations. Overall significant impacts will be high **[3/3]** without mitigations and low with mitigations for bulk sampling, test mining and field logistics (Table 5.12). Except for the socioeconomic components which carries a **(+)**, all the other likely impacts are negative **(-)**.

6. CONCLUSION AND RECOMMENDATION

6.1 Conclusions

Bashan Technologies CC (**the Proponent**) intends to undertake exploration activities in the Exclusive Prospecting Licence (EPL) No. 6702 covering base and rare metals, industrial minerals, precious metals, precious stones and semi-precious stones. The exploration activities to be undertaken as assessed in this environmental assessment are as follows:

(i) Initial desktop exploration activities.

(ii) Regional reconnaissance field-based activities.

(iii) Initial local field-based activities including detailed mapping, sampling and drilling operations.

(iv) Detailed local field-based activities including detailed mapping, sampling and drilling operations, and.

(v) Prefeasibility and feasibility studies including possible test mining.

The overall severity of potential environmental impacts of the proposed project activities on the receiving environment (physical, biological, socioeconomic environments and ecosystem functions, services, use and non-use values or passive uses) will be of low magnitude, temporally duration, localised extent and low probability of occurrence.

6.2 Recommendations

It's hereby recommended that the proposed exploration activities be issued with an Environmental Clearance Certificate (ECC). The Proponent shall take into consideration the following key requirements for implementing the proposed exploration programme:

(i) Based on the findings of this EIA Report, the Proponent shall prepare an EMP Report with key mitigations measures.

(ii) Mitigation measures shall be implemented as detailed in the EMP report.

(iii) The Proponent shall obtain permission to enter and operate in the Ai-Ais/Richtersveld Transfrontier Park from MEFT.

(iv) The Proponent shall adhere to all the provisions of the EMP and conditions of the Access Agreement to be entered between the Proponent and the land owner/s in line with all applicable national regulations.

(v) Before entering a resource protected area, the Proponent and all workers must have undergone police security clearance with respect to the security of the diamonds during exploration and small-scale test mining, and.

(vi) Continuous consultation process and open disclosure of information to the MEFT, MME and the //Karas Regional Council in terms of outcomes of the exploration and small-scale test mining operations and ways forward.

6.3 Summary ToR for Possible Mining Project Development

In an even that economic minerals resources are discovered within the EPL 6702 area and could lead to the development of mining project, a new Environmental Clearance Certificate (ECC) for mining will be required. The ECC being supported by this EIA Report only covers the exploration phase.

A separate field-based and site-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports supported by specialist studies as maybe applicable must be prepared in order to support the application for the new ECC for mining operations. The EIA and EMP studies shall form part of the prefeasibility and feasibility study with respect to the test mining or possible mining operations.

The site-specific EIA and EMP shall cover the area identified to have potential economic minerals resources as well as all areas to be used for infrastructural support areas such as pit / shaft area/s, waste rock, tailings dump, access, office blocks, water and energy infrastructure support areas (water, energy and road / access). In addition to the Terms of Reference (ToR) to be developed during the Environmental Scoping study phase for the test mining / mining stages, the following field-based and site-specific specialist studies shall be undertaken as part of the EIA and EMP for possible test mining or mining operations in an event of a discovery of economic minerals resources and possible development of a mining project:

(i) Water studies.

(ii) Field-based flora and fauna diversity.

(iii) Noise and Sound modelling linked to engineering studies.

(iv) Site-specific archaeological assessment.

(v) Socioeconomic assessment, and.

(vi) Others as may be identified / recommended by the stakeholders/ land owners/ Environmental Commissioner or specialists.

The aims and objectives of the Environmental Assessment (EA) covering EIA and EMP to be implemented as part of the feasibility study if a variable resource is discovered are:

(i) To assess all the likely positive and negative short- and long-term impacts on the receiving environment (physical, biological and socioeconomic environments) at local (EPL Area), regional, national (Namibia) and Global levels using appropriate assessment guidelines, methods and techniques covering the complete project lifecycle. The EIA and EMP to be undertaken shall be performed with reasonable skill, care and diligence in accordance with professional standards and practices existing at the date of performance of the assessment and that the guidelines, methods and techniques shall conform to the national regulatory requirements, process and specifications in Namibia and in particular as required by the MME, MEFT and MAWLR, and.

(ii) The development of appropriate mitigation measures that will enhance the positive impacts and reduce the likely negative influences of the negative impacts identified or anticipated. Such mitigation measures shall be contained in a detailed EMP report covering the entire project lifecycle.

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8. ANNEXES

1. BID / Scoping Report

Bashan Technologies CC
("Proponent")

Final Environmental Scoping / Background Information Document (BID) for Public Consultation with Respect to the Proposed Exploration / Prospecting Programme for the Exclusive Prospecting License (EPL) No. 6702, Lüderitz District, //Karas Region, **SOUTHERN NAMIBIA**

November 2020

Bashan Technologies CC
P. O. Box 2020
Swakopmund, Namibia

PROPONENT, LISTED ACTIVITIES AND RELATED INFORMATION SUMMARY

TYPE OF AUTHORISATIONS REQUIRING ECC

Exclusive Prospecting License (EPL) No. 6702
for ECC for Exploration

NAME OF THE PROPONENT

Bashan Technologies CC

COMPETENT AUTHORITY

Ministry of Mines and Energy (MME)

ADDRESS OF THE PROPONENT AND CONTACT PERSON

Bashan Technologies CC
PO Box 2020
Swakopmund, Namibia

PROPONENT CONTACT PERSON:
Mr. Ignatius Kauvee
Mobile: +26481 635 9764/+26481 254 9885 I
Email: ikauvee@gmail.com

PROPOSED PROJECT

Proposed Minerals Exploration / Prospecting activities in the Exclusive Prospecting License (EPL) No. 6702,
Lüderitz District, //Karas Region

PROJECT LOCATION

Otjiwarongo District, Otjozondjupa Region, Central Namibia
(Latitude: -28.071667, Longitude: 16.945833)

ENVIRONMENTAL CONSULTANTS

Risk-Based Solutions (RBS) CC
(Consulting Arm of Foresight Group Namibia (FGN) (Pty) Ltd)
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Mobile: + 264-811413229; Email: smwiya@rbs.com.na
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ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Dr. Sindila Mwiya
PhD, PG Cert, MPhil, BEng (Hons), Pr Eng

Summary Profile and Qualification of the Environmental Assessment Practitioner (EAP) / International Consultant Projects Director – Dr Sindila Mwiya

Dr Sindila Mwiya has more than eighteen (18) years of practical field-based technical industry experience in Environmental Assessment (SEA, EIA, EMP, EMS), Energy (Renewable and Non-renewable energy sources), onshore and offshore resources (minerals, oil, gas and water) exploration / prospecting, operation and utilisation, covering general and specialist technical exploration and recovery support, Health, Safety and Environment (HSE) permitting for Geophysical Surveys such as 2D, 3D and 4D Seismic, Gravity and Electromagnetic Surveys for mining and petroleum (oil and gas) operations support, through to engineering planning, layout, designing, logistical support, recovery, production / operations, compliance monitoring, rehabilitation, closure and aftercare projects lifecycles. The great array of highly technical specialist knowledge and field-based practical experiences of Dr Sindila Mwiya has now been extended to supporting the development of Environmentally Sustainable, automated / smart and Climate Change resilient homes, towns and cities.

Through his companies, Risk-Based Solutions (RBS) CC and Foresight Group Namibia (FGN) (Pty) Ltd which he founded, he has undertaken more than 200 projects for Local (Namibian), Continental (Africa) and International (Global) based clients. He has worked and continue to work for Global, Continental and Namibian based reputable resources (petroleum and mining / minerals) and energy companies such as EMGS (UK/ Norway), CGG (UK/ France/Namibia), BW Offshore (Norway/Singapore /Namibia), Shell Namibia B. V. Limited (Namibia/ the Netherlands), Tullow Oil (UK/Namibia), Debmarine (DBMN) (Namibia), Reconnaissance Energy Africa Ltd (ReconAfrica) (UK/Canada/Namibia), Osino Resource Corporation (Canada/Germany/Namibia), Desert Lion Energy Corporation (Canada/ Australia/ Namibia), Petrobras Oil and Gas (Brazil) / BP (UK)/ Namibia, REPSOL (Spain/ Namibia), ACREP (Namibia/Angola), Preview Energy Resources (UK), HRT Africa (Brazil / USA/ Namibia), Chariot Oil and Gas Exploration (UK/ Namibia), NABIRM (USA/ Namibia), Serica Energy (UK/ Namibia), Eco (Atlantic) Oil and Gas (Canada / USA/ Namibia), ION GeoVentures (USA), PGS UK Exploration (UK), TGS-Nopec (UK), Maurel & Prom (France/ Namibia), GeoPartners (UK), PetroSA Equatorial Guinea (South Africa / Equatorial Guinea/ Namibia), Preview Energy Resources (Namibia / UK), Sintezneftegaz Namibia Ltd (Russia/ Namibia), INA Namibia (INA INDUSTRIJA NAFTE d.d) (Croatia/ Namibia), Namibia Underwater Technologies (NUTAM) (South Africa/Namibia), InnoSun Holdings (Pty) Ltd and all its subsidiary renewable energy companies and projects in Namibia (Namibia / France), HopSol (Namibia/Switzerland), Momentous Solar One (Pty) Ltd (Namibia / Canada), OLC Northern Sun Energy (Pty) Ltd (Namibia) and more than 100 local companies. Dr Sindila Mwiya is highly qualified with extensive practical field-based experience in petroleum, mining, renewable energy (Solar, Wind, Biomass, Geothermal and Hydropower), Non Renewable energy (Coal, Petroleum, and Natural Gas), applied environmental assessment, management and monitoring (Scoping, EIA, EMP, EMP, EMS) and overall industry specific HSE, cleaner production programmes, Geoenvironmental, geological and geotechnical engineering specialist fields.

Dr Sindila Mwiya has undertaken and continue to undertake and manage high value projects on behalf of global and local resources and energy companies. Currently, (2020-2023) Dr Sindila Mwiya is responsible for permitting planning through to operational and completion compliance monitoring, HSE and engineering technical support for multiple major upstream onshore and offshore petroleum, minerals and mining projects, Solar and Wind Energy Projects, manufacturing and environmentally sustainable, automated / smart and Climate Change resilient homes developments in different parts of the World including Namibia. Currently, Dr Sindila Mwiya is developing a 16 Ha commercial and residential Mwale Mwiya Park in the Town of Katima Mulilo, Zambezi Region, Namibia as one of first advanced Environmentally Sustainable, automated / smart and Climate Change resilient development in Namibia. He continue to worked as an International Resources Consultant, national Environmental Assessment Practitioner (EAP) / Environmentally Sustainable, automated / smart and Climate Change resilient homes developer, Engineering / Technical Consultant (RBS / FGN), Project Manager, Programme Advisor for the Department of Natural and Applied Sciences, Namibia University of Science and Technology (NUST) and has worked as a Lecturer, University of Namibia (UNAM), External Examiner/ Moderator, NUST, National (Namibia) Technical Advisor (Directorate of Environmental Affairs, Ministry of Environment and Tourism / DANIDA – Cleaner Production Component) and Chief Geologist for Engineering and Environment Division, Geological Survey of Namibia, Ministry of Mines and Energy and a Field-Based Geotechnician (Specialised in Magnetics, Seismic, Gravity and Electromagnetics Exploration and Survey Methods) under the Federal Institute for Geoscience and Natural Resources (BGR) German Mineral Exploration Promotion Project to Namibia, Geophysics Division, Geological Survey of Namibia, Ministry of Mines and Energy.

He has supervised and continue to support a number of MScs and PhDs research programmes and has been a reviewer on international, national and regional researches, plans, programmes and projects with the objective to ensure substantial local skills development, pivotal to the national socioeconomic development through the promotion of sustainable natural resources coexistence, management, development, recovery, utilisation and for development policies, plans, programmes and projects financed by governments, private investors and donor organisations. Since 2006 until 2017, he has provided extensive technical support to the Department of Environmental Affairs (DEA), Ministry of Environment and Tourism (MET) through GIZ in the preparation and amendments of the Namibian Environmental Management Act, 2007, (Act No. 7 of 2007), new Strategic Environmental Assessment (SEA) Regulations, preparation of the updated Environmental Impact Assessment (EIA) Regulations as well as the preparation of the new SEA and EIA Guidelines and Procedures all aimed at promoting effective environmental assessment and management practices in Namibia.

Among his academic achievements, Dr Sindila Mwiya is a holder of a PhD (Engineering Geology/Geotechnical / Geoenvironmental / Environmental Engineering and Artificial Intelligence) – Research Thesis: Development of a Knowledge-Based System Methodology (KBSM) for the Design of Solid Waste Disposal Sites in Arid and Semiarid Environments, MPhil/PG Cert and BEng (Hons) (Engineering Geology and Geotechnics) qualifications from the University of Portsmouth, School of Earth and Environmental Sciences, United Kingdom. During the 2004 Namibia National Science Awards, organised by the Namibian Ministry of Education, and held in Windhoek, Dr Sindila Mwiya was awarded the Geologist of the Year for 2004, in the professional category. Furthermore, as part of his professional career recognition, Dr Sindila Mwiya is a life member of the Geological Society of Namibia, Consulting member of the Hydrogeological Society of Namibia and a Professional Engineer registered with the Engineering Council of Namibia.

November 2020
Windhoek, Namibia

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1. BACKGROUND TO THE PROJECT

1.1 Introduction

Bashan Technologies CC ("**Proponent**") hold mineral rights for base and rare metals, industrial minerals, precious metals, precious stones and semi-precious stones under the Exclusive Prospecting Licence (EPL) No. 6702. The Proponent is strategically focused on diamonds prospecting / exploration and small-scale test mining activities. The EPL 6702 was granted on the 16/03/2018 and will expire on the 15/03/2021. The total area of the EPL is 684.9362 Ha.

1.2 Purpose of this Document

The main purpose of this summary Scoping / Background Information Document (BID) is to provide background information on the proposed project activities by the proponent. The BID was used for public consultation and disclosure process as required in the application for Environmental Clearance Certificates (ECC) for the proposed exploration programme.

1.3 Location and Description of the Targeted Areas

The EPL No. 6702 is located in the Lüderitz District, //Karas Region, along the Orange River, the international border between Namibia and South Africa (Figs. 1.1 and 1.2). The EPL area fall within the /Ai-/Ais National Park which is part of the regional Ai-/Ais-Richtersveld Transfrontier Park created between Namibia and South Africa (Fig. 1.2). Rosh Pinah is the nearest town situated about 30 km to from the centre of the EPL along the C13 road, northwest of the EPL area (Fig. 1.3).

1.4 EPL 6702 Area and /Ai-/Ais National Park

The EPL 6702 area fall within the 4300 km² boundary of the /Ai-/Ais National Park area (Fig. 1.4). National Park is the Fish River Canyon which is the 2nd largest canyon in the world, and is a very well-known tourist destination and boasts one of the most well-known and famous hiking trails in southern Africa (Ministry of Environment, Forestry and Tourism (MEFT) and Ministry of Mines and Energy (MME), 2018)[1].

According to the Ministry of Environment, Forestry and Tourism (MEFT) and Ministry of Mines and Energy (MME), (2018), national policy on prospecting and mining in protected areas, the following areas therefore have been identified to be excluded from future prospecting and mining within the/Ai-/Ais National Park area:

a) The area around the scenic Fish River Mouth is an important wetland for a variety of wetland species including birds;

b) Existing tourist camps such as /Ai-/Ais and Hobas Tourist Camp have high tourism value and currently generate substantial income from tourism. A 30 km radius should be observed for any mining exploration activities;

c) The River mouths for the Konkiep, Boom and Naub rivers have potential for tourism and are ecologically important as they contain rare and endemic species and provide drainage system;

d) Areas close to the Canyon including the northern areas should be excluded to avoid any irreparable damage to the canyon which might affect current and future prospects of tourism;

e) Grootpens Island east of the Fish River has been earmarked as a potential lodge site;

f) Gamkab Valley and River Mouth has huge potential for 4x4 tour activities and new MET gate and facilities have been constructed at the Gamkab River mouth;

[1] Ministry of Environment, Forestry and Tourism (MEFT) and Ministry of Mines and Energy (MME), 2018). National policy on prospecting and mining in protected areas, 2018 -2022, Windhoek, Namibia.

According to the Ministry of Environment, Forestry and Tourism (MEFT) and Ministry of Mines and Energy (MME), (2018), areas adjacent to the Orange River have been severely impacted by mining, and major rehabilitation activities will be required to restore the aesthetic value of the area for any future tourism development. In line with the National Heritage Act some areas may be used for heritage tourism.

However, the area under the EPL 6702 cannot be used for heritage tourism because it falls under active diamond exploration and mining areas under the provisions of the Minerals (Prospecting and Mining) Act (No 33 of 1992) and Diamond Act 13 of 1999 (and the Regulations 1 April 2000 and Amendment of the Diamond Regulations 2003).

1.5 Targets / Areas of Interest within the EPL 6702

The area of the northern bank of the Orange River, between Augrabies and the eastern boundary of the Tsau //Khaeb (Sperrgebiet) National Park has been divided into 43 contiguous blocks. The blocks were offered for public application to undertake exploration and mining (Fig. 1.5). Each block is 3 (three) kilometers wide and runs for some 10 (ten) kilometers along the riverbank.

The prospecting and small-scale mining will take place within mainly Blocks Nos. 1 and 2. “Prospecting Area” occupies the Northern bank of the Orange River (along a strip of about 3.5 km width) (Fig. 1.5) and includes some portions of informal Blocks Nos. 1 and 2.

The proponent intends to undertake diamonds exploration and small-scale test mining over very limited Areas of Interest marked 1 – 3 as shown in Fig. 1.6 along the Orange River. According to Fig. 1.6, the Areas of Interest marked 1 – 3 falls outside the national park area excluded for minerals prospecting and mining.

The proponent intends to undertake prospecting using techniques such as geological mapping, trenching and bulk sampling.

Figure 1.1: Regional location of the EPL 6702, Map Prepared by Risk-Based Solution, 2020.

Coordinates			License Shape
Official Area:		684.9362 Ha	
Coordinate system:		GCS Bessel 1841	
	Latitude	Longitude	
Part 1			
1	28° 04' 30.43" S	017° 00' 00.43" E	
2	28° 04' 18.77" S	016° 59' 59.89" E	
3	28° 04' 11.89" S	016° 59' 40.85" E	
4	28° 03' 32.00" S	016° 59' 12.52" E	
5	28° 03' 17.82" S	016° 58' 43.68" E	
6	28° 03' 27.65" S	016° 58' 18.19" E	
7	28° 03' 58.57" S	016° 57' 56.05" E	
8	28° 04' 18.05" S	016° 57' 17.17" E	
9	28° 04' 04.04" S	016° 56' 04.81" E	
10	28° 03' 59.62" S	016° 56' 03.26" E	
11	28° 04' 07.64" S	016° 54' 06.91" E	
12	28° 05' 21.16" S	016° 52' 59.88" E	
13	28° 05' 53.45" S	016° 53' 00.10" E	
14	28° 05' 23.93" S	016° 53' 17.92" E	
15	28° 04' 29.64" S	016° 54' 02.74" E	
16	28° 04' 15.92" S	016° 54' 29.27" E	
17	28° 04' 13.40" S	016° 55' 19.99" E	
18	28° 04' 20.10" S	016° 56' 03.77" E	
19	28° 04' 41.84" S	016° 56' 43.44" E	
20	28° 04' 41.63" S	016° 57' 17.42" E	
21	28° 04' 08.65" S	016° 58' 05.38" E	
22	28° 03' 50.11" S	016° 58' 22.33" E	
23	28° 03' 40.50" S	016° 58' 41.38" E	
24	28° 03' 43.92" S	016° 58' 58.37" E	
25	28° 04' 21.04" S	016° 59' 34.91" E	

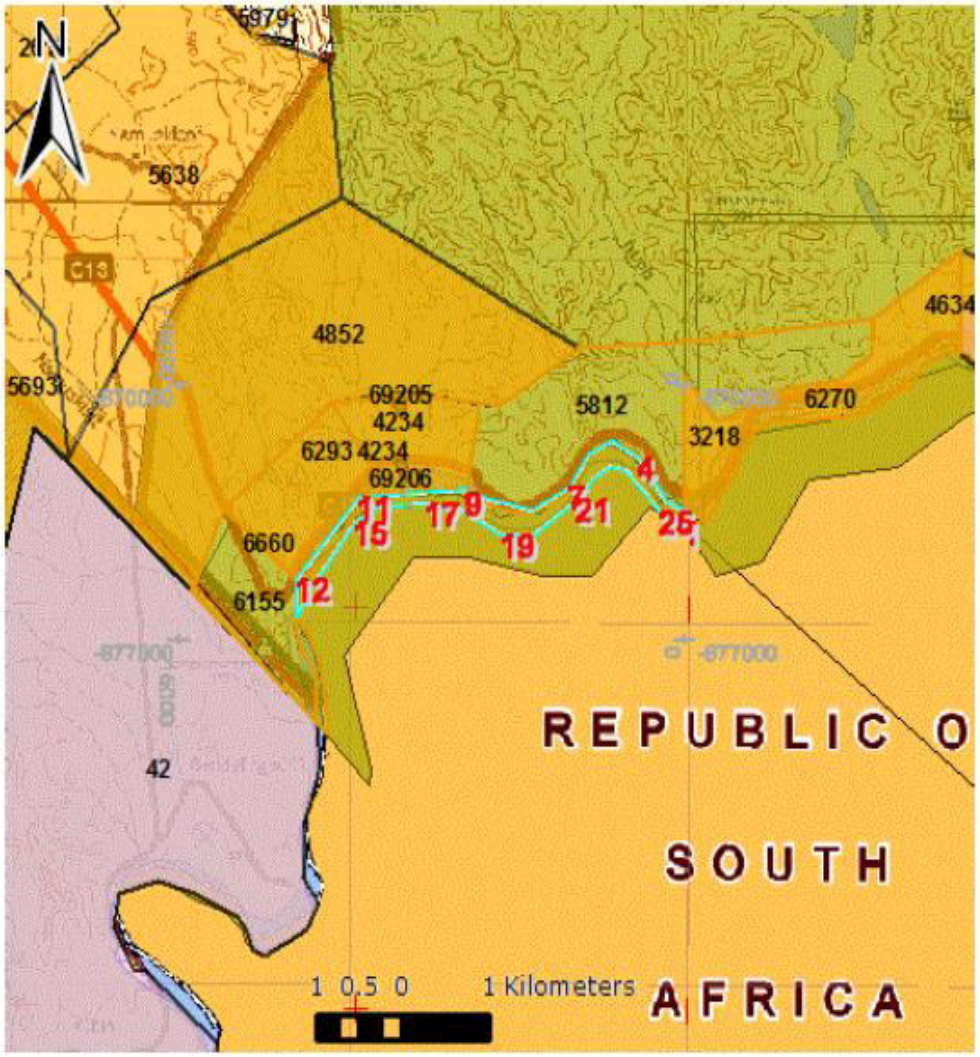


Figure 1.2: Detailed regional location of the EPL 6702 and coordinates (Source: http:// portals. flexicadastre.com/Namibia).

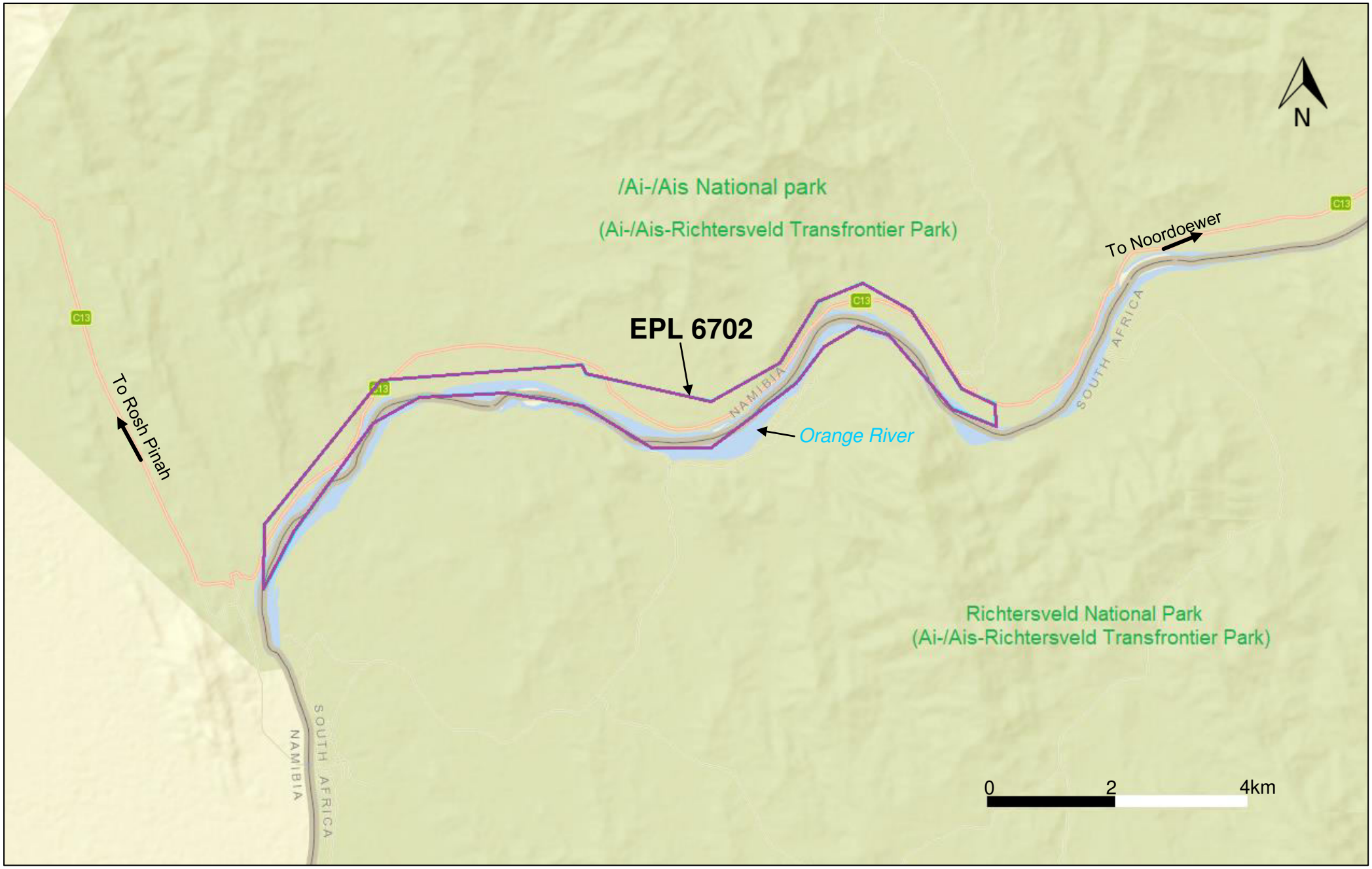


Figure 1.3: Detailed regional location of the EPL 6702 and coordinates (Source: http:// portals. flexicadastre.com/Namibia).

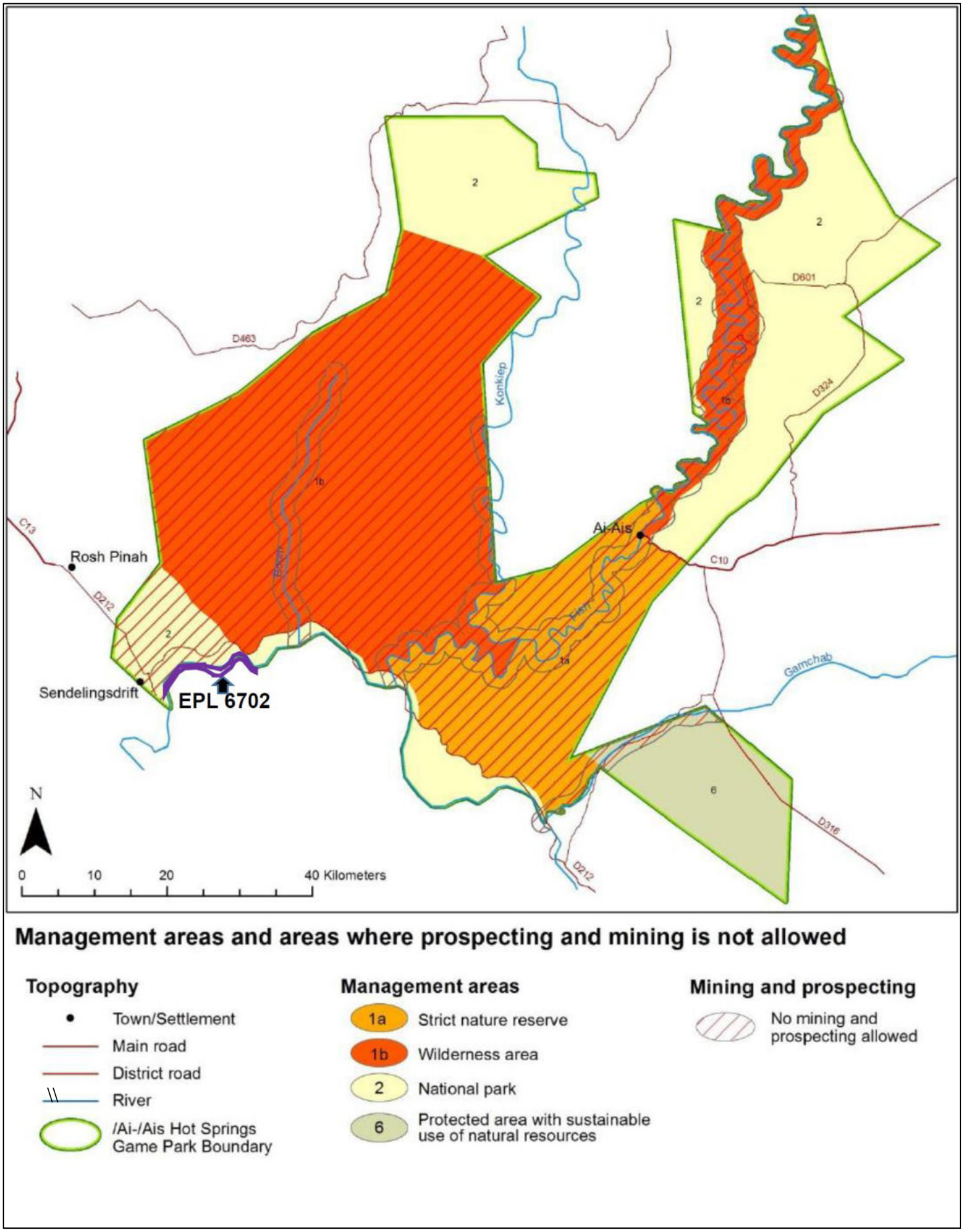
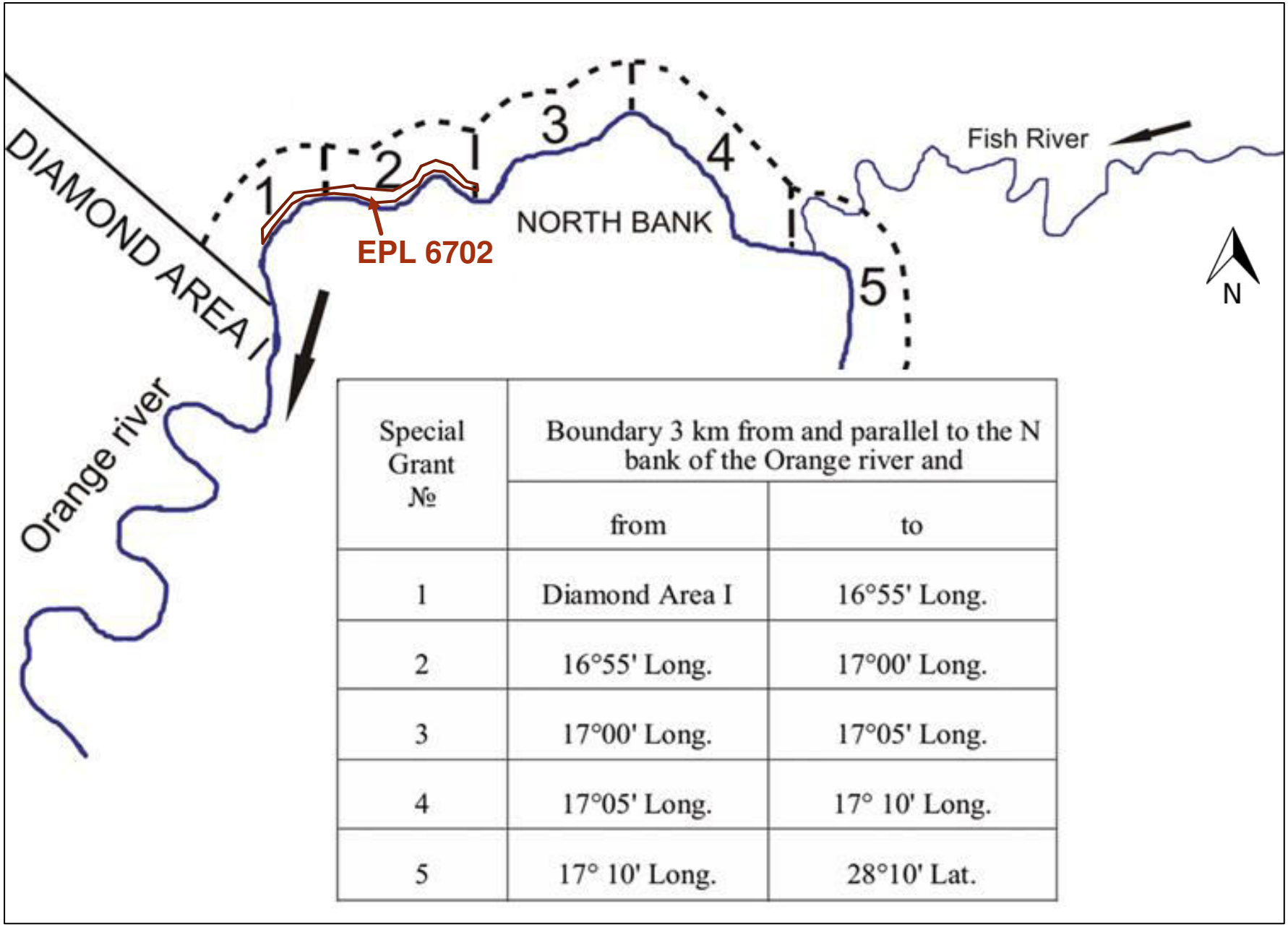


Figure 1.4: Extent and land use of the /Ai-/Ais National park with respect to minerals exploration and mining (Source: Ministry of Environment and Tourism (MET) and Ministry of Mines and Energy (MME), 2018).



Special Grant №	Boundary 3 km from and parallel to the N bank of the Orange river and	
	from	to
1	Diamond Area I	16°55' Long.
2	16°55' Long.	17°00' Long.
3	17°00' Long.	17°05' Long.
4	17°05' Long.	17° 10' Long.
5	17° 10' Long.	28°10' Lat.

Figure 1.5: The northern bank of the Orange River, between Augrabies and the eastern boundary of the Tsau //Khaeb (Sperrgebiet) National Park, divided into 43 contiguous blocks. The EPL 6702 fall within Blocks 6-8).

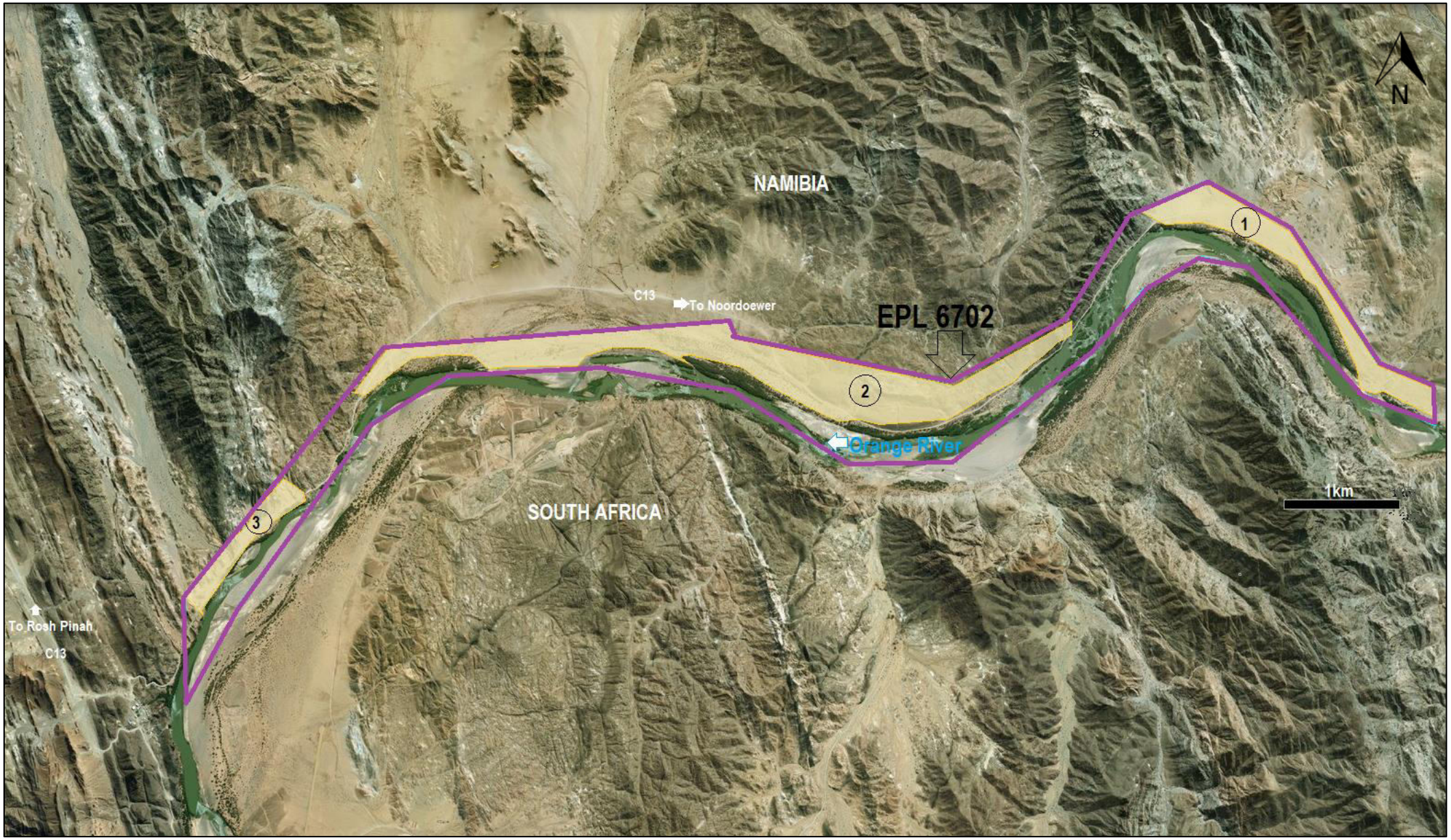


Figure 1.6: Detailed regional location of the EPL 6702 showing the key areas of interest for the proposed diamond exploration and small-scale test mining marked 1-3 (Source: http:// portals. flexicadastre.com/Namibia).

2. SUMMARY OF THE PROPOSED ACTIVITIES

2.1 Potential Diamondiferous Deposits

The mineral deposit to be explored followed by small scale test mining is diamondiferous fluvial gravel of the mesa-Orange terrace remains. Aerial image of the main targeted area is shown on Fig. 1.6. Some gravel deposits have been delineated in a palaeo-terraces of the Orange River. Within the EPL area, the alluvial terraces are traced by the chain of residual Mils along the Orange River north bank (Fig. 1.6).

2.2 Proposed Bulk Sampling

The overall grade of the gravels in the mesa-Orange terraces has been shown to be in the order of 1.5 carat per 100 tons. This low grade combined with the large average size of diamond (1.0 carat per stone) means that there is a "nugget effect". Thus, to obtain an accurate estimate of the overall deposit grade it will be necessary to take a large volume sample.

Initially, the intention was to excavate a minimum of 6 to 9 trenches – two (2) in each of the promising areas where an average grade is expected. If the promising area yields positive results and the average location yields negative, additional trenches may be excavated to improve the uncertainty and for better grade control.

For the purposes of this investigation it is assumed that only few trenches will be excavated. It is proposed that a 3,500 tonnes bulk sample of gravel may be collected from potential economic terraces depending on test results. According to preliminary estimate the collection of 3,500 tons of gravel sample will require the removal or 9,000 tons of overburden.

If some trenches provide positive results, full-scale mining will commence following the application for a Mining License (ML) and granting of all the relevant permits such as the ECC, water abstraction and discharge, security and park access. If the optimum trench fails to provide encouraging results the operation will be suspended.

2.3 Excavation and Test Mining Process

As part of the proposed exploration, excavation of large bulk samples with a minimum of 6 trenches and up to 9 trenches will be undertaken depending on test results. Each trench will be approximately 30 m in length by 15 m wide. The trenches will be terraced (one terrace every 3 m depth) and there will also be a ramp with a 15% slope angle to enable access to the trenches.

The diamondiferous gravel layer is overlain by up to 15 m of overburden, which includes mainly floodplain alluvium and proluvium. This material will need to be removed before excavation of the diamond-bearing gravels can occur. Therefore, each trench will be mined by removing the following overlying layers:

- Overlying soil layer (about 0.5 to 1 m), and;
- Overburden layer which is between 5 m and 20 m deep;

All overburden material will be transported to a suitable site to be stockpiled. The different kinds of material will be stockpiled separately for use later in various applications during and after mining e.g. backfilling, and rehabilitation process.

The 2-3 m thick diamond-bearing gravel layer will then be recovered by excavation using earthmoving equipment. The diamond-bearing gravel will be transported from the trenches to the ore yard for further processing at the Washing plant. Transportation of the material will be via haulage trucks (approximately 2-3 on site).

2.4 Processing the Gravel and Waste Products

The diamond-bearing ore will be processed covering the following steps in order to recover the diamonds:

- Ore body will be screened to remove the +28 mm (up to 32 mm) fraction;
- +28 mm fraction is the waste gravel portion that will be stockpiled on site;
- -28 mm fraction will proceed to the dense medium separation (DMS) plant (due to the high specific gravity of diamonds, it has been recommended that a Dense Medium Separation (DMS) plant is used rather than a conventional plant);
- Within the DMS plant the diamond-bearing fraction will be separated out by washing (to remove fine particles) and cycloning (to remove further waste gravels);
- Three further wastes will be produced from the DMS plant - tailings (+ 2 mm), waste gravels (up to 28 mm) and the slimes (- 2mm);
- +2 mm to 28 mm waste fractions will be stockpiled on site and the - 2 mm fraction will be pumped into a slimes dam, and;
- After diamondiferous fraction has been separated out, the diamonds will be sorted using an X-ray sorting machine.

As part of the small-scale test mining and diamond recovery process, a small DMS plant will process 50 tonnes per hour while the screening and washing plant will have about 15 tonnes per hour capacity.

2.5 Site Infrastructure

2.5.1 Water Supply

Water for the small-scale mining operation will be supplied via a pipeline from the Orange River following the issue of an abstraction pert by the Department of Water Affairs in the Ministry of Agriculture, Water and Land Reform.

The water will be abstracted using a diesel-driven pump situated alongside the river and will be pumped via pipeline to the mining areas and Wash plant. When the mine is fully operational the water requirement for the mine is 3.5 m^3/h over a 9 hours period to be used for the operation of the Washing plant, dust allaying and domestic use.

2.5.2 Power Supply

Power supply for the operation will be via 2 (two) diesel generators and solar PV as maybe required.

2.5.3 Access

There is an existing gravel road, the C13 and in good condition that extends from Rosh Pinah to Noordoewer. The road is used fairly infrequently and the principal road users are tourists and persons requiring access to Aussenkehr or the Government irrigation projects along the Orange River.

A haul road extended from the C13 along the Orange River northern bank to the diamondiferous gravel deposit, will be required to connect to the prospecting / test mining sites and the test processing plant area.

2.5.4 Solid and Liquid Waste Management

During the exploration phase, Bashan Technologies CC will collect and store all the generated domestic waste at the field camp and disposed of the waste at the existing waste disposal facility in Rosh Pinah. It is planned to continue this during the small-scale mining operations.

Due to the proximity of the proposed operations to Orange River, share water resource between Namibia and South Africa, chemical toilets will be used throughout prospecting and small-scale test mining phase.

Discharge of liquid or solid waste into any public stream and burial of waste within the EPL area is allowed are strictly prohibited.

2.5.5 Staff and Employment

It is envisaged, that Geotechnical personnel and skilled workers such as excavating machinery drivers, wash plant operators and mechanics will be required for the proposed exploration and small-scale test mining operations in the EPL 6702.

The staff required for proposed exploration and small-scale test mining will be between 6-8 senior personnel, including 1 project coordinator/manager, 1 site geologist, 1 shift's foreman, 2 mining foremen, 1 plant fitter and 2 mechanics. There will also be various visiting consulting-geologists, surveyors, environmental inspectors and Bashan Technologies CC Head Office personnel.

Approximately 6 test plant shift workers will be required and up to 10 contract laborers. There will also be the need for at least 2 security personnel, hired from an independent security company, as well as ancillary personnel such as a catering and cleaning staff. There will not be the need for a full complement of maintenance staff, but maintenance personnel will be required for at least one week of the month. There will therefore be a full-time staff of at least 25 people and at least 2-3 visitors at any one time.

Work will be on a shift basis, either one 9-hours shift, 5 (five) days a week.

2.5.6 Accommodation and Transport

All workers will be accommodated in Rosh Pinah utilising already existing facilities where available. The general labour staff will either be accommodated in a tented camp as may be required. The sub-contractors will be responsible for accommodation of their labourers, who will either be accommodated together with the plant workers in the tented camp.

Transport will be provided to all workers from Rosh Pinah to the EPL 6702 area, approximately over a distance of 30 km one-way.

2.5.7 Security

Bashan Technologies CC has identified 4 (four) areas of potential security and/or safety concern i.e. the test mining area, the washing plant area, diamond storage and camping/housing as summarized in Table 2.1.

As a result of the identified diamond security challenges there is a need for fencing and security patrols in certain areas in order to meet diamonds security requirements as provided for in the Diamond Act 13 of 1999 (and the Regulations 1 April 2000 and Amendment of the Diamond Regulations 2003).

Table 2.1: Key area of concern in term of diamond security during exploration and small-scale test mining phase in the EPL 6702.

Area	Issues
Exploration and small-scale test mining areas	1. Trenches and pits deeper than 5-10 m, so access should be controlled especially considering proximity of workers; 2. Danger from heavy vehicles, earthmoving and operating equipment;
Washing plant area	1. Theft of diamonds recovered at the Washing Plant; 2. Danger from earthmoving and operating equipment;
Diamond storage	1. Theft of the recovered diamonds;
Camp and housing	1. Petty theft especially during work hours

2.5.8 Time Schedule

Bashan Technologies CC proposing to commence operations as soon as the Environmental Clearance Certificate (ECC) as well as other applicable permits have been granted by the Government. It is anticipated that the mobilisation phase will take approximately 1-2 months. The operational phase including the stripping of overburden, removal and processing of the ore gravels and running of the plant are expected to take 2 years. The overburden stripping will take about 20 months of the 2 operational years.

2.6 Government Permits Requirements

The Ministry of Mines and Energy (MME) is the Competent Authority (CA) while the Ministry of Environment, Forestry and Tourism (MEFT) is the environmental regulator with jurisdiction extend to all protected areas in Namibia. Ministry of Agriculture, Water Affairs and Land Reform (MAWLR) is the leading agency responsible for management of surface and groundwater utilisation through the issuing of abstraction permits and wastewater disposal permits as well as water quality monitoring and reporting. MAWLR is also the Government agency responsible for management of State land and national Land Reform Programmes. Table 2.2 summarises the key permits requirements associated with the various activities to be undertaken under the EPL 6702.

The Minerals (Prospecting and Mining) Act (No 33 of 1992) is the most important legal instrument governing the mining industry. The Minerals (Prospecting and Mining) Act (No 33 of 1992) regulates reconnaissance, prospecting and mining of minerals in Namibia. The Act details reporting requirements for monitoring of activities and compliance to environmental performance, such as disposal methods. Diamonds security during exploration and small-scale test mining activities will need to be put in place in line with the provisions of the Diamond Act 13 of 1999 and the Regulations 2000 and 2003.

The proposed prospecting and small-scale test mining activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the Regulations and cannot be undertaken without an Environmental Clearance Certificate. In fulfilment of the environmental requirements, the Proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner to undertake the Scoping and EMP in order to support the application for ECC.

Table 2.2: Summary of the likely applicable permits.

Activity	Permit and Applicable Legislation	Permitting Authority	Current Status
1. Exploration (Sampling and Processing and Diamonds Recovery)	Exclusive Prospecting License (EPL) No. 6702 issued under the Minerals (Prospecting and Mining) Act, 1992	Ministry of Mines and Energy (MME)	Granted 16/03/2018 and will expire on the 15/03/2021
2. Diamonds security during Exploration and Small-Scale Test Mining	The Diamond Act 13 of 1999 (and the Regulations 1 April 2000 and Amendment of the Diamond Regulations 2003)		Meet Requirements During Exploration and Test Mining
3. Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP)	Environmental Clearance Certificate (ECC) issued under the Environmental Policy and Environmental Management Act, (Act No. 7 of 2007)	Ministry of Environment, Forestry and Tourism (MEFT)	To apply after completion of the EIA and EMP
4. Construction, alteration of waterworks with capacity to hold in excess of 20,000L	Water Act 54 of 1956	Ministry of Agriculture, Water Affairs and Land Reform (MAWLR)	To Apply when required / before the Implementation of the proposed activities
5. Abstraction of water other than that provided by Nam Water	Water Resources Management Act, 2004 (No. 284 of 2004)		
6. Discharge of effluents or construction of effluent facility or disposal site			
7. Removal, disturbances or destruction of bird eggs	Nature Conservation Ordinance 4, 1975	Ministry of Environment, Forestry and Tourism (MEFT)	No removals anticipated
8. Removal, disturbance of protected plants			
9. Removal, destruction of indigenous trees, bushes or plants within 100 yards of stream or watercourse	Forestry Act, 12 of 2001	Ministry of Agriculture, Water Affairs and Land Reform (MAWLR)	
10. Scheduled processes in Controlled area	Atmospheric Pollution Prevention Ordinance 11 of 1976	Ministry of Health and Social Services	No Permits Require
11. Management of used oil	Petroleum Products and Energy Act 13 of 1990	Ministry of Mines and Energy (MME).	To Apply when required / before the Implementation of the proposed Activities
12. Operating a petroleum consumer installation.			
13. Transport of hazardous substances and radioactive waste	Minerals (Prospecting and Mining) Act, 1992		
14. Construction of waste Disposal sites.	Environmental Policy and Environmental Management Act, (Act No. 7 of 2007)	Ministry of Environment, Forestry and Tourism (MEFT)	

3. RECOMMENDATIONS AND SUMMARY TOR

3.1 Aims and Objectives of the Environmental Assessment

The aims and objectives of the Environmental Assessment (EA) covering this BID and the EIA and EMP Reports to be prepared for the proposed minerals exploration activities in the EPL 6702 area are:

- ❖ To assess the likely positive and negative short and long-term impacts on the receiving environment (physical, biological and socioeconomic environments) at local area (EPL area), regional (//Karas Region), national (Namibia) and Global levels using appropriate assessment guidelines, methods and techniques covering the complete project lifecycle. The assessment to be undertaken shall be performed with reasonable skill, care and diligence in accordance with professional standards and practices existing at the date of performance of the assessment and that the guidelines, methods and techniques shall conform to the national regulatory requirements, process and specifications in Namibia and in particular as required by the Ministry of Environment, Forestry and Tourism (MEFT), the Ministry of Mines and Energy (MME), Ministry of Agriculture, Water Affairs and Land Reform (MAWLR) and other Competent Authorities;

- ❖ The development of appropriate mitigation measures that will enhance the positive impacts and reduce the likely negative impacts to be identified or anticipated. Such mitigation measures shall be contained in the EMP Report covering the entire project lifecycle, and;

To support the application for Environmental Clearance Certificate (ECC) for the proposed minerals exploration activities. All the proposed project activities will be assessed against the receiving environment covering the physical, biological, socioeconomic and ecosystem services (function, use values and non-use) (Table 3.1).

Table 3.1: Summary of the proposed activities, alternatives and key issues to be considered during the Environmental Assessment (EA) process covering Scoping and EMP process.

<table>
<tr><th colspan="2">ACTIVITIES</th><th>ALTERNATIVES TO BE CONSIDERED</th><th colspan="2">KEY ISSUES EVALUATED AND ASSESSED WITH EMP / MITIGATION MEASURES DEVELOPED</th></tr>
<tr><td rowspan="11">PROSPECTING / EXPLORATION WITH SMALL SCALE TEST MINING OPERATIONS</td><td rowspan="11">1. Initial desktop exploration activities (no field-work undertaken);
2. Regional reconnaissance field-based mapping and sampling activities;
3. Initial local field-based mapping and sampling activities,
4. Detailed local field-based activities such as local geological mapping, bulk sampling and test mining (Subject to the positive results of (i) - (iii) above), and;
5. Prefeasibility and feasibility studies (Subject to the positive results of (i) - (iv) above).</td><td rowspan="11">(i) Location for Minerals Occurrence;
(ii) Other Alternative Land Uses: Game Farming, other types of Agricultural activities, Tourism and minerals and mining operations;
(iii) Ecosystem Function (What the Ecosystem Does;
(iv) Ecosystem Services;
(v) Use Values;
(vi) Non-Use, or Passive Use;
(vii) The No-Action Alternative
(viii) Others to be identified during the public consultation process and preparation of the Scoping and EMP Report</td><td colspan="2">Potential land use conflicts / opportunities for coexistence between proposed exploration and other existing land uses such as conservation, tourism and agriculture</td></tr>
<tr><td rowspan="3">Impacts on the Physical Environment</td><td>Natural Environment such as air, noise, water, dust etc.</td></tr>
<tr><td>Built Environment such as existing houses, roads, transport systems, Buildings, energy and water and other supporting infrastructure</td></tr>
<tr><td>Socioeconomic, Archaeological and Cultural impacts on the local societies and communities</td></tr>
<tr><td rowspan="4">Impacts on the Biological Environment</td><td>Flora</td></tr>
<tr><td>Fauna</td></tr>
<tr><td>Habitat</td></tr>
<tr><td>Ecosystem functions, services, use values and non-Use or passive use</td></tr>
</table>

3.2 Approach to Environmental Assessment Process and Steps

3.2.1 Overview

The environmental assessment process adopted for the proposed project took into considerations the provisions of the Environmental Impact Assessment (EIA) Regulations, 2012 and the Environmental Management Act (EMA), 2007, (Act No. 7 of 2007) as outlined in Fig. 3.1. The first step in the impact identification process was to identify the various types of activities associated with each of the developmental stages of the proposed (Table 3.1). The environmental assessment steps undertaken or still to be taken are summarised as follows (Fig. 3.1):

(i) Projects screening process (**Undertaken in January 2019**).

(ii) Preparation of the BID for stakeholders consultation and projects registration with the (**Undertaken in January 2019 and updated / finalised in December 2020**).

(iii) Preparation of the Public Notice to be published in the local newspapers as part of required public consultation process (**Undertaken in January 2020**).

(iv) Opened the Stakeholder register to be maintained throughout the consultation process (**Undertaken in January 2019**).

(v) Invitation / notices to stakeholders and the general public to participate in environmental assessment process issued through the local newspaper advertisements as well as via direct emails communications to key stakeholders institutions such as Line Ministries, Regional and Local Governments as may be applicable (U**ndertaken in February and March 2019** (Figs. 3.2 -3.4).

(vi) Preparation of the Final BID, Draft EIA and EMP Reports (**Undertaken in June and July 2019**).

(vii) The final EIA and EMP reports based on the ccomments and inputs from the client and stakeholder consultations. Final Reports to be submitted to the Environmental Commissioner in MEFT through the MME (Competent Authority) in fulfilment of all the requirements of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) for application of the ECC for the proposed projects (**To be Undertaken in December 2020**).

(viii) Following the submission of the application for ECC to the Environmental Commissioner, the public and stakeholders who are interested or affected by the proposed projects will have additional **fourteen (14) days** to submit comments / inputs about the proposed projects direct to the Environmental Commissioner when the application will be made available for additional comments / inputs by the Environmental Commissioner on the MEFT digital Portal www.eia.met.gov.na, and (Fig. 3.1).

(ix) Wait for the Records or Decisions (RDs) from the Environmental Commissioner (**From January 2021**).

3.2.2 Public Consultations

Public consultation and engagement must be part of the environmental assessment process for this project. According to the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007), a person conducting a public consultation process must give notice to all Interested and Affected Patties (I&AP) of the application which is subjected to public consultation.

The EIA Regulations clearly state that potential interested and affected parties must be provided with a reasonable opportunity (21 days) to comment on the application under Section 21(6) of the EIA

Regulations. In line with the provisions of the regulations, the 1st advertisement was published in the Windhoek Observer weekly newspaper dated 22nd February 2019 informing all the I&AP about the proposed exploration (Fig. 3.2). Additional adverts were published in Namibian Newspaper dated **28th February 2019** and Confidente Newspaper dated 7th – 13th March 2019 (Figs. 3.3 and 3.4).

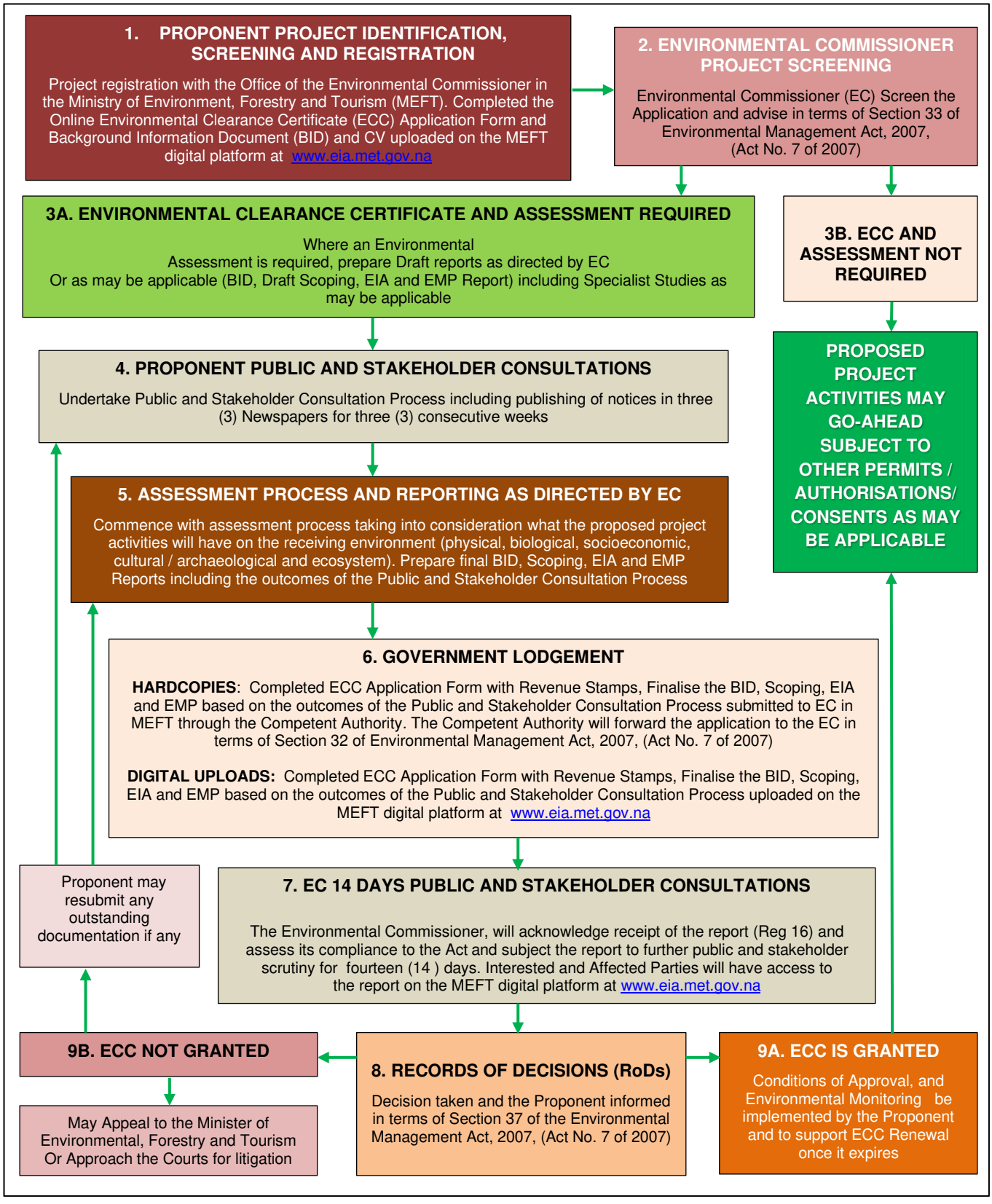


Figure 3.1: Schematic presentation of Namibia's Environmental Assessment Procedure.

ADVERTS

PUBLIC INVITATION

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE CONSTRUCTION AND OPERATION OF THE FUEL RETAIL FACILITY IN KALKRAND, HARDAP REGION

Notice is hereby given to all Interested and Affected Parties (I & APs) that an application will be made to the Environmental Commissioner in terms of Environmental Management Act (No. 7 of 2007) and its Regulations (2012) for the following intended activity.

Project Name: Mensah Service Station - Kalkrand

Project Location: 444, Denkrust, in Kalkrand, Hardap Region.

Project Description: The construction of a new Fuel Retail Facility and associated convenience store.

Proponent: Mensah Service Station

Environmental Consultant: Matrix Consulting Services

Public Meeting Date: Friday, 8 March 2019
Venue: Kalkrand Recreational Centre
Time: 10h00

Matrix Consulting Services has been appointed by Mensah Service Station to conduct an Environmental Impact Assessment for the proposed fuel retail facility.

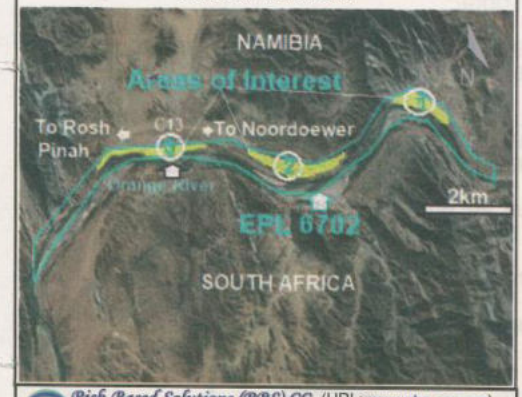
All Interested and Affected Parties (I&APs) are encouraged to register and raise concerns or provide comments and opinions. All Interested and Affected Parties will be provided with a Background Information Document (BID) comprising detailed information for the intended. Should you wish to register as I&AP and receive a BID, please contact the Matrix Consulting Services office.

Contact: Mr. Allonga Tel: (+264-61) 224197; Fax: (+264-61) 212165;
E-Mail: environment@matrixconsultingcc.com
DEADLINE FOR COMMENTS: 15 March 2019.

PUBLIC NOTICE BY BASHAN TECHNOLOGIES CC
APPLICATIONS FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR THE EPL No. 6702, LÜDERITZ DISTRICT, //KARAS REGION

BASHAN TECHNOLOGIES CC (the Proponent) hold mineral rights for base and rare metals, industrial minerals, precious metals, precious stones and semi-precious stones under the Exclusive Prospecting Licence (EPL) No. 6702 granted on 16/03/2018 and will expire on the 15/03/2021. The EPL No. 6702 area totalling 684 Ha is situated along the Orange River and fall within the Ai-/Ais Richtersveld Transfrontier Park. The proponent intend to undertake diamonds exploration and possible small-scale test mining activities over a very limited Areas of Interest as shown in yellow and marked **1-3** on the map below. The Areas of Interest marked **1-3** are not pristine and are already highly disturbed by previous diamond exploration and mining operations. The proponent intend to undertake prospecting using techniques such as geological mapping, trenching and bulk sampling followed by small scale test mining. The proposed prospecting and small-scale test mining activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the Regulations and cannot be undertaken without an Environmental Clearance Certificate (ECC). In fulfilment of the environmental requirements, the Proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for ECC. All Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed prospecting and small-scale test mining activities in the EPL No. 6702. Background Information Document (BID) is available upon registration.

REGISTER BY EMAIL: frontdesk@rbs.com.na or Contact Dr. Sindila Mwiya for more Information: smwiya@rbs.com.na, Mobile: 0811413229
DEADLINE FOR WRITTEN SUBMISSIONS IS:
FRIDAY 29th MARCH 2019



Risk-Based Solutions (RBS) CC (URL: www.rbs.com.na)
Resources (Oil, Gas, Minerals & Energy Exploration, Production & Mining) and Environmental Assessments (SEA, EIA, EMP, EMS) Specialist Consultants

PUBLIC NOTICE BY HEADSPRING INVESTMENTS
APPLICATIONS FOR ENVIRONMENTAL CLEARANCE CERTIFICATES (ECCs) FOR THE EPLs Nos. 6780-6783, GOBABIS DISTRICT, OMAHEKE REGION

HEADSPRING INVESTMENTS (Pty) Ltd (the Proponent) hold mineral rights for Nuclear Fuels under the Exclusive Prospecting Licences (EPLs) Nos. 6780-6783, all granted on the 12/02/2018 and will expire on the 11/02/2021. The individual EPLs sizes ranges between 95000-100000 Ha. The proponent intend to undertake prospecting for Nuclear Fuels using techniques such as aerial surveys, regional and local geological mapping, trenching, drilling and sampling. The exploration process will start with desktop and aerial studies, followed by ground reconnaissance of targets and detailed assessment if proves positive. No specific potential target/s have so far been delineated in these EPLs Areas. Once a potential target has been delineated, the proponent will notify the land owner/s and request for permission to access the target/s area/s. Depending on the outcomes of the initial assessments, an Access Agreement may be negotiated with the land owner/s. The proposed prospecting activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the EIA Regulations 30 of 2012 and cannot be undertaken without Environmental Clearance Certificates (ECCs) for each EPL. In fulfilment of the environmental requirements, the Proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and Environmental Management Plan (EMP) Report in order to support the applications for ECCs. All Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed prospecting activities in the EPLs Areas. A combined Background Information Document (BID) is available upon registration.

REGISTER BY EMAIL: frontdesk@rbs.com.na or Contact Dr Sindila Mwiya for more Information: smwiya@rbs.com.na, Mobile: 0811413229
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Figure 3.2: Copy of the Public Notice published Windhoek Observer Newspaper dated 22nd February 2019.

Husab workers fear for lives as Chinese get blasting contract

• ADAM HARTMAN

SWAKOP Uranium employees of the Husab mine in the Erongo region fear their safety was compromised by the company's management for contracting what they claim an "incompetent" Chinese contractor to carry out the drilling and blasting activities at the mine.

As a result, the workers stopped working since Monday, and petitioned their employer on Tuesday to investigate the matter.

About 500 workers in the mining department stopped working, and said they will not return to work until their concerns are investigated and the mine declared as safe by their employer. The workers warned that if this is not done soon, the processing department of about 1 200 workers would also shut down as it would not be supplied by the miners.

Vice president of human resources Percy McCallum, however, said only about 105 mineworkers are not working as there are 105 workers per shift, and there are three shifts.

Mineworkers Union of Namibia (MUN) branch chairman for Swakop Uranium, Timoteus Katjuaende, who read the petition, said the workers did not trust Beifang Mining Services after they learned that there were "a number of high potential incidents" related to the use and handling of explosives on site, and yet no apparent action was allegedly being taken by the company.

The workers accused Swakop Uranium of quickly suspending mining operations after an operator was killed in a truck accident last year on the mine site, and having terminated a contract for a local security company for alleged non-conformance, "but turn a blind eye" on issues that involve the Chinese expatriates and companies contracted by Swakop Uranium.

"Misconduct is misconduct, and non-compliance is non-compliance, whether the transgressor is Namibian or Chinese," charged Katjuaende.

The union accused Swakop Uranium's CEO, Cai Yushen, of turning a blind eye when Chinese break the rules or are not compliant, and in this case, the contractor is "doing experiments with explosives", or being irresponsible when handling explosives. But when confronted, they allegedly sneer at "Namibian laws"

The union alleges that Beifang Mining Services has a bad track record in terms of safety and quality compliance, yet they still managed to get the five-year contract through a "questionable tendering process"

MUN secretary for information and publicity Teofilus Teofilus said according to the Namibian Labour Act, the employer has an obligation to provide a safe and healthy environment for employees.

Some high potential incidents pointed out by the workers show that on 17 February, two live detonators were discovered on site by an excavation operator while busy preparing for a drilling process.

Another incident, on 16 February, allegedly occurred while an excavator was doing final wall scaling. The operator discovered two live detonators.

On 12 February, an incident happened in a pit while a hydraulic shovel was loading a haul truck, which resulted in a detonation after a shovel bucket came into contact with a detonator and set off a booster, resulting in the detonation.

Incidents referred to go as far back as 2016, but operations were allegedly not stopped.

The union is accusing the blasting company of using the Husab mine as an experimenting ground or training academy, which is done at the expense of the workers' safety and depriving Namibian professionals, especially young graduate mining engineers, artisans and surveyors the opportunity to develop themselves.

The company currently also does civil blasting services, mostly for all Chinese firms around the country, such as Cheetah Cement at Otjiwarongo and a coal mine at Opuwo.

The Namibian tried to reach out to Beifang Mining Services, but there was no answer. A message was left, but by the time of going to the printers, there was no response.

This company does not have any explosives magazine elsewhere, but using Husab mine explosives magazines for their commercial purposes outside Husab's operations.

PUBLIC NOTICE BY BASHAN TECHNOLOGIES CC APPLICATIONS FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR THE EPL No. 6702, LÜDERITZ DISTRICT, //KARAS REGION

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GIPF invests N$17,4m in housing development at Eenhana

THE Government Institutions Pension Fund (GIPF) has invested N$17,4 million in housing aimed at low and medium income groups at Eenhana in the Ohangwena region.

This was revealed by Ohangwena governor Usko Nghaamwa in a speech read on his behalf at the official opening ceremony of the new GIPF office at the town on Tuesday.

He said the housing development in Extension 6 will consist of 271 houses, and will greatly contribute towards the housing shortage in the region.

"The GIPF, through its unlisted investments, has been implementing some of the Harambee Prosperity Plan's pillars, such as social progress and infrastructure development by delivering housing and servicing land for their members," he noted.

Speaking at the same event, GIPF board of trustees' chairperson Goms Menette said the Eenhana housing unit development under the developer Fonmosa Island Investment consists of 271 erven, of which 124 are already serviced.

Eighty-five houses in phase one and 97 houses in phase two have been sold to date.

"This development came as a requirement to provide low-cost and decent housing to accommodate low, middle and high-income earners in a bid to ease land and housing shortages within the town of Eenhana," he added.

The GIPF is aiming to construct 30% of the 20 000 housing units envisaged under the Harambee Prosperity Plan. – *Nampa*

Goms Menette

Figure 3.3: Copy of the Public Notice published Namibian Newspaper dated 28th February 2019.

Agriculture & Tourism Conservation

■ Subsistence ■ Horticulture
■ Pastoral

Impacts of climate change on livestock productivity

By Erastus Ngaruka

CLIMATE change is a long term change in climatic/weather patterns of the earth or region. Such change is observed in temperature and rainfall patterns amongst others. It is being evidently reported that the earth temperature is on an increase and that rainfall activities have become unpredictable in many parts of the world, and Namibia is evidently experiencing the adverse effects of climate change. The agricultural output is primarily driven by climatic events, and these have adverse effects on both food and water availability in agroecosystems, hampering sustainable crop and Livestock productivity, as well as farmers' livelihoods.

The climate change effects can be direct or indirect. Livestock productivity is directly reliant on rangeland productivity which in turn is determined by soil moisture availability and environmental

Erastus Ngaruka

temperature. The management aspects as secondary determinants of agricultural output, should therefore aim at mitigating or enhancing farmers' adaptation to climate change events.

Climate change has been characterized by increase in environmental temperature, hence the extreme heat wave being experienced in all parts of Namibia currently, and figures of more than 40°C were recorded especially in the southern regions. The direct impact of this on livestock is the heat stress which negatively affects their wellbeing and performance.

Heat stress and feed intake

When an animal is eating, the digestive processes generate heat and increases the body temperature. For example, the normal body temperatures (°C) of cattle, Sheep and goats are; 38.5, 39, 39.5 respectively. When the body temperature increases beyond the normal, then the animals physiological functioning is affected and could be detrimental or life threatening in extreme cases. These ruminant animals (cattle, goat, and sheep) under normal circumstances will prefer to graze/forage during cooler hours of the day (early morning, late afternoon, or night) to avoid heat stress. They would only rest during the hot hours of the day to ruminate or re-chew the food they have eaten, breaking them into smaller pieces to enhance digestion further.

Grazing during the hot hours will mean too much heat will be exerted on the animal, from the sunlight and from the internal digestive processes rendering it to heat stress. This means the animal's physical activities such as walking, and feed intake will have to be reduced in order to maintain normal or optimal body temperature, and this in turn compromises the animal's nutrition and health status, and the overall performance. These will be experienced as nutrient deficiencies, poor growth rate and body condition, reduced milk yield, and poor reproduction amongst others.

Heat stress and reproduction

High temperature also affects livestock reproduction. The heat stress forces animals to reduce their exhaustive physical activities which also includes mating. The female animal's reproductive system as well as the sperm production process in male animals can be adversely affected by high temperature. Heat stress is said to depress the release of reproductive hormones such as the oestrogen and progesterone, compromising the consequent processes of oocyte (female egg cell) growth, oestrus (heat) cycle, conception, embryo development, and foetus growth amongst others. In male animals, high temperature negatively affects the process of sperm production, leading to temporal infertility.

Preventing heat stress in livestock

Although animals have the ability to adapt to environmental conditions and management regimes, the hot environments will compromise their potential physiological functioning and overall performance to some degree. It is therefore advisable to minimize the exposure of your animals to extreme high temperatures.

In the hot environments or when animals forage during the hot hours of the day, the water demand or intake increases. Thus, animals should have daily access to clean, cool and sufficient water. Water has a direct role of quenching the thirst and in digestion, and is importantly used as a coolant by animals through the sweating mechanism.

This article is compiled by Erastus Ngaruka, Technical Officer: Livestock within Agribank's Agri Advisory Services Division.

PUBLIC NOTICE BY BASHAN TECHNOLOGIES CC
APPLICATIONS FOR ENVIRONMENTAL CLEARANCE CERTIFICATE (ECC) FOR THE EPL No. 6702, LÜDERITZ DISTRICT, //KARAS REGION

BASHAN TECHNOLOGIES CC (the Proponent) hold mineral rights for base and rare metals, industrial minerals, precious metals, precious stones and semi-precious stones under the Exclusive Prospecting Licence (EPL) No. 6702 granted on 16/03/2018 and will expire on the 15/03/2021. The EPL No. 6702 area totalling 684 Ha is situated along the Orange River and fall within the Ai-/Ais-/Richtersveld Transfrontier Park. The proponent intend to undertake diamonds exploration and possible small-scale test mining activities over a very limited Areas of Interest as shown in yellow and marked 1-3 on the map below. The Areas of Interest marked 1-3 are not pristine and are already highly disturbed by previous diamond exploration and mining operations. The proponent intend to undertake prospecting using techniques such as geological mapping, trenching and bulk sampling followed by small scale test mining. The proposed prospecting and small-scale test mining activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the Regulations and cannot be undertaken without an Environmental Clearance Certificate (ECC). In fulfilment of the environmental requirements, the Proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr. Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and EMP Report in order to support the application for ECC. All Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed prospecting and small-scale test mining activities in the EPL No. 6702. Background Information Document (BID) is available upon registration.

REGISTER BY EMAIL: frontdesk@rbs.com.na or Contact Dr. Sindila Mwiya for more Information: smwiya@rbs.com.na, Mobile: 0811413229
DEADLINE FOR WRITTEN SUBMISSIONS IS:
FRIDAY 29th MARCH 2019

Risk-Based Solutions (RBS) CC (URL: www.rbs.com.na)
Resources (Oil, Gas, Minerals & Energy Exploration, Production & Mining) and Environmental Assessments (SEA, EIA, EMP, EMS) Specialist Consultants

PUBLIC NOTICE BY HEADSPRING INVESTMENTS
APPLICATIONS FOR ENVIRONMENTAL CLEARANCE CERTIFICATES (ECCs) FOR THE EPLs Nos. 6780-6783, GOBABIS DISTRICT, OMAHEKE REGION

HEADSPRING INVESTMENTS (Pty) Ltd (the Proponent) hold mineral rights for Nuclear Fuels under the Exclusive Prospecting Licences (EPLs) Nos. 6780-6783, all granted on the 12/02/2018 and will expire on the 11/02/2021. The individual EPLs sizes ranges between 95000-100000 Ha. The proponent intend to undertake prospecting for Nuclear Fuels using techniques such as aerial surveys, regional and local geological mapping, trenching, drilling and sampling. This exploration process will start with desktop and aerial studies, followed by ground reconnaissance of targets and detailed assessment if proves positive. No specific potential targets have so far been delineated in these EPLs Areas. Once a potential target has been delineated, the proponent will notify the land owner/s and request for permission to access the target/s area/s. Depending on the outcomes of the initial assessments, an Access Agreement may be negotiated with the land owner/s. The proposed prospecting activities are listed in the Environmental Management Act, 2007, (Act No. 7 of 2007) and the EIA Regulations 30 of 2012 and cannot be undertaken without Environmental Clearance Certificates (ECCs) for each EPL. In fulfilment of the environmental requirements, the Proponent has appointed Risk-Based Solutions (RBS) CC as the Environmental Consultant and led by Dr Sindila Mwiya as the Environmental Assessment Practitioner (EAP) to prepare the Scoping and Environmental Management Plan (EMP) Reports in order to support the applications for ECCs. All Interested and Affected Parties (I&AP) are hereby invited to register and submit written comments / objections / inputs with respect to the proposed prospecting activities in the EPLs Areas. A combined Background Information Document (BID) is available upon registration.

REGISTER BY EMAIL: frontdesk@rbs.com.na or Contact Dr Sindila Mwiya for more Information: smwiya@rbs.com.na, Mobile: 0811413229
DEADLINE FOR WRITTEN SUBMISSIONS IS:
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Figure 3.4: Copy of the Public Notice published Confidente Newspaper dated 7th – 13th March 2019.

3.3 Impacts Assessment Process

3.3.1 Evaluation of Impacts

In assessing the likely impacts that the proposed project activities (exploration) will have on the physical, biological, socioeconomic, cultural / archaeological environments and ecosystem functions, services, use values and non-use or passive use, the proposed exploration activities have been considered as the key sources of both negative and positive impacts. In evaluating the degree of potential impacts, the following factors will be taken into consideration:

(i) Impact Severity: The severity of an impact is a function of a range of considerations;

(ii) Likelihood of Occurrence (Probability): How likely is the impact to occur?

In evaluating the severity of potential environmental impacts, the following factors must be taken into consideration:

- Receptor/ Resource Characteristics: The nature, importance and sensitivity to change of the receptors / target or resources that could be affected;
- Impact Magnitude: The magnitude of the change that is induced;
- Impact Duration: The time period over which the impact is expected to last;
- Impact Extent: The geographical extent of the induced change, and;
- Regulations, Standards and Guidelines: The status of the impact in relation to regulations (e.g. discharge limits), standards (e.g. environmental quality criteria) and guidelines.

The overall impact severity has been categorised using a subjective scale as shown in Table 3.2 for magnitude, Table 3.3 for duration and Table 3.4 for extent.

Table 3.2: Scored on a scale from 0 to 5 for impact magnitude.

SCALE (-) or (+)		DESCRIPTION
0		No observable effect
1		Low effect
2		Tolerable effect
3		Medium high effect
4		High effect
5		Very high effect (devastation)

Table 3.3: Scored time period over which the impact is expected to last.

SCALE (-) or (+)		DESCRIPTION
T		Temporary
P		Permanent

Table 3.4: Scored geographical extent of the induced change.

SCALE (-) or (+)		DESCRIPTION
L		Limited impact on location
O		Impact of importance for municipality;
R		Impact of regional character
N		Impact of national character
M		Impact of cross-border character

3.3.2 Likelihood (Probability) of Occurrence

The likelihood (probability) of the pre-identified events occurring has been ascribed using a qualitative scale of probability categories (in increasing order of likelihood) as shown in Table 3.5. Likelihood is estimated on the basis of experience and/ or evidence that such an outcome has previously occurred. Impacts resulting from routine/planned events (i.e., normal operations) are classified under category (E).

Table 3.5: Summary of the qualitative scale of probability categories (in increasing order of likelihood).

SCALE (-) or (+)		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

3.3.3 Proposed Project Activities as Sources of Impacts

The results of the impacts assessment and evaluation will adopt a matrix framework similar to the Leopold matrix. Assessment results of the magnitude, duration, extent and probability of the potential impacts due to the proposed / ongoing project activities interacting with the receiving environment will be presented in form of a matrix table as shown in Tables 3.6 – 3.9.

The overall severity of potential environmental impacts of the proposed / ongoing project activities on the receiving environment will be of low magnitude (Table 3.6), temporally duration (Table 3.7), localised extent (Table 3.8) and low probability of occurrence (Table 3.9) due to the limited scope of the proposed activities and the use of step progression approach in advancing exploration.

The step progressional approach will allow the Proponent to the results of exploration success and the implementation of the next stage of exploration will be subject to the positive outcomes of previous activities as graded (Tables 3.6 – 3.9).

It is important to note that the assessment of the likely impacts to be assessed as shown in Tables 3.5 – 3.8, will be considered without the implementation of mitigation measures.

The need for implementation of the appropriate mitigation measures as presented in EMP report will be determined on the results of the impact assessment (Tables 3.6 – 3.9) and the significant impacts as detailed in Table 3.10.

Table 3.6: Example results presentation framework of the sensitivity assessment of the receptors (Physical, Socioeconomic and Biological environments) with respect to the proposed exploration / prospecting activities.

RECEPTOR SENSITIVITY		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data																
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data																
	(iii) Purchase and analysis of existing Government aerial hyperspectral																
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets																
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis																
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days																
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets																

SENSITIVITY RATING		CRITERIA
1	Negligible	The receptor or resource is resistant to change or is of little environmental value.
2	Low	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.
3	Medium	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance
4	High	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.
5	Very High	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.

Table 3.6 Cont.

RECEPTOR SENSITIVITY			PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
			Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
SENSITIVITY RATING		**CRITERIA**																
1	Negligible	The receptor or resource is resistant to change or is of little environmental value.																
2	Low	The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.																
3	Medium	The receptor or resource has low capacity to absorb change without fundamentally altering its present character, is of high environmental or social value, or is of national importance																
4	High	The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.																
5	Very High	The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.																
3. Initial Local Field-Based Activities		(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities																
		(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
		(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)																
		(iv) Possible Trenching (Subject to the outcomes of i - iii above)																
		(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)																
		(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets																
4. Detailed Local Field-Based Activities		(i) Access preparation and related logistics to support activities																
		(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities																
		(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
		(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above);																
5. Prefeasibility and Feasibility Studies		(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping																
		(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations																
		(iii) Geotechnical studies for mine design																
		(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities																
		(v) EIA and EMP to support the ECC for mining operations																
		(vi) Preparation of feasibility report and application for Mining License																

Table 3.7: Example results presentation framework of the scored time period (duration) over which the impact is expected to last.

RECEPTOR SENSITIVITY		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
SCALE / DESCRIPTION: T = Temporary; P = Permanent		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data																
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data																
	(iii) Purchase and analysis of existing Government aerial hyperspectral																
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets																
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis																
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days																
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets																

Table 3.7: *Cont.*

DURATION OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
SCALE / DESCRIPTION: T = Temporary; P = Permanent		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3. Initial Local Field-Based Activities	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities																
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)																
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)																
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)																
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets																
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities																
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities																
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above);																
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping																
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations																
	(iii) Geotechnical studies for mine design																
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities																
	(v) EIA and EMP to support the ECC for mining operations																
	(vi) Preparation of feasibility report and application for Mining License																

Table 3.8: Example results presentation framework of the scored geographical extent of the induced change.

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
SCALE / **DESCRIPTION**: L – limited impact on location; O – impact of importance for municipality; R – impact of regional character; N – impact of national character; M – impact of cross-border character		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data																
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data																
	(iii) Purchase and analysis of existing Government aerial hyperspectral																
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets																
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis																
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days																
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets																

Table 3.8: *Conti.*

GEOGRAPHICAL EXTENT OF IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3. Initial Local Field-Based Activities	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities																
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)																
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)																
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)																
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets																
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities																
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities																
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above);																
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping																
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations																
	(iii) Geotechnical studies for mine design																
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities																
	(v) EIA and EMP to support the ECC for mining operations																
	(vi) Preparation of feasibility report and application for Mining License																

SCALE		DESCRIPTION
L		limited impact on location
O		impact of importance for municipality
R		impact of regional character
N		impact of national character
M		impact of cross-border character

Table 3.9: Example results presentation framework of the qualitative scale of probability occurrence.

IMPACT PROBABILITY OCCURRENCE		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data																
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data																
	(iii) Purchase and analysis of existing Government aerial hyperspectral																
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets																
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis																
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days																
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets																

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

Table 3.9: *Cont.*

IMPACT PROBABILITY OCCURRENCE		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3. Initial Local Field-Based Activities	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities																
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)																
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)																
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)																
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets																
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities																
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities																
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above);																
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping																
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations																
	(iii) Geotechnical studies for mine design																
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities																
	(v) EIA and EMP to support the ECC for mining operations																
	(vi) Preparation of feasibility report and application for Mining License																

SCALE		DESCRIPTION
A		Extremely unlikely (e.g. never heard of in the industry)
B		Unlikely (e.g. heard of in the industry but considered unlikely)
C		Low likelihood (egg such incidents/impacts have occurred but are uncommon)
D		Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)
E		High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)

3.3.4 Assessment of the Overall Significant Impacts

3.2.4.1 Overview

The determination of the significance of the negative impacts of the sources shall be undertaken based on the environmental baseline results and the intensity of the likely negative impact. The assessment will be depending upon the degree to which the proposed development activities are likely to results in unwanted consequences on the receptor covering the natural environment such as the physical and biological environments. Overall, the assessment of significant impacts will focus on the ecosystem-based approach that considers potential impacts to the ecosystem as part of the receiving environment.

3.3.4.2 Summary of the Sources of Impacts

The main key sources of impacts that have will be used to determine significant impact posed by the proposed exploration activities comprised all the activities associated with filed-based activities such as trenching and drilling as well as the supporting campsite in the absence of any suitable accommodation or existing camping facility nearby. Each of the main sources of impacts will be evaluated against the receiving environment (receptor / pathways) (Table 3.10).

3.3.4.3 Determination of the Overall Likely Significant Impacts

In order to determine the overall significant impact of individual sources associated with the proposed exploration activities, an impact identification and assessment process will be undertaken as part of the EIA Process. The results of the overall likely significant impacts and key issues associated with the proposed activities / sources, exploration and supporting activities will be presented in form of matrix table as shown in Table 3.10.

The EIA impact identification and assessment processes will focus on the receiving environment (Physical, Biological and Socioeconomic) interaction approach with respect to the proposed project activities (exploration activities), the pathways and the likely targets or receptor that may be negatively impacted. In this process, components of the project activities that are likely to impact the receiving environment will be broken down into individual exploration activities (Table 3.10).

Table 3.10: Example results presentation framework of significant matrix impact assessment for the proposed exploration activities.

SIGNIFICANT IMPACT		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
1. Initial Desktop Exploration Activities	(i) General evaluation of satellite, topographic, land tenure, accessibility, supporting infrastructures and socioeconomic environment data																
	(ii) Purchase and analysis of existing Government high resolution magnetics and radiometric geophysical data																
	(iii) Purchase and analysis of existing Government aerial hyperspectral																
	(iv) Data interpretation and delineating of potential targets for future reconnaissance regional field-based activities for delineated targets																
2. Regional Reconnaissance Field-Based Activities	(i) Regional geological, geochemical, topographical and remote sensing mapping and data analysis																
	(ii) Regional geochemical sampling aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iii) Regional geological mapping aimed at identifying possible targeted based on the results of the initial exploration and regional geological, topographical and remote sensing mapping and analysis undertaken																
	(iv) Limited field-based support and logistical activities including exploration camp site lasting between one (1) to two (2) days																
	(v) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets for future detailed site-specific exploration if the results are positive and supports further exploration of the delineated targets																

IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	RECEPTOR CHARACTERISTICS (SENSITIVITY)				
	Very High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2 /5]	Minor 1/5
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]

Table 3.10: *Cont.*

SENSITIVITY		PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT				
		Water Quality	Physical infrastructure and Resources	Air Quality, Noise and Dust	Landscape Topography	Soil Quality	Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	Ecosystem functions, services, use values and non-Use or passive use	Local, regional and national socioeconomic settings	Commercial Agriculture	Community Protected Areas	Tourism and Recreation	Cultural, Biological and Archaeological Resources
3. Initial Local Field-Based Activities	(i) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during regional reconnaissance field activities																
	(ii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iii) Ground geophysical survey (Subject to the positive outcomes of i and ii above)																
	(iv) Possible Trenching (Subject to the outcomes of i - iii above)																
	(v) Field-based support and logistical activities will be very limited focus on a site-specific area for a very short time (maximum five (5) days)																
	(vi) Laboratory analysis of the samples collected and interpretation of the results and delineating of potential targets																
4. Detailed Local Field-Based Activities	(i) Access preparation and related logistics to support activities																
	(ii) Local geochemical sampling aimed at verifying the prospectivity of the target/s delineated during the initial field-based activities																
	(iii) Local geological mapping aimed at identifying possible targeted based on the results of the regional geological and analysis undertaken																
	(iv) Ground geophysical survey, trenching, drilling and sampling (Subject to the positive outcomes of i and ii above);																
5. Prefeasibility and Feasibility Studies	(i) Detailed site-specific field-based support and logistical activities, surveys, detailed geological mapping																
	(ii) Detailed drilling and bulk sampling and testing for ore reserve calculations																
	(iii) Geotechnical studies for mine design																
	(iv) Mine planning and designs including all supporting infrastructures (water, energy and access) and test mining activities																
	(v) EIA and EMP to support the ECC for mining operations																
	(vi) Preparation of feasibility report and application for Mining License																

IMPACT SEVERITY (Magnitude, Duration, Extent, Probability)	RECEPTOR CHARACTERISTICS (SENSITIVITY)				
	Very High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2 /5]	Minor 1/5
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]

3.4 Specific Mitigation Measures

Based on the key issues identified in Table 3.1, the following is the outlined of the indicative specific mitigations that must be prepared for the proposed exploration programme activities and in particular for the ***field-based exploration activities***:

(i) Mitigation measures for preventing flora destruction;

(ii) Mitigation measures for preventing faunal destruction;

(iii) Mitigation measures to be implemented with respect to the exploration camps and exploration sites;

(iv) Mitigation measures for vehicles movements and access tracks management;

(v) Mitigation measures for ground surface and groundwater protection as well as general water usage;

(vi) Mitigation measures to enhance positive socioeconomic impacts;

(vii) Mitigation measures to minimise negative socioeconomic impacts;

(viii) Mitigation measures to minimise health and safety impacts;

(ix) Mitigation measures to minimise visual impacts;

(x) Mitigation measures to minimise noise impacts;

(xi) Mitigation measures for waste (solid and liquid) management;

(xii) Identification and assignment of key roles and responsibilities for implementing the EMP, and;

(xiii) Others to be identified during the public consultation process and preparation of the EIA and EMP Report.

3.5 Structure of the EIA and EMP Reports

The following is the indicative summary structure outlines of the EIA and EMP reports to be prepared by the EAP in support of the application for ECC with respect to the proposed exploration activities in the EPL 6688:

(i) ENVIRONMENTAL ASSESSMENT REPORT:

- **Section 1: Background** covering the proposed project location with available infrastructure and services;
- **Section 2: Project Description** covering the summary of the proposed project exploration activities;
- **Section 3: Regulatory Framework** covering the proposed exploration with respect to relevant legislation, regulations and permitting requirements;
- **Section 4: Receiving Environment** covering physical, biological and socioeconomic environments of the proposed project area;
- **Section 5: Impact Assessment** covering the likely positive and negative impacts the proposed project activities are likely to have on the receiving environment;

- **Section 6: Conclusions and Recommendations**- Summary of the findings and way forward.

(ii) **ENVIRONMENTAL MANAGEMENT PLAN (EMP) REPORT**:

- **Section 1: Background** covering the proposed project location with available infrastructure, regulations, project motivation, summary of the environmental assessment and assessment assumptions and limitations;

- **Section 2: Implementation of the EMP** covering roles and responsibilities of the proponent, HSE team and Contractors;

- **Section 3: Specific Mitigation Measures** describing the detailed mitigation measures with respect to the identified likely impacts, and;

- **Section 4: Rehabilitation and Monitoring** covering rehabilitation options and performance monitoring and reporting.

BID END …….